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Percutaneous Radio-Guided Chemical Ablation with Absolute Ethanol of Cystic and Solid Lesions in Kinshasa Hospital Environments

By Frederick Tshibasu Tshienda, Dr. Rémy Kapongo Yobo, Dr. Magloire Atantama, Pascal Bayauli Mwasa, Charles Mbendi Lombi, Doudou Batumbo Boloweti, Jean-Marie Kayembe Ntumba & Jean-Marie Mbuyi Muamba

University of Kinshasa

Summary- *Introduction:* The main objective of the present study is to evaluate the therapeutic effectiveness and safety of percutaneous radio-guided chemical ablation with absolute ethanol (96%) in the therapeutic management of cystic and solid lesions. benign localization: thyroid classified EU-TIRADS 2, parathyroid, hepatic, renal, inguino-scrotal, ovarian as well as osteoarticular.

Keywords: *percutaneous radio-guided, chemical ablation, absolute ethanol, cystic lésions, solid lesions.*

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Strictly as per the compliance and regulations of:

Percutaneous Radio-Guided Chemical Ablation with Absolute Ethanol of Cystic and Solid Lesions in Kinshasa Hospital Environments

Frederick Tshibasu Tshienda [α], Dr. Rémy Kapongo Yobo [σ], Dr. Magloire Atantama [ρ], Pascal Bayauli Mwasa [ω], Charles Mbendi Lombi [¥], Doudou Batumbo Boloweti [§], Jean-Marie Kayembe Ntumba [χ] & Jean-Marie Mbuyi Muamba [ν]

Summary- Introduction: The main objective of the present study is to evaluate the therapeutic effectiveness and safety of percutaneous radio-guided chemical ablation with absolute ethanol (96%) in the therapeutic management of cystic and solid lesions. benign localization: thyroid classified EU-TIRADS 2, parathyroid, hepatic, renal, inguino-scrotal, ovarian as well as osteoarticular.

Materials and Methods: Eighty patients were included in the present study. Ages ranged from six to seventy-five. After ultrasound reassessment, psychological preparation, premedication and local anesthesia; we perform a puncture-drainage of the lesion under strict ultrasound guidance with good visualization of the bevel, followed by rinsing for certain lesions and injection of 96% ethanol. The volume of ethanol injected was obtained by calculating 10 to 20% of the overall volume of the lesion. We performed one to three sessions of Sclerotherapy on our patients, particularly on D1-D4 and D7. We studied the effectiveness of sclerotherapy through the complete drying of the lesion, the reduction of the lesion volume to more than 50% of the initial volume as well as the disappearance of the pain. As for recidivism; it was evaluated by the persistence of pain, the persistence or reappearance of the cystic lesion with a residual volume estimated at more than 50%.

Results: Out of eighty patients listed; We recorded 46.2% men and 53.8% women, with a sex ratio of 0.83%. The age of the patients was between 6 -75 years with an average age of 43.5±17.5 years. The youngest patient was 6 years old and the oldest 75 years old. The 37-47 age groups were the most represented with 26.3%. The majority of women were aged between 26-36 and 37-47 years, respectively 27.5% of the entire workforce. In addition, 17.5% of men were aged between 48-58 years. Nearly 55% of our patients consulted for cervical swelling; on an anatomopathological level; almost 64% of our patients had an inflammatory smear. 42.5% of the lesions treated were of thyroid location and the number of alcohol sessions depended on the organ treated, the content of the alcoholic lesion, gender without forgetting the volume of the alcoholic mass. Radiologically, the success rate was 95%, apart from one treatment failure in four patients who were asymptomatic. No complications; haemorrhagic or infectious has been encountered; except for one case of hypoglycemic shock, which was quickly corrected.

Conclusion: Ethanol 96% is an effective liquid sclerosing agent treating benign cystic lesions: thyroid EU-TIRADS2, parathyroid, hepatic, renal Bosniak Ia, osteoarticular, inguino-scrotal as well as ovarian. Given the ease of obtaining ethanol in sub-Saharan hospital environments; Kinshasa in particular, the simplicity of the procedure, the low morbidity rate and its effectiveness; obliges us to recommend percutaneous ethanol sclerotherapy as a treatment of first choice instead of other complex percutaneous ablation techniques. The average volume of ethanol used was 12.85 ml; the largest volume of ethanol was 40 ml and the smallest volume was estimated at 2 ml. The average volume of treated lesions was 106.12 ml, the smallest lesion volume was 4 ml, and the large volume was 814 ml.

Keywords: percutaneous radio-guided, chemical ablation, absolute ethanol, cystic lésions, solid lesions.

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I. Introduction

Percutaneous ethanol sclerotherapy is a chemical ablation technique designed primarily for recurrent cystic lesions (1). Alcohol (96%) is the most widely used alcoholic agent, abrading the walls of the liquid lesion and sclerosing the vessels, thus promoting lesion sclerotization. If the liquid is purely colloidal, it is evacuated with a large-gauge needle (14-gauge in our series), then a moderate quantity of alcohol is injected, all of which is withdrawn a few minutes later (2). If the extracted fluid is hematic, the lesion cavity may need to be rinsed one or more times with saline, followed by injection of absolute ethanol, which is then partially re-injected. In cases where the thick partitioned liquid is difficult to evacuate with a large-gauge needle, it can be

dissolved by injecting small quantities of absolute ethanol into several areas of the cystic lesion; 2 to 4 days later, the colloidal liquid is fluidized and ready for evacuation or sclerotherapy. In most cases, the procedure is painless. A slight burning pain may be felt when the ethanol is injected and the needle withdrawn, prompting some operators to inject a small amount of 1% lidocaine before withdrawal. This treatment is highly effective, particularly for cysts, with efficacy in excess of 80-90%.Complications are rare and reversible: thyroid recurrent paralysis, when alcohol leaks out of the thyroid nodule. The patient must be informed of this and, if necessary, asked to sign an informed consent form. This treatment, unjustly ignored in many countries, benefits from a consensual recommendation in the management of cystic thyroid nodules: ETA European Thyroid Association and ATA American Thyroid Association (3) for all thyroid nodules.

II. Materials and Methods

a) Framework of the Study

The present study was carried out in five hospital institutions in Kinshasa, capital of the Democratic Republic of the Congo; the first of which was at tertiary level; the Cliniques Universitaires de Kinshasa (CUK) and four others at primary level: Center de diagnostic spécialisé et d'imagerie Interventionnelle (CDSII), Hôpital de Kingasani II (HSK II), Clinique la Vie (CV) and Clinique Pistis médical center (PMC) all in Kinshasa. All these data were collated at CUK, the leading institution of higher education and university in the Democratic Republic of Congo (DRC), located on Mont-Amba, in the Commune of Lemba. They occupy a surface area of 27110 m2 and can be accessed via two routes: Avenue de l'Université and Avenue de la Foire at Rond-Point-Ngaba.

b) Study Type

This was a descriptive, observational, multicenter study conducted over a six-year period, from April 01, 2018 to April 01, 2024.2. 2 Study participants and design the present work was a descriptive cross-sectional study evaluating the efficacy and safety of percutaneous ethanol sclerotherapy in the treatment of thyroid, hepatorenal, articular and inguino-scrotal cystic lesions through a series of eighty consecutive patients collected in hospital settings in Kinshasa, between April 2018 and April 2024, a period of 6 years. Included in the present study were all patients, regardless of nationality, male or female, of any age, referred for management of a symptomatic cystic lesion in the following locations: thyroid, hepatic, renal, articular, ovarian and inguino-scrotal; carrying images of examinations performed on cliché or on a CD Room with an ultrasound, scan and/or MRI report. All patients were managed according to the pre-established protocol (on D1-J4 and D7). Four ultrasound scanners with linear and convex probes were used. These included two sonoscape light machines, one Phillips U-22 machine and a third Edan machine. These examinations were carried out in triplex Doppler mode. In addition to ultrasound scanners, two CT scanners were used, including a HITACHI 16-bar Eclos model, commissioned in 2011. CT scans were performed on the kidney and liver. These were performed before and after injection of the contrast medium. All examinations were performed in low-dose mode. Patients with solid cystic lesions, symptomatic cystic lesions involving organs not included in the present study, and patients who did not freely adhere to treatment after radiological consultation, were excluded from the study.

c) Radiological Technique

After skin disinfection of the area of interest with Betadine, we proceeded to puncture-evacuate the cystic contents, using an 18/14 Gauge coaxial depending on the lesion content. Lesion volume and content appearance were strictly studied. When the liquid returned as hematic, the patient received three sessions of sclerotherapy; when the liquid was clear, the patient received one or two sessions of sclerotherapy. Once the entire lesion had been evacuated, 96% ethanol was injected through the co-axial left in place. The amount of ethanol injected was calculated at 15-20% of the initial overall volume of the cystic lesion to be treated. The instilled sclerosant was left in place for a few minutes (10 to 20 minutes) before being removed. The liquid was then rinsed and reaspirated, before a small ice bag was placed on the skin for 5 to 10 minutes. At the end of the procedure, a dry, compressive dressing was applied and a short clinical monitoring period of 40 to 60 minutes was used to detect any early complications. Pain after sclerotherapy was assessed at 1st check-up using a visual analogue scale (VAS) ranging from 0 (no pain) to 10 (intense unbearable pain). All patients underwent local anaesthesia and antibiotic prophylaxis. Patients who received all three sessions were treated on day 1, day 4 and day 7. All patients were reviewed at one month, 3 months, 6 months and one year after the first sclerotherapy session. An interview concerning the immediate and delayed after-effects of sclerotherapy was completed at each radiological consultation. The final efficacy of chemical ablation was defined by the absence of cyst reconstitution, the disappearance of pain, and the persistence of a residual quantity of less than 50% of the initial volume at the 1-month follow-up ultrasound. However, in the event of recurrence after two sessions, a third session was systematically performed. In the event of refusal or non-compliance, the patient was referred to the referring physician.

d) Data Organization and Statistical Analysis

Study data were represented by socio-demographic, clinical, ultrasound and histological variables. Data were organized and encoded in Excel

version 2010. R software version 4.1.3 was used for statistical analysis of the study data. Variables were summarized by numbers and proportions, then presented in tables and graphs. A multivariate logistic regression model was used, with the number of drinking sessions of the subject as the dependent variable, using several independent variables (histology, location of the mass, sex of the subject and volume of the mass).For each independent variable, the Odds Ratio and its confidence interval at the 0.05 level of significance were calculated.

III. Results

Eighty patients were enumerated during the study period, 46.2% male and 53.8% female, giving a sex ratio of 0.83% (Table 1). Patient age ranged from 6 to 75 years, with an average age of 43.5±17.5 years (Table 1). The youngest patient was 6 and the oldest 75 (Table 1). The 37-47 age group was the most represented with 26.3% (Table 1). The majority of women were between the ages of 26-36 and 37-47, representing 27.5% of the total workforce (Table 1). A further 17.5% of men were aged between 48 and 58 (Table 1). With regard to the clinical characteristics of the patients, it should be noted that almost 55% of the patients had presented a cervical swelling on physical examination, of whom twenty-four were female and twenty male (Tables 2 and 4).10% of the patients in our sample had presented a sensation of a mass on the left flank as a clinical complaint. Similarly, 5% of males and 5% of females had presented epigastric tenderness as a clinical complaint (Tables 2, 4). The distribution of patients according to anatomopathological findings showed that 64% of patients referred for sclerotherapy presented an inflammatory smear after cytological analysis of the puncture-drainage fluid (Table 3); 15% of patients in the series presented benign lesions with no signs of atypia, and 2.5% presented a hemorrhagic smear with no atypical cells after cytological assessment. (Table 3).In relation to the distribution of organs treated, 42.5% of lesions treated were thyroid lesions, 32.5% renal lesions, 12.5% liver lesions, 7.5% breast lesions and 5% parotid lesions. (Table 5). The search for factors linked to the number of alcohol sessions carried out per patient revealed that the number of alcohol sessions depended on the type of organ alcoholized, the content of the alcoholized lesion (whether hemorrhagic or purely clear liquid), the patient's sex and, of course, the volume of the alcoholized mass. (Tables: 5, 6, Figure: 1) The relationship between the number of sclerotherapy sessions, the organs treated, the alcohol lesion and the patient's sex, clearly shows that the number of sclerotherapy sessions was increased to two or three for the same patient, when faced with the following situations: a larger lesion volume, a female subject, a hemorrhagic lesion content, or when the lesion treated was intrahepatic (Figure: 1). A comparison of the number of sclerotherapy sessions with the sex and age of patients by organ clearly shows that the number of sessions was very different for the different organs, although not significantly different by sex between patients by organ. However, the age of patients differed according to the organs affected. (Tables: 4, 6).

IV. Discussion

From April 1, 2018 to April 1, 2024, eighty patients underwent percutaneous sclerotherapy of their lesions using absolute ethanol in hospital settings in Kinshasa. A minimum follow-up period of six months to one year was required to evaluate our results. Sclerotherapy is an ancient technique involving the injection of a cytotoxic solution into a lesion to induce localized necrosis. Absolute ethanol sclerotherapy, or alcoholization, involves injecting highly concentrated ethanol (generally between 90 and 100%) over a period of a few minutes. Recent advances in minimally invasive techniques have led to the development of alternatives to open or laparoscopic surgery for the treatment of simple, symptomatic cysts in several organs. Simple puncture of these cysts without a sclerosing agent was associated with significant recurrence of up to 80% ⌈4⌋. Ethanol 99% was more widely used because it leads to rapid destruction of the secretory epithelium (1-3 min), while crossing the fibrous cyst shell very slowly (4-12 hours) and resulting in minimal local or systemic side effects. The most frequent intraoperative complication with this technique remains the risk of bleeding (4-10%). Post-operative infectious complications can reach 10% ⌈5⌋. None of these complications (hemorrhage or infection) were encountered in our series. We did, however, record one case of hypoglycemic shock, which was rapidly corrected with hypertonic saline at a rate of 1ml per kg of body weight. The latter was probably caused by a prolonged fasting period prior to the procedure. In all cases, the most frequent complication encountered in the present series was the sensation of burning during ethanol injection. In the present series, ethanol was used predominantly (100%), unlike other sclerosing agents such as Betadine and 75% alcohol, sodium tetradocylsulfate, hydroxypolyethoxydodecane, tetracycline and others. The average volume of ethanol used in the present series was 12.85 ml; the largest volume of ethanol was 40 ml and the smallest volume was estimated at 2 ml. The average volume of lesions treated was 106.12 ml, the smallest lesion volume was 4 ml, and the largest volume was 814 ml. Several lesion locations were included in the present series, including: thyroid head location with 42.5%, renal with 32.5%, hepatic with 12.5%, mammary with 7.5% and others with 5% (parotid, ovarian, inguino scrotal and osteo articular). This corroborates literature data, insofar

as when this technique was first published in Japan by Akamatsu et al. in 1988; several benign cystic lesions treated had been reported among others: thyroidiennes, parathyroid, splenic, hepatic and renal with good efficacy ⌈6-7⌋. In relation to the frequency of organs treated in the present study, it is established that thyroid nodules were the most treated to the tune of 42.5%. It should be noted; that thyroid nodules are common, clinically palpable lesions with a prevalence of 4-7% in the general population [1-3]. However, this prevalence increases to 20-76% on ultra sonographic examination [1-3]. Percutaneous sclerotherapy has been suggested as an effective alternative, particularly in patients with cystic nodules [1-3]. Simple (purely cystic) cysts, constituting 6-28% of all thyroid nodules, are usually benign, filled with cellular debris or blood, and are the result of degeneration or hemorrhage in a hyperplastic nodule. However, data on the results of percutaneous aspiration and ethanol injection (PEI) in resolving thyroid nodules is highly variable in different studies (success rate: 38-85%), which may be due to the different populations studied and the heterogeneous nature of the thyroid nodules evaluated [1-3]. With regard to socio-demographic characteristics, we noted a predominance of women (53.8%) versus men (46.3%), giving a sex ratio of 0.83%. The 37-47 age group was the most represented, with 26.3%. The majority of women were between the ages of 26-36 and 37-47, representing 27.5% of the total workforce. Seventeen-point five percent of men were aged between 48 and 58. From the above, the majority of patients treated in the present study were relatively young women. This may be explained by the fact that the most frequent location of lesions treated was the thyroid. Thyroid nodules are common, clinically palpable lesions, with a prevalence of 4-7% in the general population [2,3]. However, this prevalence increases to 20-76% on ultra sonographic examination [2,3].[2] This hypothesis contradicts the appearance of renal cystic lesions, bearing in mind that their incidence increases progressively with age. In Terrada's study, their incidence rose from 5.1% in the fourth decade to 36.1% in the eighth decade, a seven-fold increase [8]. Their prevalence was 22% in a control population over 70 years of age [9]. In relation to the clinical characteristics of the patients, it should be noted that almost 55% of patients had presented with an ante cervical swelling on physical examination, of whom twenty-four were female and twenty male (Tables V and VI). The predominance of ante cervical swelling in the present series, perhaps explained by the fact that the majority of lesions treated were of thyroid ⌈10⌋ location. The distribution of patients according to anatomo-pathological findings reveals that more than half of the patients in the present series (64%) had an inflammatory smear on cytological analysis (Table VII); 15% of patients had benign lesions with no signs of atypia, and 2.5% of patients had a haemorrhagic smear with no atypical cells. (Table VII). These data may be justified by a rigorous selection of patients for percutaneous ethanol sclerotherapy. In relation to the distribution of alcoholic lesions by organ, 42.5% of lesions treated were thyroid lesions, while 32.5% of lesions treated were kidney lesions, 12.5% of lesions treated were liver lesions, 7.5% of lesions treated were breast lesions and 5% of lesions treated were parotid lesions. (Table 12). Research into the factors linked to the number of alcohol treatment sessions carried out per patient revealed that the number of alcohol treatment sessions depended on the type of organ treated, the content of the lesion treated (whether thick, haemorrhagic or purely liquid), the sex of the patient and the volume of the cystic mass treated. (Table), 13, Figure 1). Research into the relationship between the number of sclerotherapy sessions, the volume of the lesion to be treated and the patient's sex, shows that the number of sessions during sclerotherapy was increased to two or three sessions for the same patient, when the lesion volume was greater, either when the subject treated was female, or when the lesion content was hemorrhagic, or when the lesion to be treated was located in the liver. (Figure 1); this could be explained by the liver's rich portal and vascular network, likely to cause ethanol to leak out, thus reducing its volume, with a consequent loss of efficacy. A comparison of the number of sclerotherapy sessions with the sex and age of patients by organ shows that the number of sessions was very different for the different organs, with no significant difference in sex between patients by organ. However, the age of patients differed according to the organs affected. (Table 13). According to some studies, including Hanna's, a single injection of ethanol would achieve total cyst regression in only 10-70% of cases [10,14], especially if the cystic volume was large. Repeated injections would significantly improve complete regression ⌈11⌋ as would catheter drainage for 24 hours ⌈12- 13-14⌋. The combination of the latter two options (puncture drainage followed by a second or third alcoholization) was chosen in our study for large cysts (>300 ml); having a greater risk of poor regression or recurrence. In the present series, four of our patients had recurred. There are no studies in the literature evaluating the volume at which a second early instillation of ethanol is worthwhile. The 300 ml threshold for defining a large cyst has been set arbitrarily. Many studies use a regression of more than 50% or more than 60% of the cyst from its initial size as a criterion for success. ⌈15-16⌋. We have chosen as a success criterion a volumetric regression > 50% from the initial size and as a failure a recurrence > 50% from this initial size. Only two patients had incomplete regression, and two others had reconstitution of the cystic mass. Had the volume criterion been used instead of size, their regression would have been classified as successful. In fact, the volume reduction criterion produced much greater differences than the cyst size reduction criterion,

unfortunately in the present case; we therefore chose to keep the former criterion. The results of this study in terms of volume regression were similar to those observed in the literature, and slightly better in terms of recurrence rate. This could be explained by the systematic nature of a second and/or third alcoholization for cysts at higher risk of recurrence (very large: here, an arbitrary threshold of 300 ml was chosen). However, only 4 patients underwent this specific treatment, and a larger number of patients with large cysts would need to be treated in order to confirm these data. The four patients with incomplete regressions had large cystic volumes (> 600 mL). However, as we have seen, all patients had resolution of cyst-related symptoms. Although the radiological success rate was 95%, the four patients concerned by a therapeutic failure were asymptomatic. The disappearance of cyst-related symptoms also raises the question of whether a second or third operation is justified. Like Hahn ⌈17⌋. We were able to observe in patients with repeated and early ultrasound controls (controls at 1 month, 3 months, 6 months and one year for some patients) that the decrease in cyst size seems to have continued until the sixth month before stabilizing and with no continuation of regression beyond twelve months. The median follow-up time was 3.97 years, which seemed sufficient to assess efficacy, even if the majority of patients had a follow-up time of less than one year.

V. Conclusion

Radio-guided percutaneous chemical ablation of benign and symptomatic cystic lesions using 96% ethanol should be considered a credible alternative to surgery in the various interventional radiology units in the DRC. It's a simple, minimally invasive technique that can be performed on an outpatient basis under local anaesthetic; it's effective in the medium and long term, inexpensive and enables rapid return to work. It can be recommended even after a recurrence, and does not contraindicate a possible surgical intervention in cases where it is recommended. In the present study, we made the following observations: a predominance of females (53.8%), with a sex ratio of 0.83%, an average age of 43.5±17.5 years, predominantly in the 37-47 age bracket, a predominance of antecervical swelling on physical examination in 55% of cases, cytological examination predominated by inflammatory smears and benign lesions with no signs of atypia on anatomopathological examination, thyroid localization of treated lesions predominated in 42. 5%, an estimated efficacy of 95% (4 cases of recurrence, all of hepatic location) and no major complications following treatment. The ideal dose of ethanol in the present series was calculated on the basis of the initial volume of the lesion treated (10 to 20% of the initial volume). The good results obtained in the present series are long-lasting, at the cost of rare complications, with a satisfactory cost-effectiveness ratio. The efficacy and safety of these techniques are the result of a rigorous selection of patients to be treated, and the proven expertise of our team. In the present series, ethanol was used in the majority of cases, unlike other sclerosing agents. The average volume of ethanol used was 12.85 ml; the largest volume of ethanol was 40 ml and the smallest volume was estimated at 2 ml. The average volume of lesion treated was 106.12 ml, the smallest volume was 4 ml, and the largest volume was 814 ml. Several lesion locations were included in the present series, including thyroid (42.5%), kidney (32.5%), liver (12.5%), breast (7.5%) and others (5%) (parotid, ovarian, inguino-scrotal and osteoarticular). (Table 12). This corroborates the data in the literature, insofar as when this technique was first published in Japan by Akamatsu et al. in 1988, several benign cystic lesions were reported to have been treated, including thyroid, parathyroid, splenic, hepatic and renal lesions, with good efficacy. Limitations of the present study: The sample size, the average follow-up time, not to mention the fact that the initial volume was calculated using the formula for calculating the volume of a sphere (4/3 Rˆ3), probably overestimating the actual volume. In fact, the radiological diameter measured is the maximum diameter, whereas cysts are rarely perfectly spherical. This may explain the discrepancy between the calculated mean initial volume and the aspirated cystic volume. A three-dimensional CT measurement (in a prospective study) would enable a much more accurate volumetric calculation according to the method of Seoet al. ⌈18⌋. Protection of human and animal rights: The authors state that this study did not involve subject or animal experimentation.

Confidentiality of Data: The authors declare that this study does not contain any personal data that could identify the patient or subject.

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Table 1: Patient Distribution by Gender and Age Group

Age	Gender		Total n (%)
	F	M	
≤ 25	5	2	7 (8,75)
26-36	11	4	15 (18,75)
37-47	11	10	21 (26,25)
48-58	5	14	19 (23,75)
59-69	9	0	9 (11,25)
≥ 70	2	7	9 (11,25)
Total	43	37	80 (100)

Table 2: Distribution of Patients According to Clinical, Ultrasound Indications AAD Sex

	Sex		Total
Clinical indications	F	M	
History of pancreatitis	0	2	2(2,5)
Left flank pain	0	2	2(2,5)
Right flank pain	0	2	2(2,5)
Epigastric pain	4	0	4(5)
Left lower back pain	0	2	2(2,5)
Left hypochondralgia	0	2	2(2,5)
Renitent retro popliteal mass	1	1	2(2,5)
Left breast mass	2	0	2(2,5)
Focus on low back pain	2	0	2(2,5)
Sensation of a mass in the left liver	4	4	8(10)
Sensation of a mass under the right Angulo mandibular	2	0	2(2,5)
Epigastric and left flank tenderness	2	0	2(2,5)
Cervical swelling	24	20	44(55)
Right inguinal swelling	0	2	2(2,5)
Renitent swelling of the left elbow	2	0	2(2,5)
Total	43	37	80(100)
Ultrasound indications			
Large lobar nodule classified TIRADS 4	4	0	4(5)
Right retro popliteal cyst	1	1	2(2,5)
Cystic mass of left liver	2	0	2(2,5)
Cystic mass under rightAngulo mandibular	2	0	2(2,5)
Solid cystic mass of the left liver	0	4	4(5)
Left lobar isthmo nodule	1	1	2(2,5)
Left lobar toto thyroid nodule with degeneration range	1	1	2(2,5)
No ultrasound information	30	30	60(75)
Recurrence of a cystic mass of the left liver	2	0	2(2,5)
Total	43	37	80(100)

Table 3: Distribution of Patients According to Pathological Information and Sex

	Sex		Total
	M	F	
Adenofibroma without signs of atypia	0	2	2(2,5)
benign	5	7	12(15)
Hemorrhagic smear	0	2	2(2,5)
Inflammatory smear	32	32	64(80)
Total	37	43	80(100)

Table 4: Crossed Clinical, Ultrasound and Histological Indications

	Histologie				Total
	Adenofibrome sans signe d'atypie	Benin	Frottis hémorragique	Frottis inflammatoire	
Indications échographiques					
Gros nodule toto lobaire gauche classé TIRADS 4	0	2	2	0	4(5)
Kyste rétro poplité droit	0	2	0	0	2(2,5)
Masse kystique du foie gauche	0	0	0	2	2(2,5)
Masse kystique sous angulo mandibulaire droite	0	0	0	2	2(2,5)
Masse solido kystique du foie gauche	0	0	0	4	4(5)
Nodule isthmo lobaire gauche	0	2	0	0	2(2,5)
Nodule thyroïdien toto lobaire gauche avec plage de dégénérescence	0	2	0	0	2(2,5)
Pas de renseignements échographique	2	4	0	54	60(75)
Récidive d'une masse kystique du foie gauche	0	0	0	2	2(2,5)
Total	2	12	2	64	80(100)
Indications cliniques					
Antécédents de pancréatite	0	0	0	2	2(2,5)
Douleur au flanc gauche	0	0	0	2	2(2,5)
Douleur du flanc droit	0	0	0	2	2(2,5)
Douleur épigastrique	0	0	0	4	4(5)
Douleurs lombaires gauches	0	0	0	2	2(2,5)
Hypochondralgie gauche	0	0	0	2	2(2,5)
Mase rénitente retro poplité	0	2	0	0	2(2,5)
Masse du sein gauche	2	0	0	0	2(2,5)
Mise au point de lombalgie	0	0	0	2	2(2,5)
Sensation d'une masse du foie gauche	0	0	0	8	8(10)
Sensation d'une masse sous angulo mandibulaire droite	0	0	0	2	2(2,5)
Sensibilité épigastrique et au flanc gauche	0	0	0	2	2(2,5)
Tuméfaction cervicale	0	6	2	36	44(55)
Tuméfaction inguinale droite	0	2	0	0	2(2,5)
Tuméfaction rénitente du coude gauche	0	2	0	0	2(2,5)
Total	2	12	2	64	80(100)

Table 5: Frequency of Alcohol use by Organ

Organs	Workforce	Percentage
Liver	10	12,5
Parothyroid	4	5,0
Kidney	26	32,5
Breast	6	7,5
Thyroid	34	42,5
Total	80	100,0

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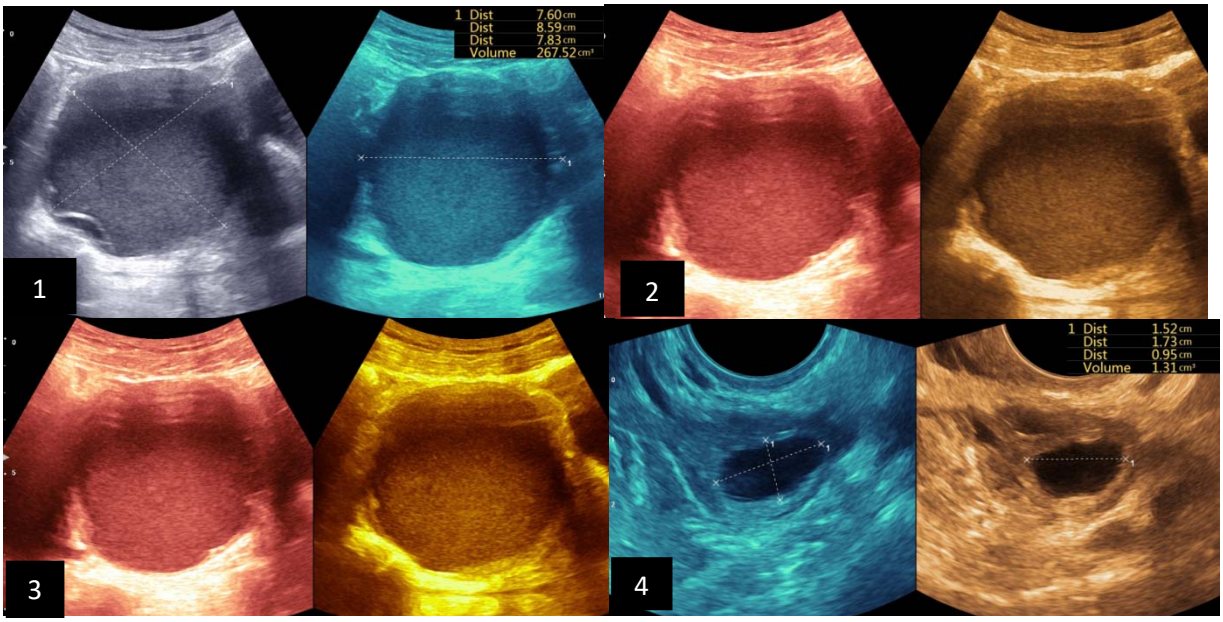
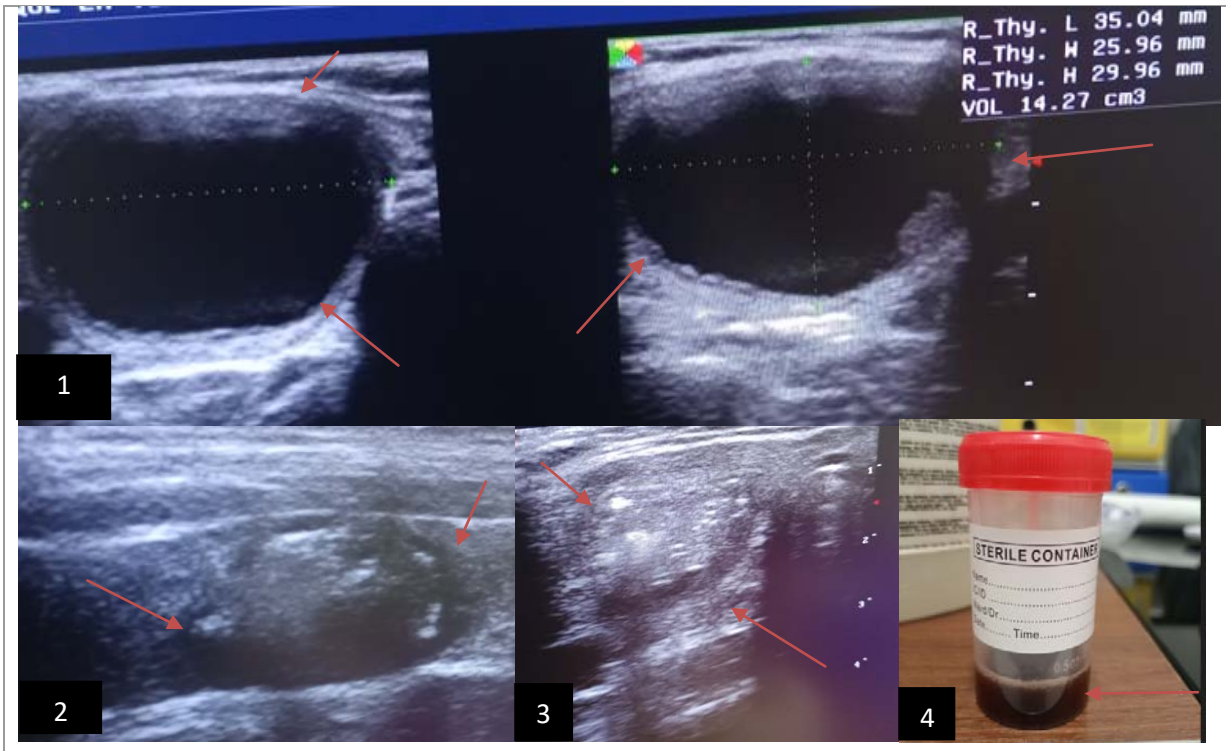
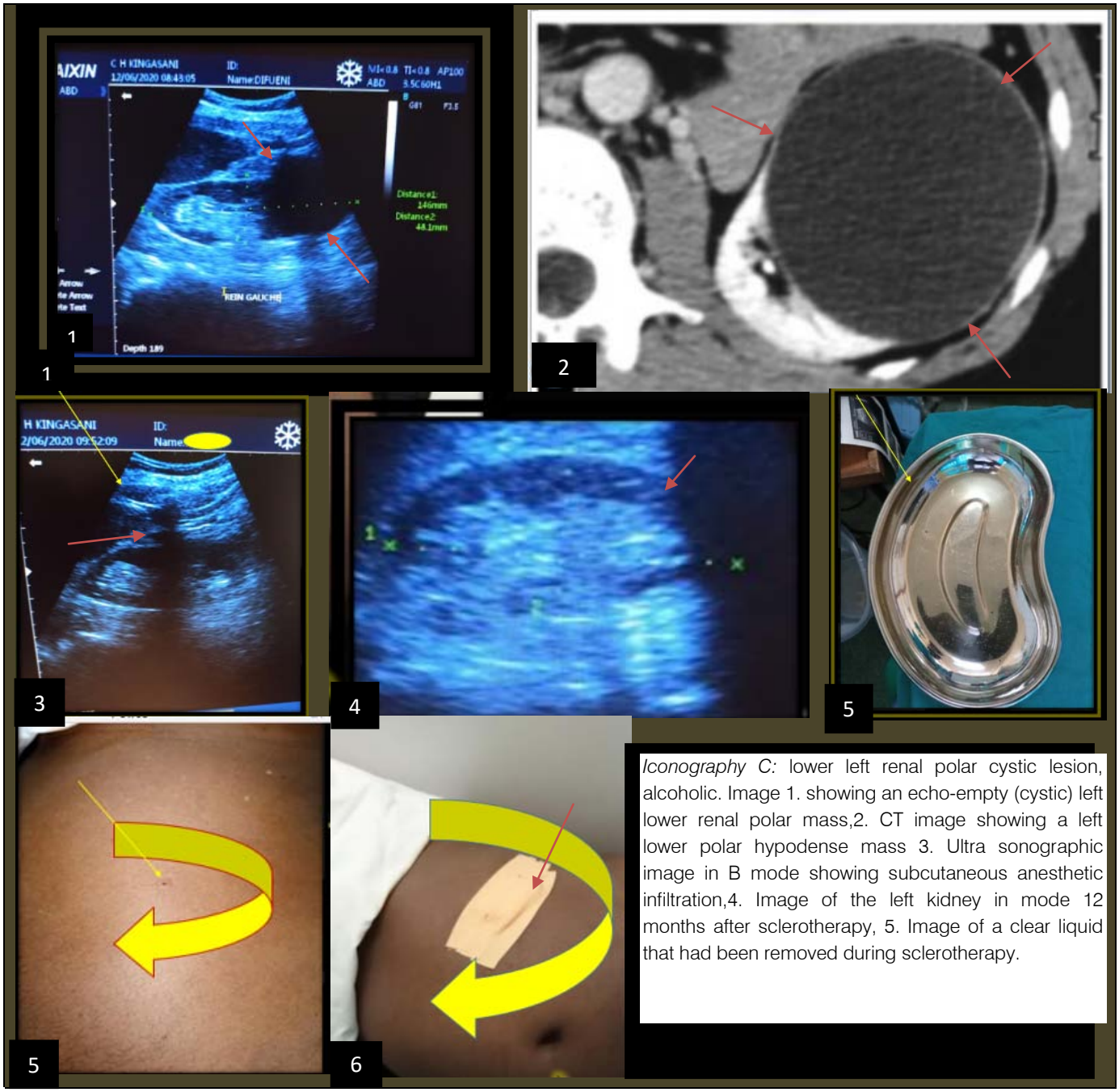
Iconographies





Iconography A: 1. Ultrasonographic image in B mode, showing a uniloculated cyst, EU-TIRADS 2 of 14.27 ml before sclerotherapy; 2. Ultrasonographic image in B mode after first sclerotherapy session, 3. Ultrasonographic image in B mode, after the second sclerotherapy session, showing complete drying of the cystic nodule, 4. image showing the sero-hematic content of the drained and alcoholic cyst.

Iconography B: Patient with a 108 ml right isthmo-lobar thyroid hematocele during the first drinking session. A. Materials used before sclerotherapy, B. Image showing a right anterior and lower cervical swelling, Ultra sonographic image: showing a hypoechoic mass dotted around the partitions of 108 ml, D. image showing after ultrasound-guided puncture showing hematic content in the syringe, E. Ultra sonographic image in B mode, showing linear hyper echogenicity of the needle.



Iconography C: lower left renal polar cystic lesion, alcoholic. Image 1. showing an echo-empty (cystic) left lower renal polar mass,2. CT image showing a left lower polar hypodense mass 3. Ultra sonographic image in B mode showing subcutaneous anesthetic infiltration,4. Image of the left kidney in mode 12 months after sclerotherapy, 5. Image of a clear liquid that had been removed during sclerotherapy.

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Improving Quality of Life in Children with Cerebral Palsy through Animal Assisted Therapy with Ponies

By Ana Stela Fonseca

Abstract- Animal Assisted Therapy (AAT) the therapy that use animals to help in the treatment of humans, has been shown to be an important tool to help to improve quality of life, self-steem, self-image, emotional awareness, developed communication skills, reducing anxiety and aggressivity1,2,3,4,5. Hippotherapy (called Equoteraphy in Brazil) is one therapy that used a horse to enhance mechanical and neurological improvements on patients with neurological diseases or orthopedical problems6,7,8. In this case AAT with pony was used for children to brush, caress, holder and take a little time of pony riding (5-10mins) once a week, with excellent results in three children with CP, who were able to remain seated after three weeks of therapy; and the tetraplegic teenager in a wheelchair began to move his limbs and react to the sensation of pain in them, after two months of practice. In this practice, two techniques were used with the principles of Acupuncture- deficiency/stagnation of Yang Qi, and Chiropractic-unblocking of joints-especially vertebrae, and improvement of the movement of the Cerebrospinal fluid. Would it be the sum of the techniques used that allowed a tetraplegic patient to acquire sensitivity to pain and movement of limbs?

Keywords: *AAT, animal assisted therapy, cerebral palsy, pony, riding, acupuncture, yang energy, chiropractic, cerebrospinal fluid, motor skills.*

GJMR-K Classification: *NLMC: WL 359*

Strictly as per the compliance and regulations of:

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Ana Stela Fonseca

Abstract- **Animal Assisted Therapy (AAT) the therapy that use animals to help in the treatment of humans, has been shown to be an important tool to help to improve quality of life, self-steem, self-image, emotional awareness, developed communication skills, reducing anxiety and aggressivity[1,2,3,4,5]. Hippotherapy (called Equoteraphy in Brazil) is one therapy that used a horse to enhance mechanical and neurological improvements on patients with neurological diseases or orthopedical problems[6,7,8]. In this case AAT with pony was used for children to brush, caress, holder and take a little time of pony riding (5-10mins) once a week, with excellent results in three children with CP, who were able to remain seated after three weeks of therapy; and the tetraplegic teenager in a wheelchair began to move his limbs and react to the sensation of pain in them, after two months of practice. In this practice, two techniques were used with the principles of Acupuncture-deficiency/stagnation of Yang Qi, and Chiropractic-unblocking of joints-especially vertebrae, and improvement of the movement of the Cerebrospinal fluid. Would it be the sum of the techniques used that allowed a tetraplegic patient to acquire sensitivity to pain and movement of limbs?**

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I. Introduction

So, what really is AAT?

It is the use of animals to help to treat people!

In the author experience, the most part of people that work at "Horse's Industry" are being treated by the horses without have no idea of that...

Since ancient Greece, animals were used as a health treatment tool for humans. Horses were ridden by patients with behavioral problems, aggression, chronic and incurable illnesses. Hippocrates advised riding to regenerate health and preserve the Human Being from many diseases.[7,9] Asclepiades of Prussia recommended movement on horseback for different types of patients, such as paralytics, apoplectic, lethargic, frenetic epileptics[10]. Historically, pets were incorporated into the therapy with humans in 1792, at the Quaker Society Friends of York retreat in England, where nurse Florence Nightingale observed benefits of pets in the individual treatment of illnesses (Velde, Cipriani, & Fisher, 2005)[11].

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Animal-assisted therapy is a form of treatment that uses animals as a tool to help in the physical, motor, cognitive, psychological, mental and energetic development of human beings[1,2,6]. At the real world, AAT has been used and scientifically proven in several countries around the world such as Italy, Sweden, Australia, Brazil, Belgium, United States, and among others. According to work carried out in Sweden (Carlsson, 2014), Animal Assisted Therapy with horses in children and teenager abused seen that reestablishes self-esteem and self-image, as well as developing communication tools, emotional knowledge, as well as reducing anxiety. (Beck & Katcher, 2003; Dell Et Al 2011; Holmes, Goodwin, Redhead, & Goymour, 2011). In the same work, there was also evidence that AAT with horses benefited patients with problems with food intake disorders, self-aggression and suicidal behavior[2]. Pets, that is, dogs, cats, and other small animals, have proven to be valuable socialization tools for adults with Alzheimer's (Wilson & Turner, 1998, p. 204), as well as an increase in social interaction and communication among autistic children, after working with animal-assisted therapy (O'HAIRE, 2013)[6], horses are often used as a mechanism of engagement and development for autistic children and adolescents[12]. Hippotherapy also known as Equoteraphy* in Brazil, is the therapeutic use of horses with the aim of benefiting patients with neurological diseases and orthopedic symptoms, improving posture, mobility and balance (Wilson & Turner, 1998, p. 43)[3]. Children with CP have atypical posture and gait patterns due to abnormal muscle tone, reduced control of their muscles, static and dynamic imbalance, incoordination and asymmetry between agonist and antagonist muscles and poor equilibrium reflexes (Krivickas, L.S., Gage, JR)[8].

II. Development

Animal Assisted Therapy is a therapy that helps people in a lot of ways, the opportunity to have contact with horses is an extreme enrichment moment, since horses can feel the feelings of person. Horses are able to connect with the emotions of the persons around and identify what they are feeling, it was demonstrated first by research leading by dr McComb, an animal physicologist at Sussex University[13] (SMITH, 2016), and after by the Hearth and Maths Institute where Dr. Gehrke

applyed a technique called Heart Lock-in[14] where they discovered that the horse focus on the feelings that the person feel, perceiving, connecting to the energetical field of the person's heart and responding with them, this was proved by the observation and alteration of the energetic waves of the horse and the human that it connected. In this study, was observed an increase in VLF or Very Low Frequency, this is an intrinsic rhythm of the heart between that represent a pivotal role in our health and wellbeing, increased of VLF had been correlated with an increased risk for major health challenges, like stroke and heart attack[14]. The contact with animals promotes increased relaxation of the body with improved cardiovascular functioning, motor function, and increased physical and mental capacity and improved social relationship[10,15]. Psychological aspects and self-esteem have an improvement, as well as the reduction of stress, anxiety and loneliness. Patients show better relationships with others, sociability, and self-care[1,2]. There is an increase in verbal capacity, memorization, concentration and their perception of their size and shape[16]. The horse serves as a dynamic basis of support (Haehl, Giuliani, & Lewis, 1999), on which children do not have any control over but allows to be moved by it. Horses offer a unique opportunity for interaction as the child or adolescent can physically ride and interact with the animal, thus creating a therapy that involves contact that is different to other animals[12]. Horse-assisted activities have demonstrated an increase in balance, coordination, and sitting posture on the horse (Fox, Lawlor, & Luttges, 1984)[11], important tools for a CP child specially the ones that this paper will talk that had any control of their trunk or movements of the body – all them are spastic and quadriplegic. In the emotional aspects, horses represent a better experience when in a group, in interaction with others, in receptivity, in the desire to practice sports, in the sense of usefulness and ability to control the expression of feelings[16,17]. Hippotherapy promotes development and motor control and sensory sensitivity, which together form a system that "builds" the practitioner's body posture (Wilson & Turner, 1998, P. 53-4).[1] Hippo patients or Equine Therapy, are mounted on a horse properly prepared for that activity, where they are pulled by a handler-that could be a professional groomer or a voluntary trained, with the work of a multidisciplinary therapeutic team, made up of a riding instructor, a physiotherapist, an occupational therapist/phychologist, depending on the objective of therapy performance, for 30 minutes. These sessions occur once or twice a week, with a defined period of 12 sessions or three months minimal, always with medical and psychological indication and evaluation and, being the animal – horse used, periodically monitored by a veterinarian regarding its health conditions (Basic Riding Therapy Course, Ande, Brazil 2019; 1st Extension Course in Riding Therapy in Brazil, 1991, Granja Do Torto, Brasília)[10,15]. In this paper, that represent almost ten years of experience in a voluntary work at a public hospital in Rio de Janeiro, Brazil design to enhance the happiness for children with Cancer treated at the hospital, where children with Cerebral Palsy, Down Syndrome, Autism, DHDA was referred by another center of treatment (ABBR) and received a weekly treatment at the Garden of the hospital. The therapy helped children that was hospitalized in the hospital to feel happier with the presence of the ponies and the visit to the garden, but in a special way had an important result in other children, specially three CP ones. The term cerebral palsy is used to describe a permanent group of movement and posture disorders that cause active limitation and are attributed to non-progressive disorders that occur in fetal development of the brain (Rosenbaum ET AL 2007). Equestrian sports require the ability to stabilize the spine of the patient, or rider, in the face of disturbances arising from the translation and rotation of the horse's body, due to the three-dimensional movement of the horse's spine that resembles the human gait (Riede, 1988). Riding a horse provides people with cerebral palsy with a sensorimotor experience, which simulates the movement of the human pelvis during ambulation[6]. Hippotherapy provides the patient with the effect of balance, coordination, orientation and rhythm, which facilitate the activation of muscle groups, decrease in tonic reflexes, associated reactions and the acquisition of motor skills[18]. A very gentle ponies were used for these children, with no more than 115cms height, remembering what was said by dr. Danielle Citterio[15] - the little horses had more frequency gait – this contributed to the quantity of movements that these children's body are affected by.

For the ones that cannot imagine the tridimensional movement, is possible to watch it at the link https://www.youtube.com/watch?v=U_tkiCQ8j9c&t=4s

The Motor Function classification system (Palisano ET AL, 1997)[10] is a method of grading the severity of loss in people with cerebral palsy. Grades I and II include people who can walk without assistance, people with Grades III-IV have an incredible decrease in their own mobility. People who are more severely affected have a loss of extensor capacity and muscle tone ability and, consequently, poor control of trunk movement[6], exactly what happened with these three cases showed in this paper. In a systematic review of 1584 studies made with research from Australia and US about the ways of prevention and treatment of children with CP, showed that Hippotheraphy is the technique that more help for acquired balance of the patient, has an important result on Gross Motor Skills, hand stimulation as well as to decrease the spasticity in the

patients[19]. Physiotherapy is an important part of treatment, and may include hippotherapy, which uses the movement of the horse to stimulate the sensorial, neuromotor and cognitive systems to obtain functional results[20]. In a Systematic Review and Meta-Analysis Study (2020) made by researches from Spain, in the use of Hippotheraphy to treat CP children was shown that the most part of the studies showed significant results with the therapy 1-2 times a week for 30 minutes, were they have improvement of spasticity after 5 weeks of practice, GMFM66 after 16-20 weeks, improved body balance after 30 mins of therapy in 12 weeks and only one that work 8mins in barrel (obligate the horse made repetitive curves enhancing the activity of the muscles corresponding to the alignment of the back and hold on the horse – legs function), showed improved of paravertebral, hip, adductors and abductor muscles, this result was measured by EMG[21] (Eletromiography – a neurological study that show the electrical activity of the muscles). In this work, three patients with cerebral palsy of different ages were monitored, and classified as grade IV, according to the Motor Function classification (Palisano ET AL., 1997)[10], with bilateral spasticity, quadriplegia, all of them without head and trunk control. The two children, and a teenager were sent to the volunteer therapy with Pony which has been carried out in the Jardim do Hospital Federal da Lagoa, for almost ten years guided by two health professionals. The work only takes place - thanks - to the extremely gentle and well - cared ponies, owned by Belgian Françoise Dennis, owner of the Riding School - Ponei Clube do Brasil, located at the Sociedade Hipica Brasileira; who lends two of her animals weekly. They literally "cross the street" and head to the Burle Marx Garden, located at the back of the Hospital. The work takes place under the direction of the Lagoa Voluntary Sector, coordinated by the physician Dr. Paulo Cerdeira, and by the veterinarian, equestrian and hippotherapist Dr. Ana Stela Fonseca; children who were undergoing a medical consultation (haematopediatric sector leaded by other physician and collaborator with the project Dr. Soraia Rouxinal), or who are about to undergo treatment, are taken by their guardians to the Hospital Garden, where they spend around 15-20 minutes with the ponies. In some cases, children are referred from ABBR (Brazilian Beneficial Rehabilitation Association), as in the case of the patients in this study. In this case of animal assisted therapy with ponies, the children remain mounted, a very short time compared to what is used in Hippotherapy, about 5 minutes only (children with special motor skill needs like CP used 7-10mins), the other part of the time, they brush the ponies, caress, hug them, they help to pull the "little friends" that are mounted together with the handler. This mounting is performed on the skin, directly on the back's skin of the animal, based on the theory within Traditional Chinese Veterinary Medicine, that the horse (equine) is the most Yang animal in nature (Reddick, Florida, US, 2010)[22], with the Yang energy being the most important energy regard to movement, immunological system, back, brain and medulla - the once that flow on the spine of all animals – include humans (this treatment was first designed for children with cancer). The largest channel of this energy in the body, passes through the spine of all animals, in the Du Mai meridian or Governor Vessel, and there being this energetic connection with the child's body, as the VG1, or the first point of the Du Mai meridian that is located exactly in the region between the coccyx and anus(in direct contact on a horse sitting position), making this the first reason of riding bareback(with no saddle) directly in the skin of the horse; the second reason is that with no saddle, the horse, or pony, moves in a more natural way, and this greater range of movement generated, acts directly on the rider, making that the rider's body be affected by a most expand movement. Where the position of the center of mass of the rider's trunk, is controlled mainly by the abdominal and paravertebral muscles,[17] at two functional levels. The first consists of a specific direction of adjustment, when the balance of the body is in danger, which generates a specific direction of postural adjustment,[23] which is altered in patients with cerebral palsy[6], and which when riding a pony without a saddle, due to the increase in range of movement requires more of the aforementioned muscles, as if undergoing "intensive treatment", since for a shorter period of time, add to the fact that are "horses with no more than 115cm" what make they have a more frequency gait(upper intensity). These patients also make use of a small turn lying on their back (as in the photo), with their head on the horse's bump, where the entire spine is on the horizontal axis, suffering the direct influence of the horse's movement[6], now no longer on the back, vertical; an exercise of mobility and consequent unlocking occurs in the various osteo-tendinous-muscular structures of the spine, specially the vertebras which will cause greater mobility in terms of the structures of the vertebral complex; unlocking it, and in consequence providing a greater influx of cerebrospinal fluid into the Nervous System to the Spinal Cord, (Basic Course of Chiropraxis in Animals, 2010)[24], and towards the tissues (nerves) - the Chiropractic principle; the sum of both techniques with the increase of the movement impacted on human body by the horse gait, should provide the liberation in extreme intensity of "Superradiance, produced by the cerebral vesicles and being spread in a Quantic tunnels through the spine to all body" following the studies of the great Brazilian Neuroscientist Gran PhD and honor professor at Albert Schweitzer International University in Switzerland, Dr. Dibiase (BIASI, 2013)[25]. This superradiance carries with it its characteristic electromagnetism, known by the Hindu or Vedas how the energy that comes from the Universe attached in the body by the chakras (mainly coronary at

the top of the head - and supply the Chi/Qi in the body, following the principles of Traditional Chinese Medicine about the deficiency or stagnation of Qi/Chi, that is responsible for the most part of diseases in life bodies.

The rhythmic movements during the horse's walk cause increased contraction and relaxation, joint stability, changes in balance and posture in patients with cerebral palsy. Responses to therapeutic riding activities are related to improved posture (Bertoti, 1998); and in walking, running and jumping in the GMFCS (Gross Motor Function Classification System) Dimension E score (Mcgibbon, Andrade, Widener & Cintas,1998)[6]; and dynamic stabilization posture, the ability to recover from disturbances, and anticipatory and control postural feedback (Sterba, 2007). In a study carried out to measure the action forces of the horse's spine and the tracing of the movements of the center of pressure (COP – Center of Pressure) in the horse's spine, exerted by the rider or equestrian, during mounting, there was an indication that, experienced riders have a characteristic path for a full step at each gait (Fruehwirth et al., 2004)[6,] one of the riders' goals is to be able to control these movements of the center of pressure, minimizing them, which facilitates the horse's swing and reduces the energy released by it. (Sloet Van Oldruitenborgh-Oosterbaan, Barneveld, & Schamhardt, 1996). The ability of riders to maintain the center of pressure of movement depends on the rider's ability to have sufficient elasticity in the trunk control center of the muscles to control trunk movements in the face of disturbances induced by the horse's mobility, combined with a learning, which allows experienced riders to be able to reduce the center of pressure of the movement, aiming for the muscles to anticipate the rhythmic movement of the horse. (Pantall, Barton, & Collins, 2009; Terada, Mullineaux, Kiyotada, & Clayton, 2004)[6]. Dr. Hilary Clayton (2011), a veterinary doctor and English rider, based in the USA, who stood out in the practice of training and studying the biomechanics of the horse, carried out a study, comparing the effect of controlling the Pressure Center, directly on the spine of horses, exerted by the weight of the rider, in experienced riders and in patients with cerebral palsy undergoing Equine Animal Therapy, show that riders with cerebral palsy have increased anteroposterior (AP) and mediolateral movement speed compared to experienced riders, because as mentioned above, experienced riders anticipate the horse's rhythmic movement. Furthermore, patients with cerebral palsy do not have control over their muscle tone, and will also have impaired proprioceptive response, causing them to "dance" more when riding a horse – reason why was necessary three holders to hold the young PC at the first and second time of practice. (Macphail and Colleagues, 1998). The movements of a horse's spine follow a consistent pattern with each step, a set of body movement through the transverse axis occurring twice during each step and combined with movement rotated around the vertical axial axis (Galloux et al., 1994), in response to the horse's movement, the center of pressure of the rider's body makes a turn on the right side and another on the left side in relation to the horse's midline with each step (Fruehwirth et al., 2004)[6].

III. Method

Once a week, two extremely docile ponies are taken to the Hospital da Lagoa Garden, pulled by two handlers – in this case professional groomers that have all the skills to manage them in a safe way for the work. Gardens provides a therapeutic function in according to a work done in US (Ulrich,1984, Ulrich, 2001).[26,27] These ponies, upon arriving at the garden, are touched, caressed, brushed and are even ridden by the children, who after a medical appointment at the Federal Hospital of Lagoa, they go down to the garden. For security reasons, all of them must use helmets when riding the pony, they were holding by voluntaries - normal person that wants to make others happy - that offer to be a voluntary at the section in the hospital. All volunteers receive brief training where they learn where to hold the child, the side of the horse/pony that they stay, and the measures to protect the child in case there is a situation where the pony gets scared and gets out of control. One of the voluntaries, normally the most experienced one stay at the left side of the pony (side were used to mounted), hold the child on the hip bones, to make the hips stayed on the right place and not interfering on the movement action on the back muscles and abdominal muscles of the child. In case of any alteration or attempt with the pony, the voluntaries were instructed to let the person that was located at the left side of the pony to hold the child at the time that other ones – in case of have more the one holding the child – go out of the pony side immediately. The voluntaries are instructed to for reasons that pony, and horses have "no eyes in the limbs" they must pay attention where the pony put their limbs to not be stepped on. Because the work takes place within the hospital area, any need for evacuation in the event of an accident with a victim would be simplified. However, in almost 10 years of work, there has been no need for this. This voluntary work was developed with the aim of bringing happiness to children with cancer, who are treated in the hospital's Pediatric Hematology, and children with other pathologies such as cerebral palsy, autism, hyperactivity, among others, also use the therapy. The ponies remain in place for about an hour or one and half hour depending how many children are that day. Each child can ride the pony without a blanket and saddle for about 3-5 minutes, directly on the fur. Children with serious neurological disorders, such as cerebral palsy, walk a little longer, and can even stay for about 7-10

minutes on the pony; these ones, after walking normally sitting, are made to walk lying down on the pony's back, which provides more mobility, in addition to the vertical axial mobility (Galloux et al., 1994), also mobility in the horizontal axial axis of the entire body spine, and a horizontal transverse mobility, in addition to transverse mobility, (described by Fruehwirth et al., 2004)[6], where the rider's body turns, both on the right and on the left side in relation to the horse's midline, in this new diagram lying down directly in the "fur-coat".

IV. Results

How this therapy was not exactly tailored to the PC children, was for cancer ones, the results of the three CP participants in this study, where observed specially by the family that lived with then, and related the improvement in the mental state of them like not be so anxious, less cry attempt and slept well. In relation to the physical skills the improvement was already noticeable both by the family and by the volunteers who hold the participants, since the 2nd session, when they got on the pony. The first time these were placed on the pony, there were two people, one on each side, holding them, as they were completely incapable of supporting their body while sitting alone. It was also observed that these were "thrown" to the sides, unable to balance themselves when the pony moved, and their bodies did not have the ability to return to the starting point, the translation movement was made, but there was no rotation of the trunk to back to the initial point. The voluntaries related that at the first time the teenager weighed a lot on their arms, he who weighed around 55 kg, three volunteers were needed to initially hold him and when it finished at the first day, all of them related be with pain on their arms to hold the body of the boy. The mother of the three children related that they were able to stay sat after the third week of the practice of the therapy.

V. Conclusion

Since the focus of this work with AAT was about promote happiness, relaxation of the children living in a hospital for Cancer treatment and acquire the benefits with nature, through animals, in the garden in a therapeutic way[26,27], this pony therapeutic work represent the possibility of touch, the affection, the caress, the exchange of energy, that patients with serious illnesses need, having this possibility inside a hospital, to forget the real reason why they are there, was really and incredible achievement. In this case, of this practice where the results of the therapy had an increase in quality of life in children with CP where two children and a teenager shown enhance of motor skills that make them able to be sat, and in one case the teenager had related movements talked by his tutor, reaction to pain expressed by movements of the limbs, as well as facial expressions related to pain, that comprises movement of twenty muscles[28] of the face, with a therapy that occurred once a week for 8 weeks, (the therapy was stopped by the Covid and backed during this time, but the teenager didn't back with his tutor). The therapeutic function of horse riding in this case with the patients with CP riding the pony for about 7-10 mins compared with other Hippotherapy mentioned by reviewed papers and metanalyses ones showed that was necessary 30 minutes of riding, 1-2 a week and at least 5-12 weeks to increase motor skills - none of them mentioned in ability of movement of the limbs, or reaction of pain, or facial expressions - make the author believe in the effectivity of the use of the sum of the ancient knowledge of Traditional Chinese Medicine (TCM)-Yang Qi Theory - deficiency and blockage, with the healing principles of Chiropractic – unblocked vertebra and movement of CS fluid, resulting in the explanation of the Quantum Theory movement of CS fluid carrying and been able for the superradiance[25] or the energy - the Chi/Qi knowed by the TCM 4.000 years ago and the Hindus at Ayuverdic Medicine.

Should this experience be effective in another place, with other children? More studies must be carried out to determine the real degree of efficiency of the sum of this therapies with Animal Assisted Therapy in riding horses for CP children.

* The limbs movements can be seen on the follow link https://youtu.be/2_FzgGxFxxQ?si=1uxgD-YeW04d7 22_ not the facial expressions for no licensed permission.

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Assessment of Interventional Radiology Practice and Knowledge in the Democratic Republic of Congo

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Summary- *Introduction:* Interventional radiology procedures are performed at three levels: primary, intermediate and tertiary. They are classified as simple, intermediate and complex procedures. These procedures have become commonplace in Western countries and in certain emerging countries in North and South Africa. However, some of these procedures are still largely unknown and impractical in the Democratic Republic of Congo (DRC), particularly in the hospital environment of Kinshasa. Intermediate and complex procedures are performed in specialized hospitals; they are time-consuming and involve a high risk of exposure to ionizing radiation.

Keywords: *interventional radiology, knowledge, practice,-hospital environments in the DRC.*

GJMR-K Classification: *NLMC: WN 160*

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Assessment of Interventional Radiology Practice and Knowledge in the Democratic Republic of Congo

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Summary- ***Introduction:*** Interventional radiology procedures are performed at three levels: primary, intermediate and tertiary. They are classified as simple, intermediate and complex procedures. These procedures have become commonplace in Western countries and in certain emerging countries in North and South Africa. However, some of these procedures are still largely unknown and impractical in the Democratic Republic of Congo (DRC), particularly in the hospital environment of Kinshasa. Intermediate and complex procedures are performed in specialized hospitals; they are time-consuming and involve a high risk of exposure to ionizing radiation.

Objective: To assess practices and knowledge of interventional radiology in DRC hospitals. Methods: descriptive cross-sectional study conducted from 15/Aug/2023 to 15/Jan/2024, organized in the form of an anonymous electronic questionnaire evolving knowledge and practices of IR in hospital settings in DR Congo was sent electronically to healthcare providers (radiologists and non-radiologists) practicing in the Democratic Republic of Congo. The socio-demographic profile of respondents, radioprotection in IR, radiology equipment available, IR procedures performed and level of competence in radioprotection and IR were recorded.

Results: The participation rate in the present series was 35.6% for radiologists and radiology assistants, and 64.4% for non-radiologists. There was a predominance of males (77.5%) and females (22.5%). The age range 32 - 41 was predominant in both groups; 19.5% for radiologists/radiology assistants and 25.4% for non-radiologists. The average age was 38.9 ± 7.3 years for radiologists/radiology assistants and 38.8 ± 9.1 years for non-radiologists. The provincial city of Kinshasa was the most represented province in the present series with 67.4%, followed by North Kivu with 5.5%.91.9% of participants had heard of IR, while 8.1% of respondents had never heard of the discipline. In terms of knowledge of IR procedures, 59.7% gave a positive response, of which only 26.2% had complex knowledge of IR procedures.

Conclusion: The level of knowledge and practice of IR in hospitals in the DRC is generally inadequate. This calls on the health authorities to organize a strategic plan for equipping the various hospitals, not forgetting the ongoing training of radiologists and non-radiologists.

Keywords: interventional radiology, knowledge, practice, hospital environments in the DRC.

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I. Introduction

Interventional Radiology (IR) comprises all invasive medical procedures designed to diagnose and/or treat a medical pathology under the guidance and control of a medical imaging device [1]. IR procedures are performed at three levels: primary, secondary and tertiary. They are classified as simple, intermediate and complex IR procedures. Certain major surgical procedures are now being replaced by treatments guided by medical imaging, with numerous benefits [2]. IR plays a key role in the diagnosis and treatment of non-communicable and cardiovascular diseases. In 2005, Sunshine JH et al noted that 6% of radiologists in the USA devoted more than 70% of their time to IR, and 11.5% had received specialization in IR [3]. In 2006, in China's Jiangsu province, 24.0% of hospitals had set up IR departments independent of diagnostic radiology, and 64.8% of hospitals had wards dedicated to patients having undergone an IR procedure [4]. In France, overall IR activity was estimated at 545,048 procedures in 2009, 42.2% of which were therapeutic [5]. This explosion in the practice of IR is only true in developed countries. These procedures, which have become commonplace in developed countries and in certain emerging countries in North and South Africa, are nevertheless unknown, non-existent and not routinely applicable in the Democratic Republic of Congo (DRC), whether in primary, secondary or tertiary hospitals. It should be noted that radiology departments are under-equipped, as noted by the World Health Organization (WHO) [6], including an insufficient number of radiologists. Human resources and equipment are concentrated in large cities [7,8]. The increase in cardiovascular and non-communicable diseases in the DRC makes it urgent to combat disparities in general radiology and IR in particular [9]. The implementation of IR centers should also help to significantly reduce

mortality from other conditions. The practice of embolization, for example, should drastically reduce deaths from postpartum haemorrhage [10]. A number of initiatives are underway, particularly in English-speaking countries, to reduce this gap in IR. There is little data on IR in low-income countries [11]. In French-speaking sub-Saharan African countries, particularly the DRC. Any action aimed at improvement requires a prior inventory, which is why the present study was initiated with the main objective of assessing IR practices and theoretical knowledge in medical training and national programs in the DRC.

II. Materials and Methods

This was a descriptive cross-sectional study conducted over a 5-month period from August 15, 2023 to January 15, 2024, in the twenty-six provinces of the DRC, using an electronic questionnaire sent to all healthcare providers. The study population consisted of radiologists, medical specialists in other disciplines (surgeons, internists, an atom oathologists, pediatricians, ophthalmologists, dentists), physician assistants in training, pharmacists, hospital and health program administrators, radiology technicians, laboratory technicians and nurses practicing in the DRC. Data collection was organized in the form of an anonymous electronic questionnaire consisting of multiple-choice questions (MCQs) and short open-ended questions (SOQs) containing the variables under study. The questionnaire was designed using the "Google forms" web application. It was sent by e-mail and by pre-selected social networks. A reminder was sent every 72 hours. Data collection was carried out in a single phase. Respondents' anonymity and free and informed consent were respected. Once the data had been collected, they were entered into Excel and analyzed using SPSS version 21 software. Results are presented in tables and figures.

III. Results

Of the 236 participants, 84 (35.6%) were radiologists and radiology assistants, and 152 (64.4%) were non-radiologists. The study showed a predominance of males (77.5%) versus females (22.5%). The 32 - 41 age group was the most represented in both groups, with 19.5% among radiologists/radiology assistants and 25.4% among non-radiologists. The average age was 38.9±7.3 years for radiologists/ radiology assistants and 38.8 ± 9.1 years for non-radiologists (Table 1). With regard to the distribution of respondents by province: the city-province of Kinshasa was the most represented with 159 responses or 67.4%, followed by North Kivu with 13 responses or 5.5% and 12 responses or 5.1% for the province of Kongo Central. *Figure 1:* Distribution of respondents by specialty and number of years in the profession: we received 84 electronic responses (19.82%) from radiologists and radiology assistants who took part in this study. Forty-six responses or 54.8% for general imaging; 10 responses or 11.9% for pediatric radiology; and finally 10.7%. For women's imaging. In terms of number of years of professional experience: 46.4% of radiologists and radiology assistants had 2 to 3 years' experience, and 42.9% 0 - 1 year. (Table 1). With regard to the distribution of respondents according to their status as non-radiologists, we noted: 31.5% of assistant physicians belonging to specialties other than radiology, 28.9% of general practitioners and 6.6% of physicians specializing in internal medicine. Figure 2: Distribution of respondents according to whether or not they had heard of IR; 217 respondents (91.9%) gave a positive answer, and 19 respondents (8.1%) gave a negative answer. Regarding the source of IR knowledge, medical school teaching was cited as the first source with 45.2%, followed by reading about the subject and continuing education with 35.0% and 25.8% respectively. Other sources were conferences (18.0%), television programs (13.4%) and internships in foreign hospitals (3.7%) Table 2. Concerning knowledge of IR procedures: 141 out of 236 respondents (59.7%) gave a positive answer; Based on the above, 26.2% of respondents had advanced knowledge of IR procedures (Table 2). Concerning the possession of medical imaging equipment and the haemostasis check-up carried out before any IR procedure; 179 out of 236 respondents gave a positive answer regarding the possession of medical imaging equipment in their institutions. Of the above, Doppler ultrasound equipment was the most common with 55.3%, followed by X-ray and CT equipment with 23.5 and 11.7% respectively. One hundred and fifty-eight respondents gave a positive answer to the question of whether they owned radiation protection equipment. The leaded apron was the most common, at 41.8%, followed by the leaded room at 39.2%, the leaded screen at 29.1% and the leaded gloves at 27.8. The leaded thyroid cover and the personal dosimeter were reported in 13.9% each. As for the question of whether the institution had a catheterization room, 4 positive responses were reported, of which 3 were positive (75.0%) in relation to three catheterization rooms in the provincial city of Kinshasa, one of which was operational and two others in the process of being installed. When an approved supplier of IR equipment was involved, only one response (25.0%) was reported. This was the Chinese company ECO, supplier of antennas and microwave generators. Concerning the hemostasis check-up prior to any IR procedure, 54 respondents gave a positive answer, all of whom (100.0%) reported the bleeding time, 96.3% the coagulation time, 74.1% the hemoglobin level, 50.0% the hematocrit level and 33.3% the active partial thromboplastin time, Table 2. Concerning referral to IR for consultation before any IR procedure, premedication

before any IR procedure, administration of analgesics before, during or after the IR procedure, and administration of antibiotics before, during or after any IR procedure likely to cause an infection: 68.6% of respondents said they did not refer the patient to IR for consultation before any procedure. As for the question of whether the hospital carries out premedication before any IR procedure, 84.7% of respondents answered in the negative. As for the administration of analgesics before, during or after the IR procedure, and the administration of antibiotics before, during or after the IR procedure likely to cause an infection, the predominance of negative answers to the 2 questions was 79.7% and 72.5% respectively. Table 3. Type of anesthesia most commonly used: With regard to the type of anesthesia most commonly used, we obtained 65 responses out of a total of 236 participants. From the above, it can be seen that 73.8% of respondents cited local anesthesia, 23.1% general anesthesia and 3.1% reported diazanalgesia. Table 3. Does your interventional radiology unit work in collaboration with other specialties? Concerning collaboration between IR units and other services and departments, 60 positive responses out of 236 were given, of which collaboration between IR units and the Departments of Internal Medicine accounted for 36.7%; collaboration between IR units and the Department of Surgery 26.7%; collaboration between IR units and the Department of Pediatrics 20.0%; collaboration between IR units and the Department of Gyneco-obstetrics and collaboration between IR units and the pathology department accounted for 16.7%. Table 3. Concerning patient follow-up after the IR procedure: 21.2% of respondents gave a positive answer. However, we note that 90.0% of them carry out follow-up as a team. Table 3. Diagnostic and therapeutic procedures performed during IR: over half the participants (50.8%) reported exploratory puncture, followed by breast biopsy (41.9%). Other diagnostic procedures included microbiopsy of nodules and masses (37.7%), liver biopsy (34.3%) and cytopuncture of nodules and lymph nodes (30.5%). Therapeutic procedures included radio-guided percutaneous drainage of hepatic abscesses (27.9%), radio-guided evacuation of intra-peritoneal or parietal abscess collections (23.3%) and sclerotherapy (20.8%), with thyroid (73.5%), liver (14.3%) and spleen (6.1%) leading the way. Table 4. Procedures performed in IR: In relation to therapeutic procedures performed in IR, radio-guided spinal infiltration and radio-guided therapeutic intra-articular injection predominated among osteoarticular procedures performed in IR, with 20.3% and 18.6% of cases respectively, followed by radio-guided nerve root infiltration with 14.4%. In urology, percutaneous renal tumor removal was the 1st procedure performed with 16.9% of cases, followed by hemodialysis catheterization and suprapubic catheterization with 15.7% and 10.2% respectively. In the hepatobiliary field, percutaneous ablation was the most common procedure with 32.2% of cases, followed by external biliary drainage and cholecystotomy with 11.4% and 6.8% respectively. Amniocentesis, craniocentesis and fetal blood sampling were the most frequently cited gyneco-obstetric procedures, with 7.4%, 4.2% and 1.7% of cases respectively. Table 4. Availability of percutaneous ablation devices and techniques: With regard to the availability of percutaneous ablation devices and techniques, microwave and radiofrequency generators were the only percutaneous ablation devices and techniques available in only 0.4% of cases each. The only vascular procedure available was arteriography in 13.9% of cases. The vascular procedures performed were venous access for central catheter, selective venous sampling and arterial access with implantable chamber in 11.4%, 3.8% and 1.7% respectively. Table 4.

IV. Discussion

With regard to the participation rate, the present study noted a predominance of healthcare providers from the provincial city of Kinshasa (67.4%). This predominance can be explained by the fact that the largest radiology school is in the provincial city of Kinshasa, and the largest number of specialist physicians and specialization assistants are in Kinshasa. Males predominated among radiologists/ radiology assistants, at 65.5% versus 35.5%, and among non-radiologists, at 84.2% versus 15.8% in the present study. The low representation of women in the medical sector, and specifically in radiology, has already been highlighted by several studies [12,13]. This gap is even more marked in interventional imaging [14]. Studies carried out in developed countries highlight the obstacles faced by women: sexist prejudice, discrimination and sexual harassment [14]. Although we have not found similar studies carried out in French-speaking sub-Saharan Africa, these obstacles appear to be identical. In addition, the risk of radiation exposure in the event of pregnancy would be a further obstacle, even if, according to several authors, the strict application of radiation protection rules would provide sufficient protection [15]. Radiation protection is an important issue in IR, and efforts must be made in this area in low-income countries, particularly in Africa [10]. As for the age of respondents, this study noted a high participation of young people, with a mean age of 38.9±7.3 years for radiology physicians/assistants and 38.8±9.1 years for non-radiologists. The mean ages in both groups in this study are close to those found by Adigo et al [16] in Togo (37.8 years), but are lower than those found by Sunshine JH et al [3] in 2005; in the USA (51 years) in their study of the portrait of interventional radiologists in the USA. In terms of having heard of IR, almost all respondents (91.9%) admitted to having heard of IR before. As for the source, 54.8% cited

sources other than university teaching, notably: personal reading on the subject, continuing medical education, scientific conference or congress and others. Despite the high level of awareness of IR in the DRC, it is sad to note that the practice of IR in the DRC, as defined by the Fédération de Radiologie Interventionnelle (FRI) and the Société Française de Radiologie (SFR), seems less satisfactory (talk about the fact that the university should be involved in popularizing or integrating new subjects, in this case the course on IR for a full and clear understanding of the situation, or other ideas relating to how to go about acquiring this knowledge). With regard to the presence of one or more medical physicists in radiology facilities in the DRC, no positive response was given. This reflects not only the shortage of medical physicists, but also the lack of collaboration with existing medical physicists. With regard to knowledge of IR procedures, 59.7% of respondents admitted to having such knowledge, 47.5% of whom had knowledge of simple IR procedures. Intermediate and complex IR procedures are not well known in DRC hospitals, and only 26.2% were familiar with them. This can be explained by the fact that the majority of IR procedures performed in hospitals in the DRC, and Kinshasa in particular, are simple. However, taking into account the fact that with the evolution of IR, in practice only complex procedures, particularly therapeutic vascular procedures, are considered as “true” IR procedures, proves that the practice of IR in the DRC is largely insufficient. With regard to the availability of catheterization rooms, the study noted only 3 positive responses, i.e. 1.3%. Of the three available rooms, two are in the process of being installed, and only one is operational and used much more for IR procedures. This indicates a very low rate of intermediate and complex IR procedures in the DRC. No positive response concerning the availability of an IR unit meeting international standards was given in the present study. This reflects the lack of cooperation with international manufacturers and suppliers of IR equipment. The contrast with developed countries is striking: as early as 2007, O'brien et al [20] reported that 87% of Canadian radiologists had at least one angiography room, and Teng et al [4] in China in 2008 estimated the number of angiography rooms at between 1,000 and 1,500. The available technical platform also determines the approach and the sites where IR procedures are performed. The lack of suppliers of IR equipment in the present study (1.6%) may justify the lack of biplane angiography equipment and the absence of IR blocks equipped to international standards. As for the availability of percutaneous ablation equipment, the study noted only one microwave device (0.4%) currently available in the DRC. The availability of the only microwave generator is due to a public-private partnership between our team and the Chinese company ECO-Médical based in the city of Nanjing. This state of affairs bears witness to the lack of collaboration between the supervisory ministry, interventional radiologists and hospital institutions in the DRC, and the various interventional suppliers of IR equipment around the world. Regarding IR consultation, we recorded 74 positive responses (31.4%). The low rate of pre-operative IR consultations can be explained by the fact that knowledge and practice of this promising discipline are still at an embryonic stage in DRC hospitals. The pre-medication rate prior to any IR procedure remains low, at 20.3%. Hemostasis testing prior to any IR procedure also remains low, with a rate of 22.9%. The young age of this discipline in the DRC is one of the main reasons for this. Among the tests performed, we noted 54 positive responses for bleeding time (100.0%); 52 positive responses for coagulation time (96.3%); 40 positive responses (74.1%) for hemoglobin level; 27 positive responses (50.0%) for hematocrit level; and 18 positive responses (33.3%) for active partial thromboplastin time. Regarding the administration of antibiotics before, during or after the IR procedure, we recorded 27.5% positive responses. This low rate can be explained by the fact that the majority of procedures performed were biopsies, particularly breast biopsies, which did not require the administration of antibiotics. Local anesthesia was the most frequently used type of anesthesia, with 48 responses (73.8%) out of 65 positive responses. The predominance of simple IR procedures is probably the reason for this in the present study. Regarding patient follow-up after IR procedures, we received 50 positive responses (21.2%). The lack of follow-up after IR procedures has been performed can be explained by the low rate (31.4%) of pre-procedure radiological consultation recorded in the present study. In terms of examination of the various diagnostic IR procedures performed, the study noted a predominance of breast biopsies (41.9%), liver biopsies (34.3%), lymph node biopsies (28.0%) and soft tissue biopsies (25%). The predominance of ultrasound-guided biopsies of breast masses can be explained by a number of factors: the affordability and accessibility of echo-guided breast microbiopsy, the multiplication of breast cancer screening campaigns, the improvement in neo-adjuvant chemotherapy for breast cancer requiring immunohistochemical typing, the availability of the mammo-echo pair in hospitals in the DRC, Kinshasa in particular, not forgetting the sensitivity among clinicians of IR procedures, notably echo-guided breast microbiopsies. Boudghene [21] in France reported that the majority of biopsy punctures were carried out in the breast (42.73%), and that ultrasound was the most commonly used means of guidance (78%). As for the therapeutic IR procedures performed, the present study showed a predominance of radioguided percutaneous drainage of hepatic abscesses with 27.96%, followed by radioguided evacuation of intraperitoneal or parietal abscessed collections with 23.3%, and sclerotherapy

with 20.8%. This can be explained by the predominant use of abdominal Doppler ultrasound, which remains the most widely used means of guidance in the DRC. In this study, radioguided spinal infiltrations, radioguided therapeutic intra-auricular injections and radioguided nerve root infiltrations were the main procedures related to osteoarticular IR procedures, with 20.3, 18.6 and 14.4% respectively. Joffre et al [1] in France in 2010, reported a predominance of intra-auricular infiltrations at 93.4%. The predominance of intra-auricular infiltrations was also reported by Savi De Tove Kofi-Mensa et al [22] in 2020, in their study on the state of IR practice in French-speaking sub-Saharan Africa. In relation to procedures performed in IR: percutaneous renal tumor removal (16.9%), hemodialysis catheterization (15.7%) and suprapubic catheterization (10.2%) were the main procedures performed in urology (Give reasons for the predominance of these main procedures. In the hepatobiliary field, percutaneous ablation and external biliary drainage were the most common procedures, accounting for 32.2% and 11.4% respectively. As for IR procedures performed in gyneco-obstetrics, amniocentesis (7.4%), craniocentesis (4.2%) and fetal blood sampling (1.7%) were found at low rates. With regard to vascular IR procedures performed in neuroradiology, it should be noted that venous access for central catheter was the main procedure in this study with 11.4%, followed by selective venous sampling with 3.8% and arterial access with implantable chamber with 1.7%. With regard to vascular diagnostic procedures that can be performed in the DRC, the study found that 13.9% of patients underwent arteriographic examinations. These results differ from those observed by Sunshine et al [3,4], who reported 11.5% and 7.6% respectively. In terms of guidance modality for IR procedures, Doppler ultrasound was the most widely used radiological guidance modality in the present study (31.8%), followed by CT (7.2%) and scopy (5.1%). Ultrasound remains the most widely available and used imaging modality for IR procedures in the DRC. This justifies the fact that the sites concerned are most often shallow. Breast biopsies account for 41.9%, followed by liver biopsies for 34.3%. Boudghene [21] in France reported that the majority of biopsy punctures were carried out in the breast (42.73%), and that ultrasound was the most commonly used means of guidance (78%). However, some simple procedures that can be performed under ultrasound are performed by few radiologists (treatment of joint calcifications, catheter placement for peritoneal dialysis, chemical tumor ablation). This underscores the need to develop a culture of IR in the DRC.

a) Prospects for IR Development

The development of IR in the DRC requires the availability of the necessary material and human resources. In a study carried out in Canada, the obstacles to the practice of IR were: lack of rooms or equipment (35%), lack of radiologists (33%) and lack of funding or administrative support (28%) [20]. We made a similar finding in the present study. Implementing IR in low-income countries, the DRC in particular, requires the availability of various necessary resources. A checklist of different needs, or tool for assessing readiness to implement IR, has been drawn up in order to take stock of the various needs to be met before IR can be implemented [11]. It is desirable that the political authorities of the DRC underpin the various actions to be taken in order to improve the practice of IR. Improving technical facilities and revising downwards the cost of IR procedures are necessary conditions for the development of IR in the DRC. Significant efforts are required in view of the many shortcomings in radiology equipment in the DRC [6,23,24]. Human resources It is vital to increase the number of interventional radiologists trained to international standards. We therefore need to arouse the interest of radiology trainees in IR. According to a study carried out in Spain, the organization of symposia on IR increases the interest of medical students and helps identify candidates for targeted recruitment [25]. Other authors, such as Tan et al in China, advocate introducing IR into the undergraduate training program for medical students [26]. Efforts led by the RAD-AID organization have helped to highlight disparities in radiology, particularly interventional radiology [27]. Based on these findings, several initiatives in partnership with high-income countries, such as Tanzania [28], have been launched to help implement IR in low-income countries.

b) Strength of the Study

This study is the first of its kind to be carried out in hospitals in the DRC, covering all the provinces. For the very first time, it gave us an idea of the practice of IR in the twenty-six provinces of the DRC.

V. Conclusion

IR remains a little-known discipline among healthcare providers in the DRC. Almost all the medical facilities that took part in the study are either poorly equipped or under-equipped with IR equipment. No international-standard IR unit is currently available in the DRC. The practice of IR in the DRC is still at an embryonic stage, and the procedures most frequently performed are essentially diagnostic and non-vascular. The development of IR practice, especially in its vascular and non-vascular therapeutic aspects, is vital in view of the role these techniques now play in the efficient management of several thoracic and cardiovascular, neuro-vascular, tumoral, urological and, of course, gyneco-obstetrical pathologies. The popularization of the discipline, the training of interventional radiologists, the equipping of various university and provincial referral hospitals with IR equipment, the improvement of existing

technical platforms without forgetting the facilitation of accessibility to IR procedures should be taken into account at all levels.

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Understanding the Action of Homoeopathic Medicines

By Dr. Swati Saini

Abstract- Homoeopathy is called pseudo-science by the doctors of modern medicine and scientists as they claimed that the higher dilutions do not have any curative properties in them, the dilutions are mere alcohol mixed with water. But with advancements in science and development of nanotechnology, understanding the action of homoeopathic medicines has become easier. Higher-dilutions have particles of source material which are very small in size called nanoparticles. The process of potentization through which homeopathic medicines are made can be claimed as a way of production of nanoparticles[2]. Homeopathy hence, was a science ahead of its time. It is an advanced science rather than a pseudo-science.

Keywords: *homoeopathy, nanotechnology, hyper-dilutions..*

GJMR-K Classification: *NLMC: WB 930*

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Understanding the Action of Homoeopathic Medicines

Dr. Swati Saini

Abstract- Homoeopathy is called pseudo-science by the doctors of modern medicine and scientists as they claimed that the higher dilutions do not have any curative properties in them, the dilutions are mere alcohol mixed with water. But with advancements in science and development of nanotechnology, understanding the action of homoeopathic medicines has become easier. Higher-dilutions have particles of source material which are very small in size called nanoparticles. The process of potentization through which homeopathic medicines are made can be claimed as a way of production of nanoparticles[2]. Homeopathy hence, was a science ahead of its time. It is an advanced science rather than a pseudo-science.

Keywords: homoeopathy, nanotechnology, hyper-dilutions.

I. Introduction

Dr. Samuel Hahnemann was born in 1755 and graduated in medicine around 1779.After practicing medicine for few years, he quit medicine stating the bad state of medicine in the 19th century. He thought that instead of helping the patients the present state of medicine further deteriorated their condition.

After quitting medicine, he started translating books from different languages. While translating a book he saw a line "astringent property of cinchona bark helped in curing malaria". Curiosity of Dr. Hanemann led him to perform certain experiments leading him into proving a natural science which worked on the principle of like cures like. This science was called homoeopathy; Homoeo: similar pathos: suffering.

After research of many years, in the year 1833 Hahnemann published 5th edition of Organon of medicine in which he introduced the theory of drug dynamisation. According to natural science of medicine (homeopathy) disease is caused by a dynamic influence. Following the law of homoeopathy, like cures like the medicine treating the disease should also be dynamic. The dynamic nature of medicines was produced through two processes which are unique to homoeopathy: trituration and succussion.

Intially Dr. Hahnemann preferred lower dilutions of the medicines (30 C) ie 1 part of the drug and 10^{60}parts of alcohol. Which, arguably is not possible as potencies around 12C theoretically contain some bulk form molecules of the crude substance. Beyond 12C bulk form molecules of the original substance will be absent as the dilution had achieved Avagadro's no ($6.022X\ 10^{23}$). Scientists suggest that homoeopathic medicines only have alcohol and water and have no medicinal properties in them; denying homeopathy as a science and often call it a pseudo-science. Stating the usual pharmacological law of dose and effect that is lower bulk form doses exert lesser biological effects, modern chemists assert that hyper-dilutions have no biological effect and they only have placebo effect as they do not have any bulk particles.[1]

Homoeopathic medicines are dynamised through two procedures namely trituration and succussion. These methods of dynamisation could potentially produce nanoparticles through top-down approach (It corresponds to creating nanoscaled particles starting from larger dimensions and reducing them)[2]. Ball milling is the simplest method of top down approach of producing nanoparticles. Ball milling produces nanomaterials by mechanical attrition in which kinetic energy from a grinding medium is transferred to a material undergoing reduction.[3] This could authenticate the transfer of energy and initiation of the fabrication of the nanoparticles during the process of trituration. Like modern nanotechnology methods of microfluidization, sonication, and vortexing, manual succussions introduce intense turbulence, particle collisions, and shear forces into solution that break off smaller and smaller particles of source material as well as silica from the walls of the glass containers or vials[1][4]. The combined impact of these mechanical nanosizing procedures aid in generating nanoparticles of the source material.[4] A study was done by Dr. ES Rajendran using Aurummetallicum in different potencies (6C to CM) which suggested that homoeopathic medicines have nanoparticles. The different potencies prepared were studied using high resolution transmission electronic microscope (HRTEM) and energy disruptive spectrometer (EDS).[5]

Few researches have also shown that during the process of succussion the usage of silica or glass bottles also play an additional role in differentiating the nanoparticle properties from the properties of source material. The types of glassware,[6] pH, temperature, amounts of agitation, and the ratio of ethanol to water solvent[1][7] can further modify the specific sizes and

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properties of the resultant nanoparticles. This is further justifiable by the fact that nanotechnologists frequently use silica as a non-specific biological amplifier.[8] Homoeopathic medicines have always been prepared in glass or silica vials. In a study by Witt et al. it was suggested that when the vials are lined up with paraffin, the effects of the medicine decreases. And further, upon addition of powdered glass to potencies prepared in plastic vials, the lost effects reappear.[9] Thus presence of nanoparticles of silica and nanoparticles of the source material together contribute to illustrating different biophysical properties of the nanoparticles. Electron microscopy of various high dilutions of homoeopathic remedies have shown presence of source particles in them even though the dilutions are below and above Avagadaro's number.[10]

Duringstudy on nanoparticles it was found that the size of a particle can influence its physiochemical properties. Unique properties of nanoparticles are attributed to the fact that nanoparticles no longer follow Newtonian physics rather they follow quantum physics this produces change in their magnetic, optical and electrical behaviour. Also the larger surface area of nanoparticles gives them different physiochemical properties then their source particle along with larger area for adsorption of protein and DNA. Nanoparticles along with adsorbed DNA and proteins cross the membranes easily and as they are highly reactive and catalytic agents. Hence the dosage required for them to produce a change is reduced. Supporting yet another fundamental law of homoeopathy of a single simple remedy. The increased catalytic activity and bioavailability of the nanoparticles along with easy protein and DNA adsorption have helped in management of genetic and hereditary diseases using homoeopathic medicines. In footnote of aphorism 284 Dr Hahnemann mentions that sulphur dilutions given to mothers during pregnancy, help in destroying the psora – that is the producer of the most common chronic diseases in man thereby protecting progeny in advance from such diseases.

Another property that nanoparticle show is self-assembly which is the autonomous organisation of components into patterns or structures without human intervention.[11]It is assumed that during the process of potentization in the preparation of homeopathic medicines, the nanoparticles thus produced acquire information from the source material encrypted on them by means of epitaxy. The potentised medicines produced following these processes help in interaction with the immune cells in activating a self-healing reaction that aids in cure.[4]

II. Conclusion

Researches on different homoeopathic medicines (lycopodium, carbovegetabilis, aurummetta licum, hypericumperforatum, ferrummettalicum, natrum-muraticum) with different potencies have shown the presence of nanoparticles using sophisticated machineries. These researches hence have thrown light on the fact that homoeopathy is not a pseudoscience rather it is a more advanced science. Nanotechnology has therefore established a connection between indeterminate effects of homoeopathy to now scientific basis of affects it produces on living beings. Thus vindicating homoeopathy under the realm of science.

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Safety and Diagnostic Accuracy of Biopsy of Targeted Splenic Lesions under Ultrasound Guidance using the Multiple-Pass Technique without Co-Axial in Kinshasa Hospitals

By Frederick Tshibasu Tshienda, Dedé Matanda Tshitemb, Jenny Mbuyi wa Mbuyi, Pierrot Lebughe Litite, Jean Christophe Mulumba Badibanga, Jean-Marie Kayembe Ntumba & Jean-Marie Mbuyi Muamba

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Summary- Introduction: The most frequent splenic pathologies can pose a diagnostic challenge to clinicians, radiologists and pathologists. These pathologies are innumerable, and may be of malignant or benign tumoral origin. Six techniques are currently available to obtain splenic tissue samples for pathological evaluation. Less invasive percutaneous techniques, performed by an interventional radiologist under ultrasound or CT guidance, include fine-needle aspiration biopsy and core tissue biopsy. They are associated with fewer complications and greater precision.

Keywords: biopsy, splenic lesions, under ultrasonographic guidance, multiple passages without co-axial.

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Safety and Diagnostic Accuracy of Biopsy of Targeted Splenic Lesions under Ultrasound Guidance using the Multiple-Pass Technique without Co-Axial in Kinshasa Hospitals

Frederick Tshibasu Tshienda [α], Dedé Matanda Tshitemb [σ], Jenny Mbuyi wa Mbuyi [ρ], Pierrot Lebughe Litite [ω], Jean Christophe Mulumba Badibanga [¥], Jean-Marie Kayembe Ntumba [§] & Jean-Marie Mbuyi Muamba [χ]

Summary- Introduction: The most frequent splenic pathologies can pose a diagnostic challenge to clinicians, radiologists and pathologists. These pathologies are innumerable, and may be of malignant or benign tumoral origin. Six techniques are currently available to obtain splenic tissue samples for pathological evaluation. Less invasive percutaneous techniques, performed by an interventional radiologist under ultrasound or CT guidance, include fine-needle aspiration biopsy and core tissue biopsy. They are associated with fewer complications and greater precision.

Materials and Methods: This was a descriptive, multicenter, observational study of the various radioguided percutaneous splenic puncture-biopsy procedures performed using the multiple-pass technique without co-axial placement over a 5-year period. The objectives of the present study were to demonstrate the safety and diagnostic accuracy of targeted splenic puncture biopsy using the multiple-pass technique without co-axial placement, and to evaluate the rate of major complications of the said technique.

Results: A total of eighteen patients underwent percutaneous splenic biopsy. In this study, patients aged ≤ 25 years (33.3%) and those aged 48-58 and 59-69 years were more likely to have undergone percutaneous splenic biopsy. (22.2% and 22.2%) were the most affected. Males predominated, with 66.7% versus 33.3%. Splenomegaly was the most frequently encountered clinical parameter with 44.44%. Lymphomatous lesions were present in 33.3% of patients, with CD20-negative diffuse large-cell lymphoma (11.1%), non-Hodgkin's lymphoma (11.2%) and hepatosplenic T lymphoma NOS (11.1%). Splenic tuberculosis ranked second in 22.2% of patients, and Gauchier's disease in 22.2%. Ultrasound was the most commonly used radiological guide in 88.9% of cases. The 14-gauge automatic gun was used in 44.4% of cases. The co-axial or indirect technique was used in all patients (100%); the multiple-pass technique without co-axial (T-MPSC) was used in all patients (100%); 4-5 cores were taken in the majority of patients (88.9%). No major complications were encountered in the present series.

Conclusion: Radiation-guided percutaneous biopsy of splenic lesions with automatic or semi-automatic 14-16 G tru-cuts, using the coaxial-free multiple-pass technique (T-MPSC), yields large-calibre tissue material for accurate diagnosis during pathological analysis. This technique also avoids embolization of the co-axial pathway and per- or post-biosurgical haemorrhagic complications. In conclusion, percutaneous radio-guided splenic biopsy is an effective alternative to splenectomy in patients with single or multiple splenic lesions.

Keywords: biopsy, splenic lesions, under ultrasonographic guidance, multiple passages without co-axial.

I. Introduction

The spleen is a voluminous vascular lymphatic organ located in the upper part of the abdominal cavity on the left side, between the two extremities of the abdomen, the stomach and the diaphragm, composed of white and red pulp. The white pulp is made up of lymphoid nodules and lymphoid tissue, while the red pulp is made up of venous sinusoids between which lie the splenic cords. The stroma of the red and white pulp is composed of fibers and reticular cells [1]. The spleen is the body's largest lymphoid organ. Unlike the lymph nodes, the spleen is not drained by the lymphatic system, but rather is connected to the systemic circulation. The most common splenic pathologies can pose a diagnostic challenge to clinicians, radiologists and pathologists alike. These pathologies are innumerable, possibly of malignant or benign tumoral origin such as; lymphomas and metastases; of specific or non-specific infectious origin with tuberculosis in the lead, of fungal origin without forgetting infiltrative processes such as sarcoidosis

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[1-4]. As imaging has not proven accurate for diagnosis, splenic tissue samples may be required to accurately determine its malignant and or infectious tumoral nature [1,2]. Splenic tissue samples can be obtained either by splenectomy or percutaneous biopsy [3-4].

Splenectomy is accompanied by morbidity (8.6%-37%) and mortality of (0%-2.9%). This is mainly due to infection generated [6-7]. Percutaneous biopsy, with reported complication rates of 0.5% for organs such as the liver and kidneys, is a potentially safer alternative to surgical biopsy [8-11]. Historically, biopsy percutaneous image-guided biopsy was approached with apprehension by radiologists, due to accessibility and bleeding risk [12]. This reluctance may be linked to a high rate of major complications (13%) for percutaneous spleen biopsy performed with a large 14 Gauge [13] needle. Several recent publications have reported much lower complication rates with small-gauge needles (18 Gauge or smaller) [4-6,14]. The diagnostic accuracy of splenic biopsy varies according to publications, ranging from 84% to 90% [4,11,14]. In the Democratic Republic of Congo; no study to our knowledge has reported on this technique; hence the main objective of the present study, which consisted in demonstrating the safety and diagnostic accuracy of targeted splenic biopsy puncture using the multiple-pass technique without co-axial under ultrasonographic guidance; in hospital settings in Kinshasa; university clinics in Kinshasa in particular.

II. Materials and Methods

a) Type and Period of Study

This was a descriptive, multicenter, observational study of the various radioguided percutaneous splenic puncture-biopsy procedures performed using the multiple-pass technique without placement of a co-axial tru-cuts over a period of six and a half years, i.e. from January 2018 to June 2024:

b) Study Setting

We carried out this study in eight hospital institutions in the city and province of Kinshasa, including one tertiary-level institution, the University Clinics of Kinshasa, and the following primary and *secondary-level institutions:* Center médical Diamant de Kinshasa, Clinique présidentielle de l'unité Africaine, Centre Hospitalier de Kingasani, Centre d'imagerie médicale pilote Kokolo, Centre de diagnostic spécialisé, d'expertise et d'Imagerie Interventionnelle de la RDC, Pistis médical center de Limete, Centre spécialisé de Kinshasa and Vision médicale pour tous. All these data were collated at the Kinshasa university clinics, located on the Kimwenza road, in the Mont Amba district, in the commune of Lemba.

c) Study Population

A total of eighteen patients who had undergone biopsy of splenic lesions were included in the present study. These patients ranged in age from 5 to 64 years, with a median age of 35.5 years. Of the 18 patients, twelve were male and six female.

d) Inclusion Criteria

Any male or female patient referred for biopsy puncture of a splenic lesion and/or echoguided drainage of a radio-guided splenic abscess with a medical imaging result (abdominal ultrasound, abdominal CT scan and/or abdominal MRI); Any patient with a haemostatic assessment deemed fair (Bleeding time: Clotting time:); Any patient with a hemoglobin and/or hematocrit level within acceptable limits (Hemoglobin ≥ 7 g/dl and Hematocrit ≥ 21 %); Any patient who has freely given written consent for interventional radiology (IR) at splenic level.

e) Criteria for Non-Inclusion

The following were not included in the present study: Any patient referred for a splenic IR procedure without a prior medical imaging result; Any patient with a haemostatic balance below the set thresholds (TS:TC:); Any patient with a hemoglobin and/or hematocrit level below the set thresholds (Hb≤ 7 g/dl and Hct ≤ 21 %) refractory after correction, any patient who has not freely given written consent for the indicated splenic interventional radiology procedure.

f) Parameters of Interest and Operational Definitions Parameters of Interest:

1. Socio-demographic parameters included age, sex and place of origin.
2. *Clinical Parameters:* Included clinical reason for referral to IR unit, incident after IR procedure (minor, major, etc).
3. *Biological Parameters:* Included hemoglobin level, hematocrit level, red blood cell count, bleeding time, coagulation time, pathological findings.
4. *Radiological Parameters:* Included the means of imaging used to perform the procedure, the indication for biopsy or drainage of intra-splenic collections, the equipment used (automatic gun, semi-automatic gun, suction gun, drainage trocar, etc.). the technique used (co-axial or indirect technique, axial or direct technique), the type of anaesthesia used (local versus general anaesthesia), the anaesthetic product used, the number of cores taken, the number of passes made, whether or not the biopsy path was embolized, whether or not haemostats were used, whether or not clots were used, the type of premedication, the anatomopathological result and, lastly, the technique used to take the cores

(multiple-pass technique without coaxial (T-MPSC).

5. Materials and Technique of Multiple passages without co-axial (T-MPSC).

   Precautions: Oral and written consent was obtained. A haemostasis test was performed 48 hours prior to the procedure. A platelet count greater than or equal to 150,000/mm3 and a prothrombin time (PT) greater than or equal to 55% were required for the procedure. We used 16 to 14 gauge (G) automatic and semi-automatic biopsy needles 10-20 cm in length.

   Equipment: After radiological consultation, we proceeded to review the examinations and reassess the lesion using B-mode ultrasound and triplex Doppler with convex and linear multi-frequency probes. Several ultrasound devices from the following brands were used: Phillips U-22, Sonoscape Light, Sonoscape S-50 and Mindray.

6. Materials and Technique of multiple passages without coaxiality (T-MPSC).

   Precautions: Oral and written consent was obtained. A haemostasis test was performed 48 hours before the procedure. A platelet count greater than or equal to 150,000/mm3 and a prothrombin time (PT) greater than or equal to 55% were required for the procedure. We used automatic and semi-automatic biopsy needles of gauge (G) 16 to 14, with a length of 10 to 20 cm.

   Equipment: After the radiological consultation, we reviewed the examinations and reassessed the lesion using B-mode ultrasound and triplex Doppler with convex and linear multi-frequency probes. Several ultrasound machines of the following brands were used: Phillips U-22, Sonoscape Light, Sonoscape S-50 and Mindray. The patient was placed in a left lateral decubitus position for 40 minutes to an hour after the procedure, before being allowed to return home or to the hospital ward. On discharge, painkillers were systematically prescribed, but antibiotic prophylaxis was recommended on a case-by-case basis in consultation with the referring physician.

III. Results

Analysis of patients' socio-demographic characteristics revealed that: the age groups most affected in the present series were those ≤ 25 years with 33.3% and those between 48-58 and 59-69 years with respectively: 22.2 and 22.2%. Table I. Gender analysis, shows a predominance of males in the present series with 66.7% against 33.3% of females. Table I. Clinical characteristics of patients: splenomegaly was the most frequent clinical parameter, accounting for 44.44% of cases.

Table II. The sensation of a mass in the left hypochondrium was found in 33.33% of patients in the series. Table II. Polytransfusion and other symptoms such as weight loss, anorexia, untimed fever, abdominal bloating, including left hypochondrium pain were respectively found in 11.1%. Table II. In relation to the anatomopathological characteristics of patients, lymphomatous origin came out on top at 33.3%. Table III; 11.1% for CD20-negative diffuse large-cell lymphoma, 11.2% for non-Hodgkin's lymphoma and 11.1% for NOS hepatosplenic T-cell lymphoma. Splenic tuberculosis was found in 22.2% of patients, while Gauchier's disease was also found in 22.2%.

Table III. In terms of guidance methods, ultrasound was the most widely used radiological guidance method, accounting for 88.9%. Table III. Computed tomography was used in 11.1% of patients in the series. Table III. With regard to sampling equipment, the 14-gauge automatic gun was the most widely used, accounting for 44.4% of patients, versus the semi-automatic 14-gauge gun, which was used by 33.3%.

Table IV. In relation to the guidance technique, the co-axial or indirect technique was used in almost all cases (100.0%). Table. IV. With regard to core sampling, we used our own technique, known as the multiple-pass technique without co-axial, abbreviated T-MPSC. Table. IV. Local anesthesia was used in almost all cases (100%). Table IV. No complications, minor or major, were encountered in this series. Table IV. Eight patients in the series (44.44%) had disturbed haemostasis levels below 10 gdl. Hemoglobin levels were 7 g/dl in two patients and 10 g/dl in six. Psychological preparation was carried out in almost all patients (100.0%); analgesics, atropine premedication and antibiotic prophylaxis were instituted in almost all patients in the series (100.0%). IV. With regard to the number of cores taken for pathological diagnosis, the majority of patients in the series (88.9%) had 4-5 cores. In 11.1% of patients, the number of cores taken was more or less than 4 samples.

IV. Discussion

The spleen is not commonly affected by diseases; however, those that do affect it are numerous, including malignancies (lymphoma, metastatic), infections (tuberculosis, fungi) and infiltrative processes such as sarcoidosis [2,3]. Analysis of socio-demographic characteristics revealed a predominance of age groups ≤ 25 years with 33.3% and those between 48-58 and 59-69 years with respectively: 22.2 and 22.2%. As for gender, we found a male predominance of 66.7% out of a total of eighteen patients corrected in the present study. All our patients underwent radio-guided biopsy sampling. A review of the literature reveals that there are currently six

techniques for obtaining splenic tissue samples for pathological evaluation. The surgical techniques complement open biopsy, open splenectomy, laparoscopic splenectomy and laparoscopic biopsy. Splenectomy is associated with relatively high morbidity (8.6%-37%) and mortality (0%-2.9%), mainly due to infection [15-18], but the current surgical trend is to preserve the spleen whenever possible. Asplenia is known to predispose to infection. A particularly important and specific infectious complication of splenectomy is post-pleenectomy infection. It is caused by encapsulated organisms such as Streptococcus pneumoniae, Neisseria meningitidis and Hemophilus influenzae type B. This condition occurs at an annual frequency rate of 0.5% in splenectomy patients, and is associated with a mortality rate of 50%. Thrombosis, particularly portal vein thrombosis, is a well-known complication of splenectomy. Improvements in the precision and frequency of imaging examinations have led to increased detection of portal vein thrombosis. As for the sampling equipment used, the 14-gauge automatic gun was the most widely used at 44.4%, compared with the semi-automatic 14-gauge gun, used at 33.3%. The use of the 14 G gun could be explained by the fact that it was more available in our stock during the study period; however, no major complications were found in the present series. The results of our study corroborate the results of the study by Wani, et al ⌈19⌋ who like us had no major complications, but there were 11.11% minor complications. However, Lindgren et al [14] reported on a series of 32 spleen biopsies performed with a 14G needle: four out of 32 patients (12.5%) presented with major bleeding during the procedure, requiring transfusion [14]. More recent series have instead shown lower complication rates [7,8,20-26 ⌋, but focused on fine-needle aspiration biopsy (FNAB) having included a relatively small number. The meta-analysis by McInnes et al [20] examined pooled complication rates for FNAB and core needles biopsy (CNB) and found an overall complication rate of 4.2%, with a major complication rate of 2.5%. with a major complication rate of 2.2%; these figures rise to 5.8% and 3.2%, respectively, for CNB alone. Oslon et al [27], of their 92 biopsies, had seven (7.2%) minor complications and only one (1.0%) major complication. Data from our study reported a major complication rate (0%), similar to that reported 0% in the study published by Patel et al ⌈28⌋, in which major and minor complication rates were 0% and 1.9% respectively (1/52). However, studies including McInnes et al [30] "Percutaneous Image-guided Biopsy of the Spleen: Systematic Review and Meta-Analysis of the Complication Rate and Diagnostic Accuracy" showed a major complication rate of 1.3% (95% CI: 0.6%, 2.5%) for biopsies performed with an 18-gauge needle. In their study, Olson et al ⌈29⌋found 7.2% minor complications and 1.0% major complications. of minor complications and a major complication rate of 1.0%. The overall complication rate was 8.2% (n = 8). In these studies, the average major complication was 1.2%, and one study showed 7.2% minor complications. In our study, minor complications were not highlighted, although they amounted to simple pain in the left hypochondrium, soothed by post-procedural analgesics. In relation to radiological guidance, the co-axial or indirect technique was used in all our patients (100.0%). The splenic tissue samples were collected using our own technique, known as the co-axial-free multiple-pass technique (abbreviated T-MPSC). The present study demonstrated a diagnostic accuracy of around 100%. This is superior to that reported in the study by Wani, et al ⌈19⌋ 94.12% with a 95% confidence interval [CI], 71.5%)., 71.3%-99.85%) and a diagnostic yield of 94.4%. Sensitivity was 93.7% (CI,69.77%__99.84%) and, as there were no false-positive biopsies, specificity was 100% (95% CI, 2.5%__100%). In their study, Gómez-Rubio et al [29] demonstrated that the diagnostic accuracy of splenic biopsy was 92%, and that for splenic lymphomas, the accuracy of NBC was 100%. Olson et al [27] showed that diagnostic accuracy was 94.5%.

V. Conclusion

Radiation-guided percutaneous biopsy of splenic lesions with automatic or semi-automatic 14-16 G tru-cuts, using the coaxial-free multiple-pass technique (T-MPSC), yields large-calibre tissue material, facilitating accurate diagnosis during pathological analysis. This technique also avoids embolization of the co-axial pathway and per- or post-biosurgical haemorrhagic complications. In conclusion, percutaneous radio-guided splenic biopsy is an effective alternative to splenectomy in patients with single or multiple splenic lesions. Percutaneous tru-cutaneous splenic biopsy is a safe procedure, with no evidence of an increased risk of major complications compared with surgical splenic biopsy.

VI. Limitations

This is a retrospective study with a small sample size.

Study Merits:

This is the first study to be carried out in the DRC, and in the hospital environment of Kinshasa in particular, which introduced a new biospic technique for the sampling of splenic tissue, known as T-MPSC. This study also showed that splenic biopsies could be performed with 14G tru-cut without major complications.

Protection of Human and Animal Rights:

The authors declare that this study did not involve experimentation on patients, subjects or animals.

Confidentiality of Data

The authors declare that this study does not contain any personal data that could identify the patient or subject.

Study Funding

This study has not received specific funding from any public or private institution.

Declaration of Conflict of Interest

The authors declare that they have no conflict of interest in relation to this article.

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Table I: Socio-Demographic Characteristics of Patients

Age (years)	Count	Percentage
≤25	6	33,3
26-36	2	11,1
48-58	4	22,2
59-69	4	22,2
≥70	2	11,1
Total	18	100,0
Sex	**Count**	**Percentage**
F	6	33,3
M	12	66,7
Total	18	100,0

Age	Sexe		Total
	F	M	
≤ 25	4	2	6
26-36	0	2	2
48-58	0	4	4
59-69	2	2	4
≥70	0	2	2
Total	6	12	18

Tableau II: Clinicat Information of Patients

Clinical information	Count	Percentage
• Other: physical asthenia, weight loss, anorexia, fever without a specific time, abdominal bloating, pain in the left hypochondrium	2	11,11%
• Massive splenomegaly	8	44,44%
• Sensation of a splenic mass	6	33,33%
• History of transfusion	2	11,11%
Total	18	100,00

Table III: Histopathological Results of Patients and Methods of Guidance used

Histopathological Results	Effectifs	Pourcentages
• Diffuse large B-cell lymphoma CD 20 negative	2	11,1
• Non – hodgkin lymphoma	2	11,1
• Hepatosplenic T-cell lymphoma NOS	2	11,1
• Gaucher's disease	4	22,2
• Not available	4	22,2
• Tuberculose splénique	4	22,2
Total	18	100,0

Imaging	Count	Pourcentage
• Ultrasound	16	88,9
• CT scan	2	11,1
• Artériography	0	0
• MRI	0	0
• Fluoroscopy	0	0
• Cone beam CT	0	0
• Ultrasound + CT scan	0	0
Total	18	100,0

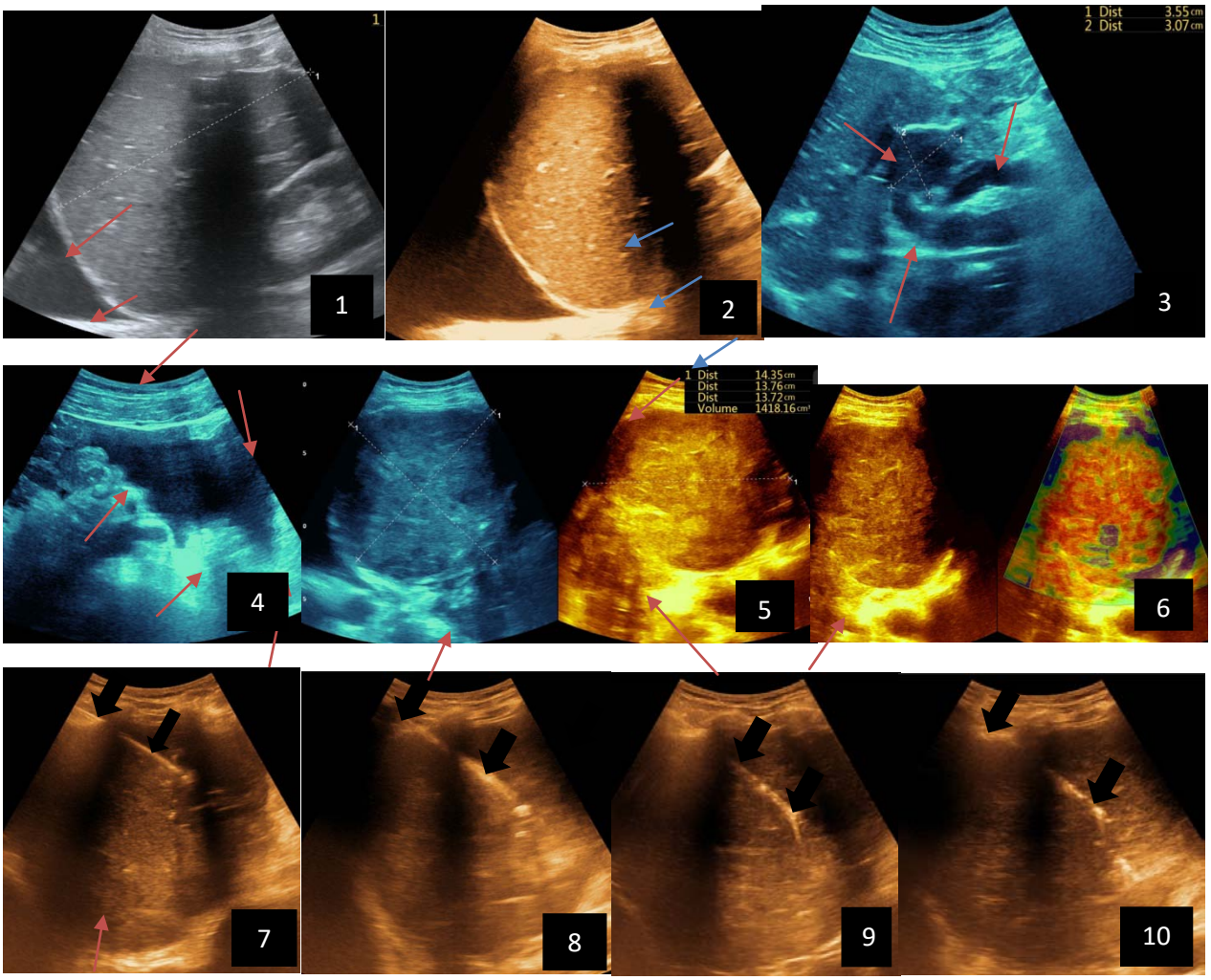
	Imaging techniques used	Total	
Histopathological Results	CT SCAN	Echographie	Total
• Diffuse large B-cell lymphoma CD 20 negative	0	2	2
• Non- hodgkin lymphoma	0	2	2
• Hepatosplenic T-cell lymphoma NOS	0	2	2
• Gaucher's disease	0	1	1
• Not available	0	7	7
• Splenic tuberculosis	2	2	4
Total	2	16	18

Tableau IV: Techniques used, Types of Guns used, Type of Anesthesia, Hemostasis Balance and Complications after Surgery

Types of needles	Automatic needle	Aiguille semi-automatique	Aiguille aspiratif
G14	8	6	0
G16	0	4	0
G17	0	0	0
G18	0	0	0
Total	8(44,4%)	10(55,6%)	0
Technique used	Count	Pourcentages	Total
Co-axial technique (indirect)	18	100,0	100,0
Axial technique (direct)	0	0	0
Embolization of the tract	0	0	0
Multiple passage sampling technique without co-axial (T-MPSC)	18	100,0	100,0
Type of anesthesia		Oui	Non
Local	With preservative	0	18
	Without preservative	18	0
General		0	146
Produit utilize	Count	Pourcentage	Total
Lidocaine (5ml)	18	100,0	100,0
Lidocaine+Bicarbonate	0	0	0
Complications	Count	Pourcentages	Total
Minor incidents	0	0	0
Major incidents	0	0	0
Assessment	Result	Effectifs	Pourcentages
	<10	8	
	≥10	10	
Hematocrite level	<30	8	
	≥30	10	
Coagulation time	Normal	18	100,0
Bleeding time	Normal	18	100,0
Blood group			
Preparationbefore the procedure	Count	Pourcentages	Total

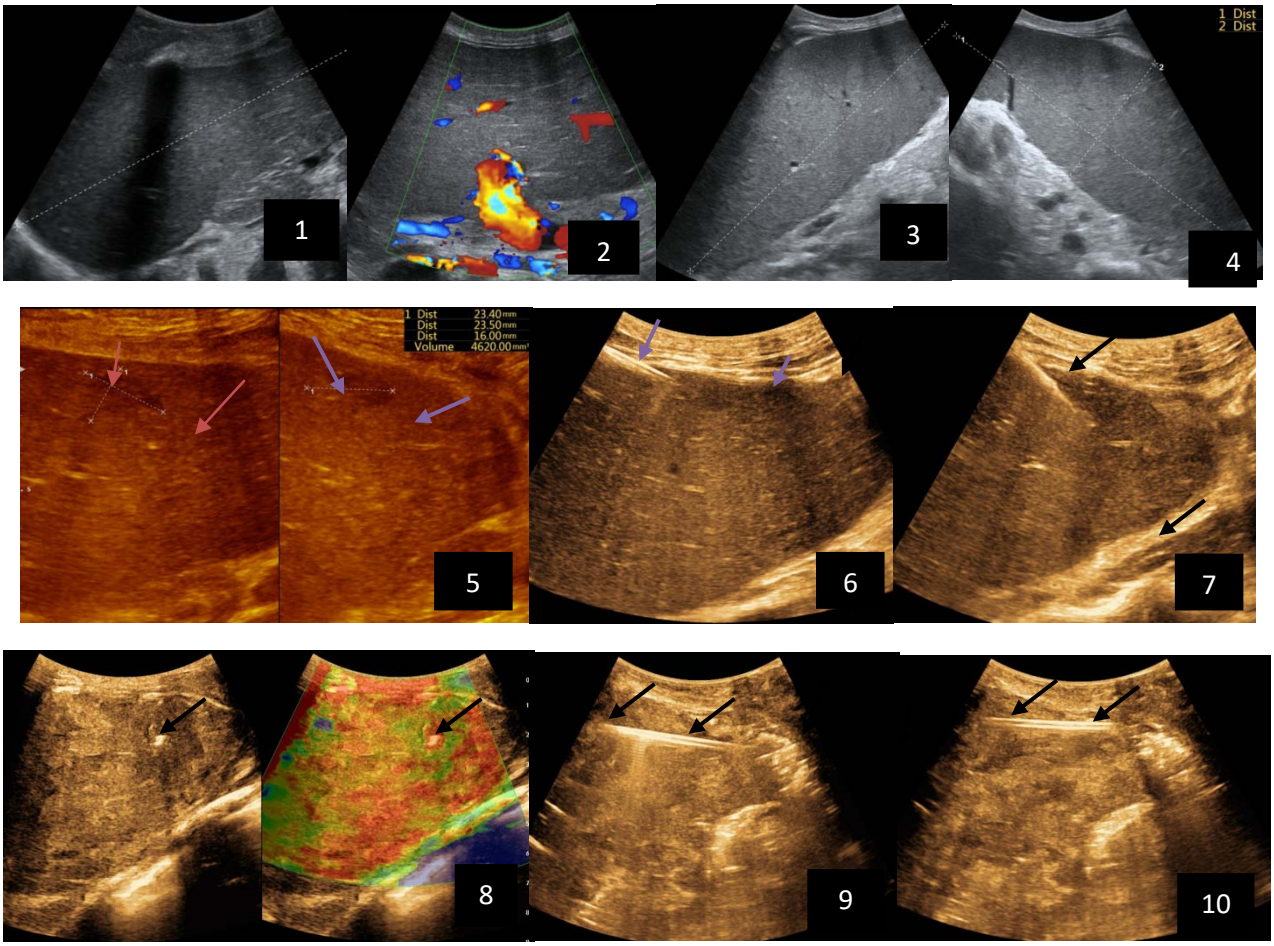
Psychologicalpreparation	18	100,0	100,0
Premedication	18	100,0	100,0
Hemostaticassessment	18	100,0	100,0
Proton pump inhibitors	18	100,0	100,0
Minor analgesics	18	100,0	100,0
Antibioticprophylaxis	18	100,0	100,0

Iconography



Iconography 1: 54-year-old patient with an intra-splenicsolid mass, anatomopathologically compatible withlymphoma: images 1 and 2: right pleurisy of moderateabundance, image3: celiacadenopathy, image 4: free ascites of moderateabundance, images 5 and 6: intra-splenicsolid mass of around 1418.16 ml in B mode and elastographyshowing areas of tumourrigidity, images 7-10: oblique linear images, showingbiopsy gun tracks.

Figure 1: Number of Corescollected



Iconography B: 1 to 4: ultrasound images in mode B showing a large size, 5: ultrasound image in mode B showingsolidhyperechogenic nodules under the capsulorhexis, 6 to 10: ultrasound images in mode B showinglinearhyperechogenic images without overlay in relation to the trajectories of the aiguilles of biopsy.

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Assessment of Levels of Immunization and Factors Associated with the Non-completion Routine Immunization within (9-12 Months) Attending Primary Healthcare Centres in Ibadan North and South East, Nigeria

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Abstract- Immunization is designed to prevent transmittable diseases and it is an integral public medical intervention and an economical method to decline mortality and morbidity associated with transmittable diseases. This work attempts to determine the vaccine coverage and factors related to the non-completion routine immunization within babies (9-12 months) attending Primary Healthcare Centre (PHC) in Ibadan North and South East Local Government Areas, Oyo State.

Keywords: vaccine coverage, factors, non-completion routine immunization, children within 9-12 months, preventable diseases, Ibadan.

GJMR-K Classification: NLMC Code: WA 115, WA 540

Strictly as per the compliance and regulations of:

Assessment of Levels of Immunization and Factors Associated with the Non-completion Routine Immunization within (9-12 Months) Attending Primary Healthcare Centres in Ibadan North and South East, Nigeria

Basiru [α], T. A., Ogunwale [σ], T. O., Oluwalana [ρ], A. I., Oladele , D. O., Oyetola [¥], S. O., Ibrahim [§], D. O., Oladimeji [χ], J. F., Abbah [ν], S. C., Ekanade [Θ], C. T. & Balogun [ζ], F. A.

Abstract- Immunization is designed to prevent transmittable diseases and it is an integral public medical intervention and an economical method to decline mortality and morbidity associated with transmittable diseases. This work attempts to determine the vaccine coverage and factors related to the non-completion routine immunization within babies (9-12 months) attending Primary Healthcare Centre (PHC) in Ibadan North and South East Local Government Areas, Oyo State. The descriptive cross-sectional study research design was employed for this work. Health belief model theory and multistage sampling procedures were applied to choose 422 participants from all the chosen PHCs in the study location. The results indicated that complete immunization coverage for all five childhood vaccines in both sites were low (69.5%) relative to the WHO stipulated guideline of 80%. Overall results revealed that the complete immunization coverage from the sampling site for children 12 months of age was 69.7% and 69.5% for children among 9–11 months. The findings of survey indicated that percentage of vaccine coverage reduces as child age increases. Mothers/caregivers' knowledge of vaccination, perception concerning vaccination and socio-demographic factors like educational status, occupation, and monthly earnings were all statistically significantly correlated with complete immunization in children. This study concluded that knowledge and perception control behavior and disposition of mothers/caregivers towards vaccination. Thus, health personnel and health educators need to underscore the significance of vaccination and likewise seek to decry all the wrong believes and negative attitudes on vaccination.

Keywords: vaccine coverage, factors, non-completion routine immunization, children within 9-12 months, preventable diseases, Ibadan.

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I. Introduction

Immunization denotes building up people's immune response against an agent. Immunization is a more accessible means to get immune to a particular disease, and it is less hazardous *(Fiore et al., 2019).* Vaccines are necessary for both infants and of ages because they defend against the several diseases. Aside from defending infants against life-limiting illnesses, immunization as well assists in building body's defences of infants *(Fiore et al., 2019).* The prescription of a vaccine to help the immune response build defense against diseases is termed vaccination. Vaccines comprise a microbe or virus in a destroyed or weakened condition, or proteins or toxins from the living organism.

Immunization of children against six preventable diseases (diphtheria, pertussis, tuberculosis, polio, tetanus, and measles) is essential to decline childhood morbidity and fatality. Immunization continues to be one of the most cost-efficient and integral public healthcare interventions to reduce child morbidity and mortality. Globally, childhood vaccination is projected to prevent from 2 to 3 million mortalities yearly *(Meleko et al., 2017)*. Using immunizations, a few infectious diseases have been eliminated in most regions of the Earth planet. One instance of such is smallpox and poliomyelitis. Polio is still common in a few nations of the earth and a few people might still be at menace of contacting it, particularly those who have never received the vaccine, people who didn't obtain all doses of the vaccine, and those that journey to regions of the earth in which polio

WHO conducted an immunization crusade between 1967 and 1977 and it led to the eradication of smallpox.

At the beginning of programme, smallpox still threatened 60% of the earth's population. Likewise, the destruction of poliomyelitis is presently possible. Since the inauguration via WHO and its partners of the Global Polio Eradication Initiative in 1988, infection has dropped by 99%, and nearly five million individuals eluded paralysis. It was predicted that from year 2000 to 2008, measles mortalities worldwide fallen by above 78%, in regions of the earth established a goal to eradicate prevalence of polio disease. Neonatal and maternal tetanus have been eliminated from 20 of the 58 heavy-risk nations *(Masresha et al., 2018).*

In man's history, the development and broad dissemination of childhood vaccines have been one of the ultimate successes of public health. Initiatives like Expanded Programme on Immunization (EPI) through WHO promoted coordinated, nation-level development in routine vaccination (e.g., tetanus, diphtheria, pertussis, polio, measles, and BCG), and laid the roots for attempts to bring in fresh vaccines and further increase coverage over the future decade. The EPI continues to be devoted to its aim of global access to all crucial vaccines *(Masresha et al., 2018)*.

Empirical reviews have indicated that the mortality of children takes place more often in the growing countries. Essentially, children residing in African nations die yearly as a result of avoidable transmittable diseases. Similarly, Epidemiological accounts in African zones indicate 'nine million mortalities of children globally due to vaccine-avoidable diseases *(Masresha et al., 2018)*, and a greater percentage which is 4.4 million happened in sub-Saharan Africa'. This is considerably attributed to weak immunization coverage and health problems in sub-Saharan Africa. Furthermore, in many areas of Africa, immunization facilities have not been ideal, especially for routine immunization which is known as the critical factor for below vaccination of children *(Hill et al., 2021).*

In 2017, around 20% of babies in the globe with incomplete DPT immunization lived in Nigeria *(Obanewa et al., 2020),* and three million out of the projected 8.9 million children in the WHO African Zone who were not vaccinated against measles in 2015 are residing in Nigeria *(Obanewa et al., 2020)*. Therefore, Nigeria represents nearly 40% of the 28279 measles cases stated in the WHO African Zone in 2016 *(Masresha et al., 2017).* Nigeria has a yearly population growth rate of 2.83% which makes Nigeria the most thickly populated nation in Africa and is the second most significant factor contributory to below–five fatality universally *(Masresha et al., 2018)*. There are marked differences across geopolitical regions with vaccination coverage and completion, which vary from around 50% in the South-South and South-West to 27, 14, and 10% in the North-East, North-Central, and North-West Nigeria, respectively *(Masresha et al., 2017).*

All states in Nigeria fall under the global goal of 80% coverage for three doses of pentavalent immunization. Performance level of immunization is poorest in North West or North East areas where all the states falls under 50% pentavalent coverage. Children residing in the rural areas are half as possibly to be immunized than those in built-up areas and children of younger and less educated caretakers are at most threat *(Hill et al., 2021).*

Immunization is a vital vision of the PHC system in Nigeria. One of the significant aspects emphasized by the worldwide community is accomplishing global health coverage, and PHC is a needed foundation for these endeavors. Vaccination is an integral part of international health coverage, which is fundamental to PHC. Nevertheless, a few factors like medical distrust, socio-political factors, unfriendly behaviours of medical personnel, poor medical systems, clashes between programmes, and supplementary immunization activities are contributing factors that hinder sufficient immunization coverage in *PHCs (Masresha et al., 2017; Hill et al., 2021).*

An investigation on rural-urban disparities in demographic factors and related immunization status among children of 12-59 months in a south-western region of Nigeria indicates that immunization coverage was relatively high but yet substandard in the south-western part of Nigeria *(Ijarotimi et al., 2018).* Maternal factors were observed to control immunization status. Other factors in line with the research are location and paternal factors, which are highly related to immunization coverage in the south-western zone of Nigeria. Also, in Oyo State, a survey on unacceptable rates of immunization coverage in governmental recognized factors related to the accomplishment of a total child vaccination schedule in Ido LGAs and Ibadan North East (LGAs) of Oyo State, Nigeria *(Fatiregun et al., 2013)*. The investigation revealed that the status of complete immunization coverage was unacceptable in nearly all the clinic wards *(Fatiregun et al., 2013).*

Immunization is vital in the prevention of infectious and poor immunization is ascribed to some diseases in little one; hence, it is crucial to evaluate factors that result in non-completion routine immunization in little one. Depending on this proposition, the purpose of this study was to investigate the level of vaccination and factors accountable for non-completion routine immunization within (9-12 months) attending PHCs in Ibadan North and South East LGAs, Oyo State, Nigeria and offer lasting solution recommendations to the challenge of incomplete immunization status.

II. Materials and Methods

Descriptive cross-sectional analysis was carried out on mothers/caregivers who attended immunization programs in Ibadan North and South East Local Government, Oyo State, Nigeria during November 2019-April 2020. Depending on geographical areas, the study site was separated into two zones: Ibadan North and Ibadan South East. Then the three PHCs each from both Ibadan North and South East LGAs were randomly chosen from this zones and sampling was conducted utilizing multistage sampling technique. The work was approved by the Research Ethics Review Committee of Department of Planning, Research, and Statistics Division, Ministry of Health, Oyo State, Nigeria (code number: AD 13/479/4307A) and written informed consent was obtained from all the participants. After explaining the objectives of the research, the questionnaires were completed by the subjects or researcher in case of illiteracy of the participants. Inclusion criteria were being an all mother/caregiver with children between 9 and12 months attending immunization clinic at the chosen PHCs in Ibadan North and South East LGA, and those that tend to participate in the investigation. Exclusion criteria were mother/caregiver with children having health problems resulting in hospitalization. The sample size of the survey was estimated as 422 utilizing the Cochran formula the unidentified population, with a standard deviation of the score being 10 ($\sigma=10$), the error value of 1 ($d=1$), type I error ($\alpha=.05$, $z=1.96$) taking into consideration a 10% attrition.

a) Data Collection

Four questionnaires were employed for data gathering as follows: (i) socio-demographic factors of participants; (ii) child immunization coverage; (iii) knowledge, perceptions, and attitude towards child vaccination; and (iv) associated factors with child vaccination coverage in PHCs'.

b) Demographic Questionnaire

The demographic factors form comprised nine items regarding age, marital status, education qualification, number of children, occupation, monthly earnings, religion, ethnicity, and baby's age.

c) Child Immunization Coverage Questionnaire

The child immunization coverage questionnaire was a researcher-made tool comprising thirteen items. The items covered the areas of vaccinating the child after birth is a piece of common knowledge among mothers in our local government area; we, don't think there is adequate immunization coverage in health clinics within my community; all, statutory child vaccines are readily available in health clinics within my community, has your child ever received polio, measles, pneumococcal (PMV) vaccine, yellow fever, and pentavalent immunizations? Has your child ever received any vaccinations, drops, or injections in the past?, Has your child ever received an injection in the right upper arm or shoulder that usually results in a scar? The vaccine is not available in many clinics in my community, where does your child usually receive vaccinations? Where did your child receive their most recent vaccination?

The validity of the questionnaire was confirmed by an authorized letter of introduction from the Department of Public Health, Faculty of Basic and Medical Science, Lead City University, Ibadan, by interviewing technique employing KoBo collect androids application in each LGA by the researcher with the assistance of trained research assistants who were students from colleges of Health Technology with the support of health officers working in the chosen centers picked for the investigation. Also, the test-retest reliability was determined by giving the questionnaire to 10 eligible people in two rounds with a14-day duration. The Chi-square was calculated as 23.544 and 27.528, which were significantly different at the $p<0.001$.

d) The Measure of Parental/Caregivers' Knowledge and Misperceptions of Routine Immunization Questionnaire

The questionnaire comprises ten questions, and the questions dealt with the areas of childhood vaccines are vital for my child's health, getting vaccines is a good way to protect our child/children from diseases, measles vaccine needs to be obtained at nine months, vaccination schedule needs to be completed before twelve months?, oral polio ought to be received three times?, several communities and caregivers reject RI because of rumors, false information, and fear, lack of confidence and trust in RI as effective health interventions seem to be pretty common in all regions of Nigeria; RI, is to depopulate the society; RI will make their children infertile when they grow up, and we are afraid that our child/children will be affected with virus.

e) Associated Factors with Child Immunization Coverage in Primary Healthcare Centers Questionnaire

The questionnaire involved fourteen questions and contained three sublevels comprising why the child was not vaccinated, why the child hasn't had all recommended vaccines, and health officers' attitudes. This questionnaire measured the associated factors with child immunization coverage and determine of medical worker attitude. The overall knowledge level for child vaccination was estimated as the composite of five knowledge questions, which comprised whether the participants knew the significance of vaccine to health, whether the vaccine is a suitable means to defend the child from disease, knowledge of the age measles vaccine needs to be given, awareness on whether vaccination has to be completed before 12 months, and the number of times polio vaccines needs to be given.

Those who had the correct answer to each knowledge questions were graded 1 point and those who didn't know were graded 0 point. The knowledge mark was estimated as the sum of all knowledge questions with a lowest mark of 0 and highest mark of 5. The knowledge status of participants was classified as good knowledge when participants grade was more significant than the average mark (which was 2), and poor knowledge when grade was below the average mark. Depending on the total mark in this questionnaire, the samples were categorized as negative perception concerning RI (1 mark) and positive perception regarding RI (0 mark) groups. The validity and reliability of this instrument were approved in research conducted by the WHO Vaccination Coverage Survey published in 2018 and reviewed in 2019 *(NDHS, 2019).* Furthermore, the authors evaluated the reliability and validity of this instrument in Nigeria by interviewing procedure utilizing the KoBo collect androids application *(Hill et al., 2021).* In this work, the validity of this questionnaire was estimated using the informed content validity. For this the questionnaire was submitted to 10 experts, the confirmation of whom was indicative of approved informed content validity. More so, intending to measure the reliability of the questionnaire, ten eligible people completed the questionnaire in two rounds with 14 days. By the way, the Chi-square between the questionnaire marks was found to be 23.544 and 27.528.

Fig. 1: Field Sampling from the Researcher from One of the PHCs in Ibadan

f) Data Analysis

Statistical analysis was conducted utilizing SPSS software (Statistical Package for the Social Sciences, version 21.0, SPSS Inc., Chicago, Illinois, USA). We used descriptive (e.g., frequency, mean, standard deviation, percentage, bar, and pie charts) and inferential (e.g., regression analysis) statistics. Lastly, $p<0.05$ was regarded as significantly different.

III. Results

a) Search Results and Survey Characteristics

Socio-demographic characteristics of the study participants: 422 mothers/caregivers of children aged 9 to 12 months were involved in this work. The age of the respondents varied between 14 and 34 years, with an average of 29±6.17 years. The most represented age class was 24 to 28 (37.9%). The proportion of the study population following the study geographical distribution was 54% for Ibadan South East while 46% for Ibadan North LGA. Among the PHCs, 115 (27.3%) were Boluwaji PHC. Four hundred and seven (97.4%) mothers/caregivers were married, 6 (1.4%) were single, and 4 (1.0%) were widowed/separated/cohabiting. One hundred and twenty-two (28.9%) mothers/caregivers' had a level of education at least equivalent to a secondary school certificate, while 93 (22%), 87 (20.6%), 42 (10%), 49 (11.6%), and 2 (0.5%) stated possessing a primary school certificate, OND, HND, BSc, and Postgraduate certificates, and 27 (6.4%) had no formal education. Of the 422 participants involved in this assessment, 146 (34.6%), 242 (57.3%), and 34 (8.1%) had 1 to 2 children, 3-4 children, and five and more children, respectively. Concerning occupation, 203 (48.6%) study participants were traders. About religion, 174 (41.2%) were Christian, 241 (57.1%) were Islam, while 7 (1.7%) were other religions; 41.3% of the study population had a mean monthly income of between 0 and 18,000 Naira; the most common ethnic group in the study population was Yoruba (69%). There was a significant relationship between age group, marital level, academic status of females, women's employment level, women's monthly income, number of children, religions, and ethnic status. Details of the socio-demographic profile of the respondents are shown in Table 1.

Table 1: Summary of Measure of Demographic Variables based on Descriptive Statistics
The number of participants=422

Attributes	Frequency (n)	Percentage (%)
Mean age: 29.29 ± 6.17		
Age group		
14 to 18 years	11	2.6
19 to 23 years	43	10.2
24 to 28 years	160	37.9
29 to 33 years	108	25.6
34 years and above	100	23.7
Total	422	100.0
LGA		
Ibadan North	194	46.0
Ibadan Southeast	228	54.0
Total	422	100.0
Primary Health Centre		
Idi Ogungun PHC	103	24.4
Agbowo PHC	52	12.3
Basorun PHC	39	9.2
Molete PHC	71	16.8
Algon Comprehensive PHC	42	10.0
Boluwaji PHC	115	27.3
Total	422	100.0
Marital Level		
Single	6	1.4
Married	407	97.4
Cohabiting	1	.2
Widowed/separated/cohabiting	4	1.0
Total	418	100.0
Academic Status		
No formal education	27	6.4
Primary school leaving certificate	93	22.0
Secondary school certificate	122	28.9
OND	87	20.6
HND	**42**	**10.0**

BSC	49	11.6
Postgraduate	2	0.5
Total	422	100.0
Number of Children		
1-2 Children	146	34.6
3-4 Children	242	57.3
Five or more Children	34	8.1
Total	422	100.0
Occupation		
Housewife	66	15.8
Trader	203	48.6
Artisan	35	8.4
Skilled worker	53	12.7
Civil servant	59	14.1
Other, identify	2	0.5
Total	418	100.0
Monthly Income (Naira)		
0 - 18,0000	173	41.3
19,000-40,000	126	30.1
41,000-60,000	52	12.4
61,000-80,000	33	7.9
81,000 and above	35	8.4
Total	419	100.0
Religion		
Christianity	174	41.2
Islam	241	57.1
Others	7	1.7
Total	422	100.0
Ethnic Status		
Yoruba	292	69.2
Igbo	49	11.6
Hausa	77	18.2
Others	4	0.9
Total	422	100.0

Source: Author's Computation, (2022)

b) Coverage of Childhood Immunization in the two Lgas In Ibadan Primary Healthcare Centers

Immunization coverage of children aged 9 to 12 months in the two LGA in Ibadan Primary Healthcare Centres of the 422 children aged 9 to 12 months involved in this survey, 77.7% received polio immunization, 62.3% obtained measles immunization, 66.8% obtained pneumococcal immunization, 59.2% had yellow fever vaccination, 78.2% obtained pentavalent vaccination, 89.3% received any vaccination drops or injections in the past. In contrast, 84.4% received injection in the right upper arm (Figures 2-8).

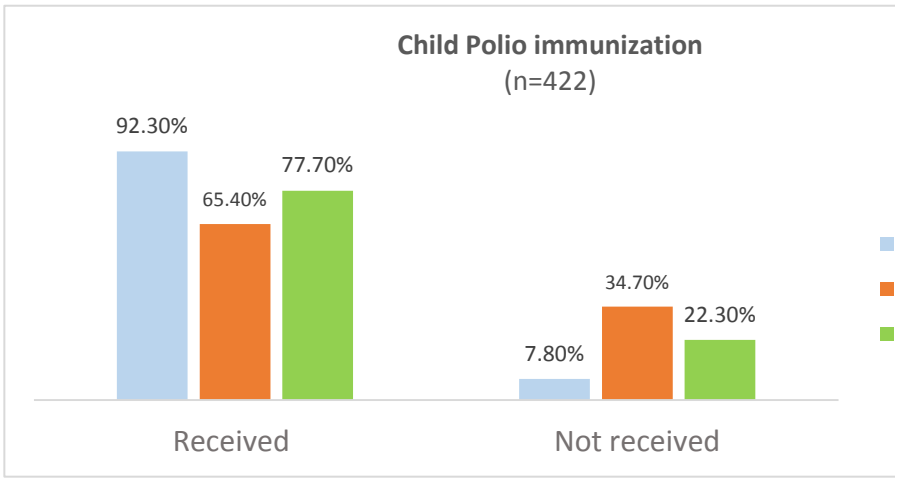

Figure 2: Percentage of Children Reported to Have Ever Received Polio Immunization by Study Geography

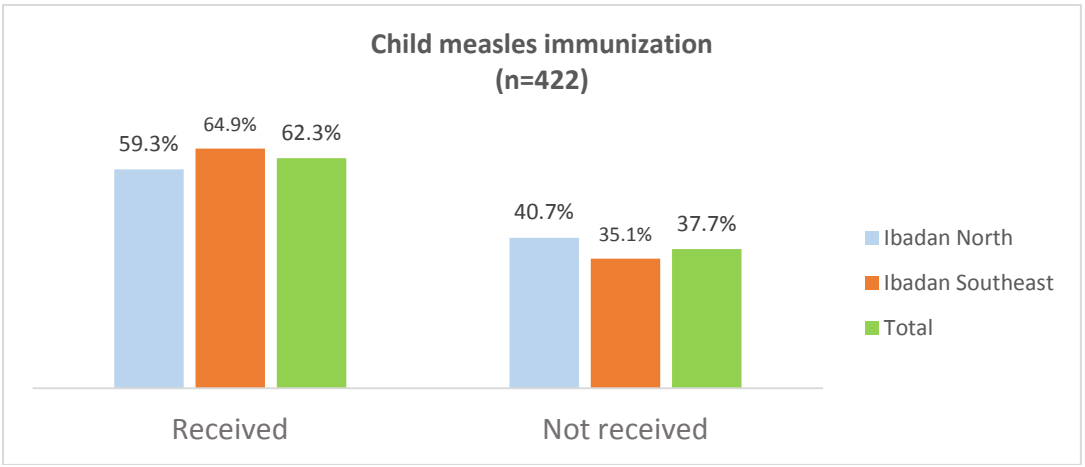

Figure 3: Percentage of Children Stated to Have Ever Received Measles Immunization by Study Geography

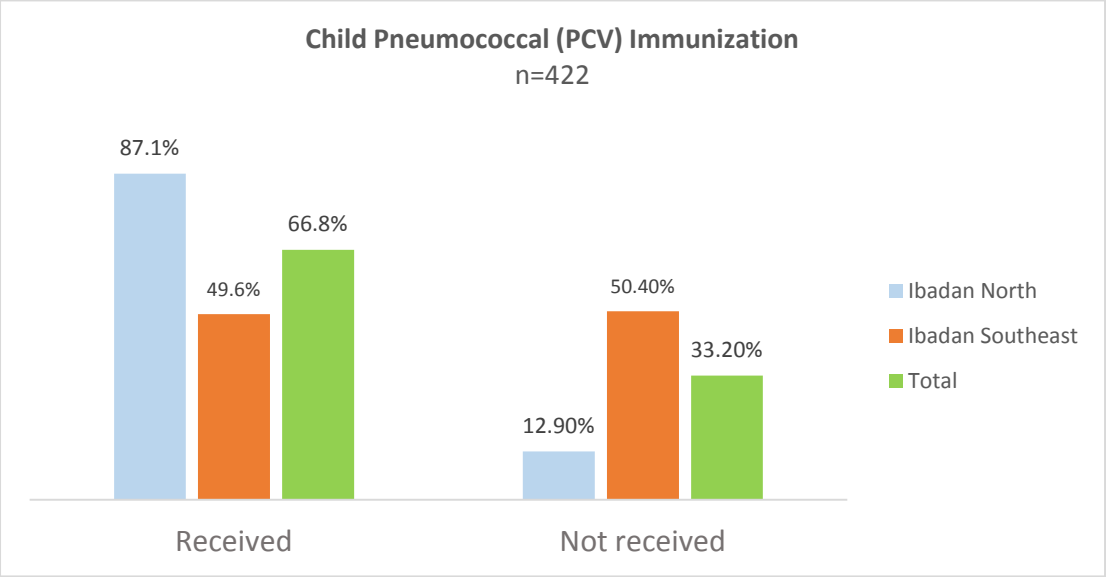

Figure 4: Percentage of Children Reported to Have Ever Received Pneumococcal (PCV) Immunization by Study Geography

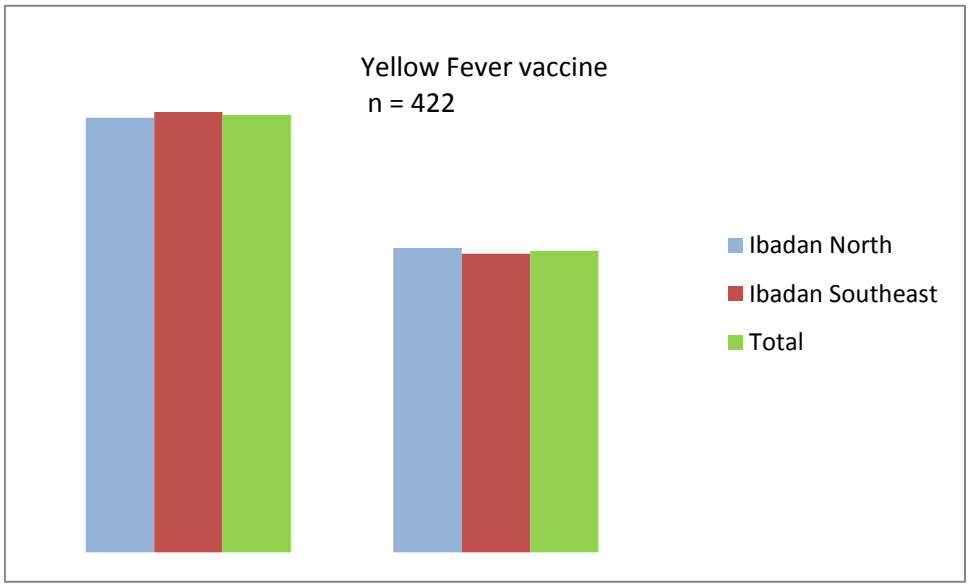

Figure 5: Percentage of Children Reported to Have Ever Received Child Yellow Fever Vaccine by Study Geography

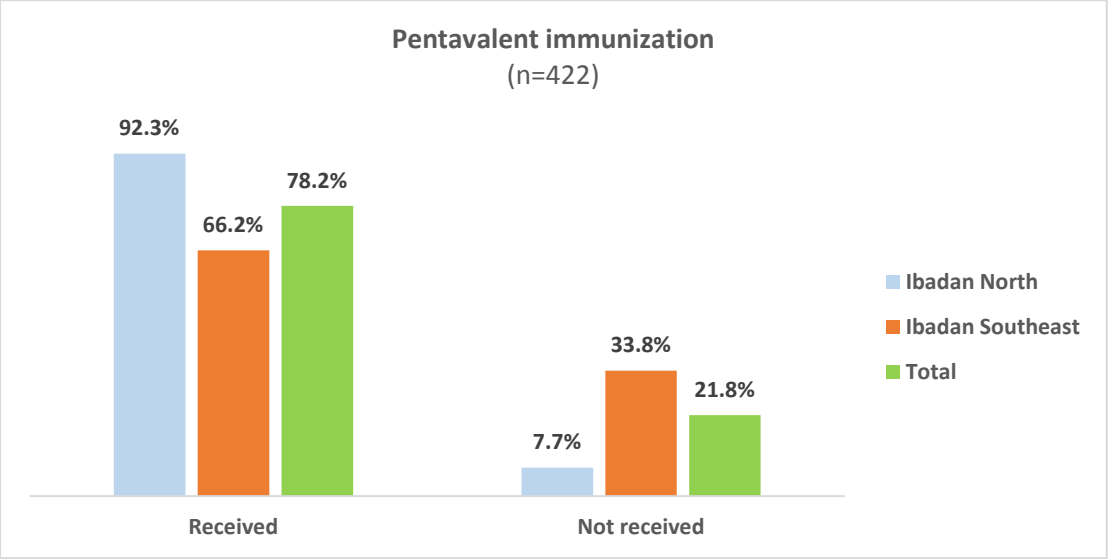

Figure 6: Percentage of Children Reported to Have Ever Received Pentavalent Immunization by Study Geography

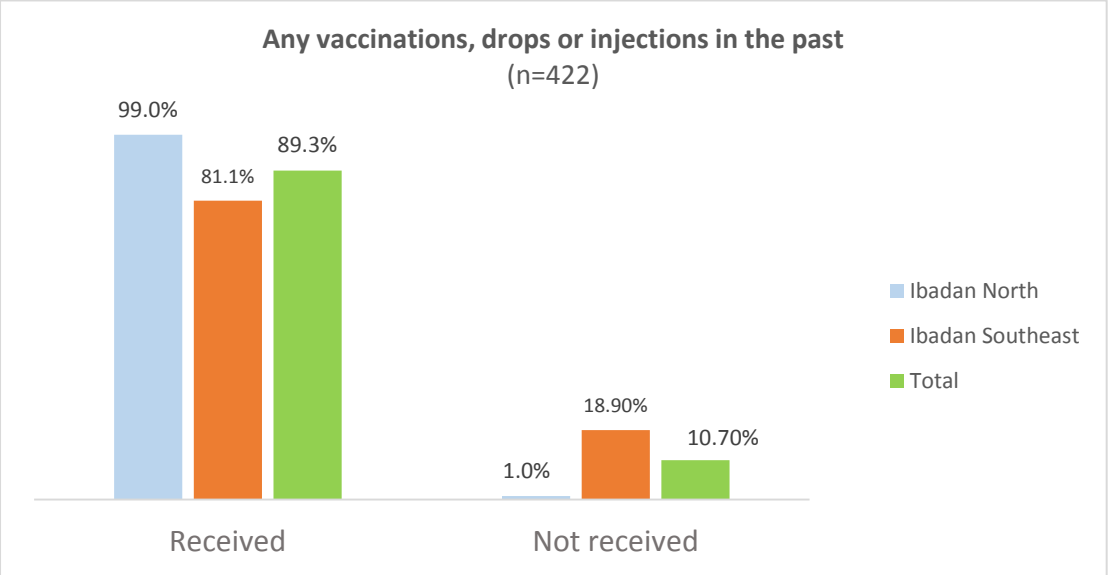

Figure 7: Percentage of Children Reported to Have Ever Received any Vaccinations, Drops, or Injections in the Past by Study Geography

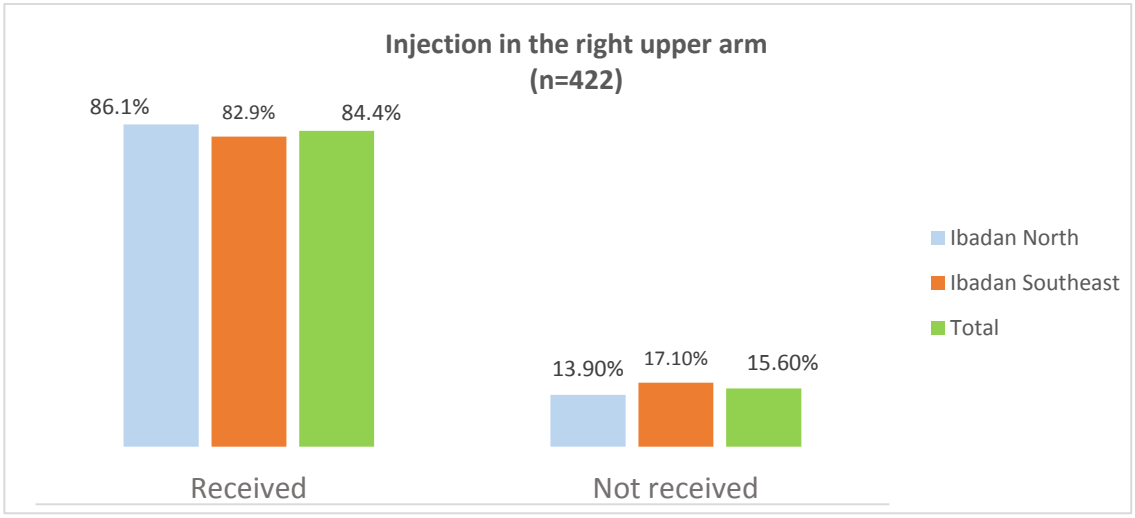

Figure 8: Percentage of Children Reported to Have Ever Received any Injection in the Right Upper Arm (Measles Vaccine) in the Past by Study Geography

Missed immunization was determined employing the five scheduled immunization. Out of 422 children within 9 – 12 months, 90 (21.3%) missed at least one of expected scheduled immunization and was high among children that are 12 months (see Table 2). Reasons for missed vaccination of mothers of children aged 9 to 12 months who were not or partially vaccinated in the Ibadan healthcare centers in 2022. Ninety mothers/caregivers of children aged 9 to 12 months who were not or partially vaccinated gave the reasons for not vaccinating of their child. Visits to the clinic were not on the date of vaccination (32% and 51%), the child fell sick (46% and 24%), there was no vaccine (7% and 12%), and waiting was too much (4% and 7%) were the four reasons most often mentioned (Table 2).

Table 2: Summary of Missed Immunization Schedule based on Child's Age

Sn	Child's Age	Nos of Child	Nos. of Missed	% missed	Nos. vaccinated	% vaccinated
1	Nine months	94	2	2.1	92	97.9
2	Ten months	72	7	9.7	65	90.3
3	Eleven months	154	47	30.5	107	69.5
4	Twelve months	102	34	33.3	68	66.7
	Total	422	90		332	

Source: Author's Computation, (2022)

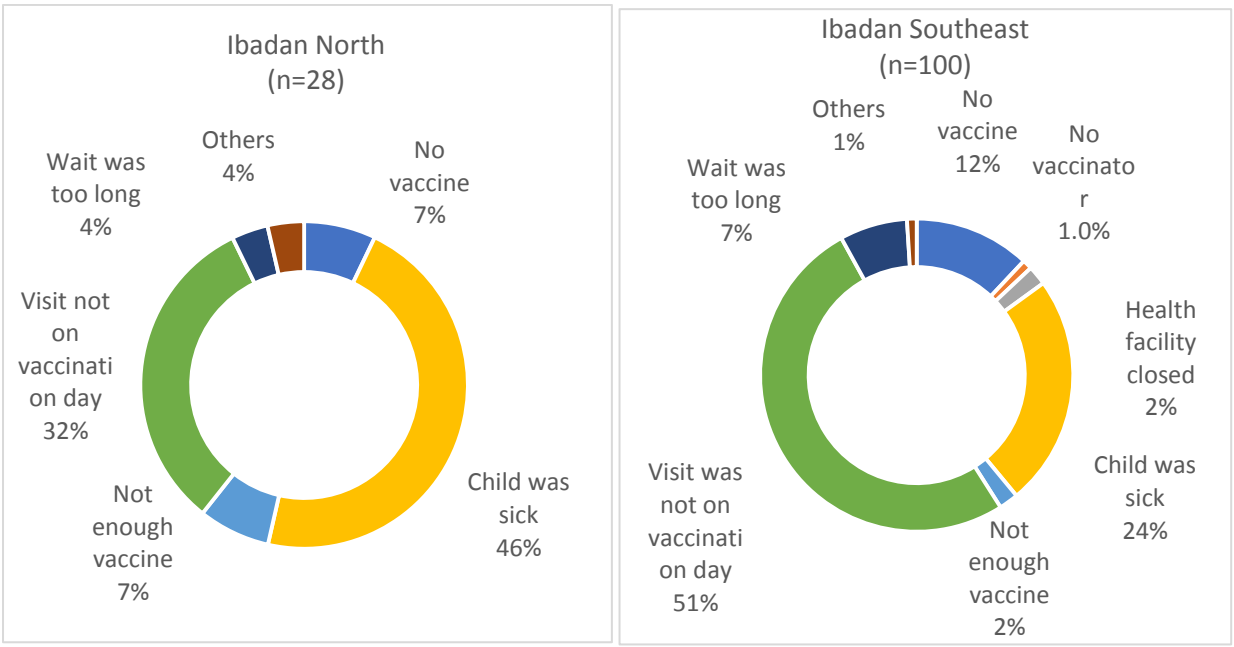

Figure 9: Reasons for Missing Vaccination of Children in both Study Locations

c) *Summary of Caregiver and Child Immunization Characteristics*

Caregiver and child immunization characteristics are classified into five subtitles: (i) vaccinating the child after birth is a piece of common knowledge among mothers; (ii) no adequate immunization coverage in health clinics within the community; (iii) all statutory child vaccines are readily available in health clinics within the community; (iv) place of usual child vaccinations; and (v) place of most recent child vaccination (see Table 3). They are classified by frequency of inclusion in the assessments examined, denoted 'n'. In précis, the most often recognized factors for evaluating caregiver and child munization characteristics were: vaccinating the child after birth agree (n = 187, 44.3%); no adequate immunization coverage in health clinics agree (n = 209, 49.5%); all statutory child vaccines are readily available in health clinics agree (n = 158, 37.4%); place of usual child vaccinations (n = 407, 96.4%); and place of most recent child vaccination (n = 401, 95%).

Table 3: Summary of Caregiver and Child Immunization Characteristics

Variables	Frequency (n)	Percentage (%)
Vaccinating the child after birth is a piece of common knowledge among mothers.		
Strongly agree	96	22.7
Agree	187	44.3
Neither agree nor disagree	5	1.2
Disagree	132	31.3
Strongly disagree	2	0.5
Total	422	100
There is no adequate immunization coverage in health clinics within the community		
Strongly agree	48	11.4
Agree	209	49.5
Neither agree nor disagree	13	3.1
Disagree	151	35.8
Strongly disagree	1	0.2
Total	422	100
All statutory child vaccines are readily available in health clinics within the community		
Strongly agree	67	15.9
Agree	158	37.4
Neither agree nor disagree	10	2.4
Disagree	185	43.8
Strongly disagree	2	0.5
Total	422	100
Place of usual child vaccinations		
Local government health clinic	407	96.4
Local private doctor's office	4	0.9
Secondary healthcare facility	2	0.5
In a private healthcare facility	9	2.1
Total	422	100
Place of most recent child vaccination		
Local government health clinic	401	95
Local private doctor's office	8	1.9
Secondary healthcare facility	2	0.5
In a private healthcare facility	11	2.6
Total	422	100

Source: Author's computation, (2022)

d) Summary of Parental/Caregivers Knowledge, Perceptions, and Attitude towards Child Vaccination

i. *Summary of Participant's Knowledge of Child Vaccination*

Most knowledge and misperceptions were assessed as part of a multi-factorial approach to increase childhood vaccination coverage and were identified as adequate by the respective study authors. Specific expertise and misperceptions are classified into six subheadings: (i) childhood vaccines are essential for a child's health; (ii) getting vaccines is a good way to protect children from diseases; (iii) measles vaccine is received at nine months; (iv) vaccination schedule should be completed by twelve months; and (v) oral polio should be received three times (see Table 4). They are computed by frequency in the incorporated works, termed below as 'n'. In a nutshell, the most generally mentioned knowledge comprised childhood vaccines are essential for child's health (n = 297, 70.4%); getting vaccines is a good way to protect children from diseases (n = 329, 77.9%); measles vaccine is received at nine months (n = 244, 57.9%); vaccination schedule needs to be completed by twelve months (n = 161, 38.2); and oral polio must be received three times (n = 224, 53.1%). In general, expertise was estimated with the composite immunization knowledge score of participants, which indicated 41% for high knowledge and 59% for low knowledge regarding immunization. Higher knowledge was found among participants in Ibadan North (52.6%) than in Ibadan South East (31.1%).

Table 4: Summary of Participant's Knowledge Profile on Child Vaccination

Variables	Frequency (n)	Percent (%)
Childhood vaccines are essential for a child's health		
Strongly agree	169	40.1
Agree	128	30.3
Neither agree nor disagree	63	14.9
Disagree	24	5.7
Strongly disagree	38	9.0
Total	422	100.0
Getting vaccines is a good way to protect children from diseases		
Strongly agree	217	51.4
Agree	112	26.5
Neither agree nor disagree	36	8.5
Disagree	34	8.1
Strongly disagree	23	5.5
Total	422	100.0
Measles vaccine is received at nine months		
Strongly agree	178	42.3
Agree	66	15.6
Neither agree nor disagree	18	4.3
Disagree	104	24.6
Strongly disagree	56	13.2
Total	422	100.0
The vaccination schedule should be completed within twelve months		
Strongly agree	76	18.0
Agree	58	13.7
Neither agree nor disagree	161	38.2
Disagree	56	13.3
Strongly disagree	71	16.8
Total	422	100
Oral polio should be received three times		

Variables	Frequency (n)	Percent (%)
Strongly agree	15	3.6
Agree	33	7.8
Neither agree nor disagree	224	53.1
Disagree	52	12.3
Strongly disagree	98	23.2
Total	422	100

Source: Author's Computation, (2022)

ii. *Summary of Participant's Perceptions towards Child Vaccination*

Most respondent's perceptions were assessed regarding child vaccination. Specific perceptions are classified into six classes: (i) many communities and caregivers reject routine immunization due to rumors, incorrect information, and fear; (ii) lack of confidence and trust in routine immunization as effective health interventions appear to be relatively common in all parts of Nigeria; (iii) routine immunization is to depopulate the community; (iv) routine immunization will make children impotent when they grow up; (v) afraid that child/children will be infected with a virus; and (vi) it is not a crime in my religion to be vaccinated (see Table 5). They are categorized by frequency in the included works, regarded below as 'n'. In conclusion, the most regularly stated perceptions consisted of many communities and caregivers reject routine immunization due to rumors, incorrect information, and fear (n = 269, 53.8%); lack of confidence and trust in routine immunization as effective health interventions appears to be relatively common in all parts of Nigeria (n = 216, 51.2%); routine immunization is to depopulate the community (n = 213, 50.4%); routine immunization will make children impotent when they grow up (n = 264, 62.6%); afraid that child/children will be infected with a virus (n= 193, 45.8%); and it is not a crime in my religion to be vaccinated (n =298, 70.6 %). Generally, perception was evaluated with the composite immunization perception score of participants, which signified 30.6% for good perception and 69.4% for poor perception concerning immunization. Good perception was obtained more among participants in Ibadan South East (39.9%) likened to Ibadan North (19.6%) as displayed in Figure 8.

Table 5: Summary of Participant's Perceptions towards Child Vaccination

Variables	Frequency (n)	Percentage (%)
Many communities and caregivers reject routine immunization due to rumors, incorrect information, and fear		
Strongly agree	154	36.5
Agree	115	27.3
Neither agree nor disagree	54	12.8
Disagree	43	10.2
Strongly disagree	56	13.2
Total	422	100.0
Lack of confidence and trust in routine immunization as effective health intervention appears to be relatively common in all parts of Nigeria		
Strongly agree	113	26.8
Agree	103	24.4
Neither agree nor disagree	59	13.9
Disagree	78	18.5
Strongly disagree	69	16.4
Total	422	100
Routine immunization is to depopulate the community		
Strongly agree	62	14.7
Agree	53	12.6
Neither agree nor disagree	94	22.3

Variables	Frequency (n)	Percentage (%)
Disagree	112	26.5
Strongly disagree	101	23.9
Total	422	100
Routine immunization will make children impotent when they grow up		
Strongly agree	61	14.4
Agree	40	9.5
Neither agree nor disagree	57	13.5
Disagree	121	28.7
Strongly disagree	143	33.9
Total	422	100
Afraid that child/children will be infected with a virus		
Strongly agree	77	18.3
Agree	58	13.7
Neither agree nor disagree	94	22.2
Disagree	110	26.1
Strongly disagree	83	19.7
Total	422	100
It is not a crime in my religion to be vaccinated		
Strongly agree	144	34.1
Agree	154	36.5
Neither agree nor disagree	8	1.9
Disagree	94	22.3
Strongly disagree	22	5.2
Total	422	100

Source: Author's Computation, (2022)

iii. *Summary of Participant's Perceived Barriers to Child Vaccination*

Most participants perceived barriers to child vaccination. Specific perceived barriers are classified into nine subtitles: (i) health staff who deal with mothers in an unfavorable, rude, and sometimes abusive manner were found to be associated with the mother's refusal for bringing children for vaccination; (ii) health workers shouting at mothers who forgot to bring their children's immunization record cards or missed scheduled appointments affects the completion of RI services; (iii) behaviour of healthcare workers could undermine trust in the health workers and could also discourage caregivers from listening to health education messages; (iv) healthcare workers with calm and friendly attitude towards caregivers increases respond to vaccination information during RI session; (v) lack of confidence in healthcare workers made me not complete my child's immunization; (vi) lack of vehicular movement hinders my child immunization; (vii) mothers that are domiciled near a health facility providing RI services are more likely to fully immunize their children than those living in areas where there are no health facilities providing RI close to them; (viii) long walking distances, as well as long waiting time at the facility, are critical factors associated with poor completion of RI schedules ; and (ix) lack of good roads to health centre affected my child's immunization completion (see Table 6). Perceived barriers for non-vaccination of mothers/caregivers of children aged 9 to 12 months who were not or partially vaccinated in the Ibadan North and Ibadan South East health district in 2022. Four hundred and twenty-two mothers/caregivers of children aged 9 to 12 months who were not or partially vaccinated gave the reasons for not vaccinating their child. Health staff who deal with mothers in an unfavorable, rude, and sometimes abusive manner (n = 368, 87.2%); health workers shouting at mothers who forgot to bring their children's immunization record cards or missed scheduled appointments affects the completion of RI services (n= 337, 79.8%); behaviour of healthcare workers could undermine trust in the health workers and could also discourage caregivers from listening to health education messages (n= 335, 79.3%); healthcare workers with

calm and friendly attitude towards caregivers increases respond to vaccination information during RI session (n=345, 77.7%); lack of confidence in HCWs made me not complete my child's immunization (n=299, 70.8%); lack of vehicular movement hinders my child immunization (n= 292, 69.2%); mothers that are domiciled near a health facility providing RI services are more likely to fully immunize their children than those living in areas where there are no health facilities providing RI close to them (n= 333, 78.9%); long walking distances, as well as long waiting time at the facility, are critical factors associated with poor completion of RI schedules (n= 334, 78.1%); and lack of good roads to health centre affected my child's immunization completion (n= 325, 77.0%) were the nine reasons most frequently mentioned.

Table 6: Summary of Participant's Perceived Barriers to Child Vaccination

Variables	Frequency (n)	Percent (%)
Health staff who deal with mothers in an unfavorable, rude, and sometimes abusive manner were found to be associated with the mother's refusal to bring children for vaccination.		
Strongly agree	197	46.7
Agree	171	40.5
Neither agree nor disagree	3	0.7
Disagree	31	7.4
Strongly disagree	20	4.7
Total	422	100
Health workers screaming at mothers who forgot to bring their children's immunization record cards or missed scheduled appointments affect the completion of RI services		
Strongly agree	162	38.4
Agree	175	41.4
Neither agree nor disagree	8	1.9
Disagree	65	15.5
Strongly disagree	12	2.8
Total	422	100
Behaviour of healthcare workers could undermine trust in the health workers and could also discourage caregivers from listening to health education messages.		
Strongly agree	195	46.2
Agree	140	33.1
Neither agree nor disagree	8	1.9
Disagree	59	14.0
Strongly disagree	20	2.8
Total	422	100
HCWs with calm and friendly attitudes towards caregivers increase response to vaccination information during RI sessions.		
Strongly agree	186	40.0
Agree	159	37.7
Neither agree nor disagree	2	0.5
Disagree	56	13.3
Strongly disagree	19	4.5
Total	422	100
Lack of confidence in healthcare workers made me not complete my child's immunization.		
Strongly agree	176	41.7
Agree	123	29.1
Neither agree nor disagree	11	2.6
Disagree	94	22.3

Strongly disagree	18	4.3
Lack of vehicular movement hinders my child's immunization		
Strongly agree	147	34.8
Agree	145	34.4
Neither agree nor disagree	11	2.6
Disagree	95	22.5
Strongly disagree	24	5.7
Total	422	100
Mothers who are domiciled near a health facility providing RI services are more likely to fully immunize their children than those living in areas where there are no health facilities are providing RI close to them.		
Strongly agree	187	44.3
Agree	146	34.6
Neither agree nor disagree	12	2.8
Disagree	59	13.9
Strongly disagree	18	4.4
Long walking distances, as well as long waiting times at the facility, are critical factors associated with poor completion of RI schedules		
Strongly agree	158	37.4
Agree	176	41.7
Neither agree nor disagree	14	3.3
Disagree	61	14.5
Strongly disagree	13	3.1
Total	422	100
The lack of good roads to the health center affected my child's immunization completion		
Strongly agree	196	46.4
Agree	129	30.6
Neither agree nor disagree	13	3.1
Disagree	68	16.1
Strongly disagree	16	3.8
Total	422	100

Source: Author's Computation, (2022)

iv. *Summary of Associated Factors with Child Immunization Coverage in Ibadan North and South East Primary Healthcare Centers*

Associated factors with child immunization coverage in 9-12 months children are classified into ten subheadings: (i) knowledge of vaccination; (ii) perception of child vaccination; (iii) LGA; (iv) age category; (v) occupation; (vi) number of children; (vii) marital status; (viii) academic status; (ix) monthly income; and (x) religion (see Table 7). They are categorized by frequency of inclusion in the works investigated, regarded as 'n' (see also Table 7). In short, the most often determinant factors for estimating child immunization coverage utilizing Chi-square were: knowledge of vaccination (23.544), perception of child vaccination (27.528), LGA (1.293), age category (4.034), occupation (27.318), number of children (8.316), marital status (7.734), educational qualification (27.318), monthly income (20.521); and religion factors (1.091).

Multivariable regression analysis to model employing the probability ratio technique (forward: LR) was used to estimate the share of association between vaccination knowledge, perception, and socio-demographic factors in the prediction of the complete vaccination among children while controlling for the confounders. This analysis revealed that knowledge of vaccination was the significant predictors of vaccination coverage. Among these three variables (e.g., knowledge, perception, and socio-demographic factors), the level of knowledge was the most influential factor in this respect (AOR: 0.34, CI: 0.19 – 0.58, $p<0.001$), followed by the level of perception (AOR: 0.28, CI: 0.16 – 0.47, $p<0.001$). Generally, the likelihoods of exposure to complete immunization coverage were 0.34 and 0.28, respectively (see Table7).

Table 7: Summary of Associated Factors with Child Immunization Coverage using Chi- Square

Factors	Received less than five vaccines at nine months and above		Received all five vaccines at nine months and above		Total	X^2	*P*
	N	%	N	%			
Knowledge of Vaccination							
Low knowledge	175	70.3	74	29.7	249	**23.544**	**0.000**
High knowledge	81	46.8	92	53.2	173		
Total	256	60.7	166	39.3	422		
Perception of child vaccination							
Poor perception	202	68.9	91	31.1	293	**27.528**	**0.000**
Good perception	54	41.9	75	58.1	129		
Total	256	60.7	166	39.3	422		
LGA							
Ibadan North	112	57.7	82	42.3	194	1.293	0.255
Ibadan South East	144	63.2	84	36.8	228		
Total	256	60.7	166	39.3	422		
Age category							
14 to 18 years	8	72.7	3	27.3	11	4.034	0.401
19 to 23 years	28	65.1	15	34.9	43		
24 to 28 years	88	55.0	72	45.0	160		
29 to 33 years	70	64.8	38	35.2	108		
34 years and above	62	62.0	38	38.0	100		
Total	256	60.7	166	39.3	422		
Occupation							
Housewife	41	62.1	25	37.9	66	**27.318**	**0.000**
Trader	144	70.9	59	29.1	203		
Artisan	13	37.1	22	62.9	35		
Skilled worker	27	50.9	26	49.1	53		
Civil servant	26	44.1	33	55.9	59		
Other, specify	2	100.0	0	0.0	2		
Total	253	60.5	165	39.5	418		
Number of children							
1-2 children	75	51.4	71	48.6	146	**8.316**	**0.000**
3-4 Children	160	66.1	82	33.9	242		
Five or more children	21	61.8	13	38.2	34		
Total	256	60.7	166	39.3	422		
Marital Status							
Single	1	16.7	5	83.3	6	7.734	0.052
Married	250	61.4	157	38.6	407		
Cohabiting	1	100.0	0	0.0	1		
Widowed/separated	1	25.0	3	75.0	4		
Total	253	60.5	165	39.5	418		
Educational Qualification							
No formal education	22	81.5	5	18.5	27	**27.318**	**0.000**
Primary education	71	76.3	22	23.7	93		
Secondary education	77	63.1	45	36.9	122		
Higher education	86	47.8	94	52.2	87		
Total	256	60.7	166	39.3	422		

Factors	Received less than five vaccines at nine months and above		Received all five vaccines at nine months and above		Total	X^2	*P*
Monthly Income							
0 - 18,0000	121	69.9	52	30.1	173	**20.521**	**0.000**
18,000-40,000	57	45.2	69	54.8	126		
41,000-60,000	31	59.6	21	40.4	52		
61,000-80,000	20	60.6	13	39.4	33		
81,000 and above	25	71.4	10	28.6	35		
Total	254	60.6	165	39.4	419		
Religion							
Christianity	101	58.0	73	42.0	174	1.091	0.580
Islam	150	62.2	91	37.8	241		
Others	5	71.4	2	28.6	7		
Total	256	60.7	166	39.3	422		

Source: Author' Computation, (2022)

IV. Discussion of Findings

By result of this work, the status of immunization coverage varies in both Local Government Areas and vaccine. Coverage of many vaccines were high while few were low. The pentavalent vaccine had the maximum (79%) overall mean coverage in both Ibadan North (92%) and Ibadan South East (66%). Polio immunization coverage comes next to that of pentavalent with overall mean coverage rate (77.7%) in Ibadan North (92.3%) and Ibadan Southeast (65.4%), respectively. Pneumonia had an overall vaccine rate (68.3%) with Ibadan North (87%) and Ibadan South East (49.6%). Measles overall vaccination rate (62.3%) with Ibadan North had (59.3%) and Ibadan South East (64.9%). Yellow fever overall injection rate (59%) with Ibadan North (59%) and Ibadan South East (60%), respectively. It is clear from the finding of study that pentavalent, polio, pneumonia, measles, and yellow-fever vaccine had coverage rate that were above average in both LGAs. Notwithstanding, the coverage of pentavalent, polio, and pneumonia vaccines were more in Ibadan North relative to Ibadan South East, while measles injection rate was more remarkable in Ibadan South East than Ibadan North and the rate is just at the same range for yellow-fever in both LGAs. The immunization status in Ibadan North and Ibadan South East were poor likened to the result in a survey carried out in Osun State Nigeria that detected 80% coverage rate for all antigens administered at birth. These vaccines (BCG, OPV0, and HBV1) had greater coverage levels *(Adedire et al., 2016).*

Furthermore, results signified that the percentage of missed vaccination was lower in Ibadan North (14%) with Ibadan South East (43.9%) and primary reason for missed vaccination is child sickness, the rest reasons indicated were no vaccine at the clinic and long waiting time at the health center. The work obtained complete immunization coverage for all five vaccines at 39.3%. The status of immunization coverage in this work is likewise related to Ibadan North East and Ido by *Fatiregun et al. (2013),* which revealed that the weighted complete injection coverage was 40.2% and 41.3% in Ibadan North East and Ido, respectively.

Our results showed that awareness and knowledge of vaccines among mothers/caregiver were high, more significant part (70%) of participants were conscious that childhood vaccines were crucial for the child and significant percentage (78%) expressed that receiving vaccines for their child is a best method to immune the child from illnesses. Notwithstanding, caregivers understanding on particular immunization information like vaccination date for all injections were not very sufficient because more significant part of them counts on records on vaccination cards and database offered by health personnel.

About perception, just 39.9% of sampled caregivers in Ibadan South East had good perception concerning immunization and few (19.6%) had good perception toward immunization in Ibadan North. More significant part of the sampled respondents are still of the notion that vaccination may be utilized to depopulate the society and children may become infertile or affected with virus. The result of this analysis is related to the deduction of *Fatiregun et al. (2013)* result that shows that non-completion of immunization or non-immunization is mostly be as a result of unawareness regarding injection schedule and fear of aftermaths of vaccination.

Hints on factors associated with poor immunization coverage indicate that more significant part (64%) of caregivers assumed that rumors of aftermaths, inadequate information, and fear inhibit complete immunization coverage in both Ibadan North and Ibadan South East. The rest indicated factors resulting in mothers rebuff to bring children for vaccination are related to negative attitude of health personnel. For health officer attitude causing hindrance

to complete immunization program, this work is not the just work that detects the attitude and conduct of health officers as hindrance to immunization coverage. The study by *Rahji and Ndikom (2013),* determined in Ibadan too concur that health providers' attitude is a factor hinders conformity with vaccination schedules. Most mother/caregivers may find it hard to relate sufficiently with some health officers and this poor relational association may deter the immunization completion.

Our results also revealed that caregivers' understanding of vaccination, perception concerning vaccination, and the socio-demographic, for example, academic status, mothers' profession, and earnings, are all related to complete immunization in children. Mothers/caregivers who have a good knowledge of vaccination had significantly higher proportion of their children who acquired all five vaccines. Also, mothers/caregivers with poor perception of child vaccination had a reduced percentage of their children obtaining all five vaccinations. Other factors that indicated statistical significance with vaccination coverage were work, parity, academic status, and earnings. Nevertheless, age of the mothers/caregivers was not statistically associated with immunization coverage rate. This result is in harmony with the result in Bungudu, Zamfara State, North West Nigeria *(Adedokun et al., 2017),* signified that degree of knowledge on RI and obtaining at a minimum secondary school is considerably related to complete immunization. Likewise, this study is in agreement with the Abdulraheem *et al.* (2020) finding that indicates that there is no statistical differences about immunization fullness as a result of determinants like marital level, age of mothers', and sex of the child. Thus, the results of this work and previous literature affirmed the reality that the academic status of the mother/caregiver is more crucial to immunization coverage than the rest of demographic factors like age or marital level; this could be a result of the truth that there is no age that is most likely be excessive or inadequate for dissemination of information, any person at any age class or marital level could fathom and use any medical associated information specified by health workers.

Moreover, *Shelton et al. (2013)* deduced in their work that the profession of mothers/caregivers can deter the completion of immunization in children. Occupation schedule particularly in public servants are continuously hard to change, so mothers who fall under this group of labor force who usually resume at 8 in the morning which is the similar time appoint for most immunization appointment may find it hard to attend all injection schedules. Likewise, result from this work is in harmony with the Ethiopian research which ascribed unawareness concerning immunization to poor coverage. The work too asserted that children of mothers that understood the age in which vaccination needs to begin and finishes have the probability to finish vaccination appointment likened to those whose mothers are uneducated of RI appointment *(Shelton et al., 2013).*

V. Conclusion

Immunization is directed at the averting of infectious diseases and it is a crucial community medical intervention and a cost-efficient approach to decline fatality and morbidity related to infectious diseases. Complete immunization coverage for all the five vaccines in Ibadan North and Ibadan South East is low relative to the WHO guideline limit. Notwithstanding, a few critical child vaccine like pentavalent, polio, pneumonia, measles, and yellow-fever vaccine had coverage level that were more than average in both LGAs. Causes for missed vaccination were child sickness, lack of vaccine at the health center, long waiting time at the medical building, and poor attitude of health personnel. Conscious and understanding of vaccines among caregiver in both Ibadan North and Ibadan South East were high and knowledge of childhood vaccines were crucial to adequate vaccination of children. Mothers/caregivers' understanding of vaccination, perception regarding immunization and the socio-demographic like academic qualification, mothers' profession, and earnings were all related to complete vaccination in children. Mothers/caregivers who have good knowledge on immunization had considerably more significant proportion of their children who had all five vaccines. Similarly, mothers/caregivers with low perception of child immunization have a reduced proportion of their children getting all five vaccinations. Other factors that demonstrated statistical differences with immunization coverage are profession, parity, academic level, and earnings. Nevertheless, age of mothers/caregiver was not significantly associated with vaccination coverage status. This study recommended that health officers and health educators need to stress the significance of immunization and also attempt to decry all the wrong beliefs and negative attitudes on immunization.

VI. Limitation of the Study

The following are limitations to the work:

1. Participants Potential Social Desirability, bias among participants, and the truth that causality from a cross sectional study cannot be determined and there is limitation to potential generalization of results.
2. *Participants Attitude:* Because of the nature of technique of gathering data (Kobo Collect) which is unpopular not like printed questionnaire, the participants felt hesitant to answers the question willingly as anticipated but with compelling clarification and education, they thereafter concurred.

3. *COVID-19 Pandemic Associated Factors:* The pandemic which has led to a new rule of wearing masks and physical distancing hindered the participants to willingly relate but after several episodes of data gathering they conformed.

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Statement of Competing Interests

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Abbreviations:

EPI: Expanded Program on Immunization;

GAVI: Global Alliance for Vaccines and Immunization;
WHO: World Health Organization;

DTP: diphtheria, tetanus, and pertussis vaccine;

HDI: Human Development Index;

USA: United States of America;

PHC: Primary Health Care service;

RI: Routine immunization; HCWs: healthcare workers

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Epidemiologico-Etiological Profile of Anemia in Children Aged 5-16 Years Attending a Tertiary Care Centre

By Bansi Jitendra Seta, Mohmad Uvesh Chauhan, Priya Marwah & Munish Kumar Kakkar

Abstract- *Background:* Anemia is a condition where the body lacks enough healthy red blood cells or hemoglobin to carry adequate oxygen to tissues and organs. This can lead to symptoms like fatigue, weakness, and pale skin. Causes include nutritional deficiencies (e.g., iron, vitamin B12), chronic diseases, genetic disorders, and blood loss. Treatment depends on the underlying cause and may involve dietary changes, supplements, or medications.

Material and Methods: In this hospital based observational study, data were on epidemiology, clinical characteristics and laboratory findings of our study population from the medical records and filled up the pre-designed proforma. We categorized our study subjects into Rural and Urban on the basis of addresses they provided in their hospital records (as per aim of the study). Based on investigations findings, we further categorized the etiological factors into Nutritional and Non-nutritional causes.

Keywords: *anemia, nutritional, non-nutritional.*

GJMR-K Classification: *NLMC: WH 155*

Strictly as per the compliance and regulations of:

Epidemiologico-Etiological Profile of Anemia in Children Aged 5-16 Years Attending a Tertiary Care Centre

Bansi Jitendra Seta [α], Mohmad Uvesh Chauhan [σ], Priya Marwah [ρ] & Munish Kumar Kakkar [ω]

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Results: 66.3% of participants were aged 5-11 years, and 33.7% were aged 12-16 years. Moderate anemia was most prevalent among younger children (5-11 years), while severe anemia was more common in older children (12-16 years). A statistically significant association was found between age group and gender, and between severity of anemia and age groups.

Conclusion: The high prevalence of non-nutritional anemia underscores the necessity for public health strategies that go beyond dietary interventions. Addressing environmental, genetic, and chronic disease factors is crucial.

Keywords: anemia, nutritional, non-nutritional.

I. Introduction

Anemia is a sign which is present when the blood hemoglobin level is two standard deviations below the mean for particular age and sex.

Anemia leads to decreased oxygen-carrying capacity of blood. It, thus, leads to compensatory physiological adaptations in form of increase in plasma volume and redistribution of blood flow to maintain the volume of blood; increase in cardiac output as a consequence of increased stroke volume, to increase the oxygen delivery to tissues by increasing blood flow. [1,2.]

Anemia, a *worldwide public health problem*, is affecting both the developing and developed countries[3]. Globally, it affects 22.8 % of the world's population i.e. 1.74 billion people of which 25.4 % i.e. 305 million people are the school going aged children [4.]

In the one-fourth of global population estimated to be anemic, cases are rapidly increasing for children younger than 5 years of age, young girls, expectant mothers and women. Studies showed increase of 420 million cases of anemia globally over three decades with total 1.92 billion people being affected with anemia in 2021 [5,6].

In *India*, nearly one-fourth of the children i.e. 23.5% of age 5-9 years had anemia. The prevalence of anemia among children was *highest in Tripura* i.e. 41.1% and was *lowest in Kerala* i.e. 3.1% [7].

The aim of our study was to assess the status of anemia in Rural and Urban children aged 5-16 years and compare the prevalence of anemia in Rural and Urban children aged 5-16 years and further to evaluate the etiological profile of anemia in children aged 5-16 years.

II. Methodology

The Hospital based Observational Study was conducted at Mahatma and Medical College & Hospital, Jaipur, Rajasthan We included Children of age group: 5-16 your both boys and girls, who came to our Tertiary Care Centre during August 2022- December 2023 (for observational study).

We collected data on epidemiology, clinical characteristics and laboratory findings of our study population from the medical records and filled up the predesigned proforma Relevant history taking was done in form of dietary history, menstrual history (if applicable).

Laboratory workup was done in all patients which included routine Investigations like CBC and Peripheral Blood Film. Further workup in form of Reticulocyte count, Coombs test, Ferritin levels and High Performance Liquid Chromatography (HPLC), was done as per requirement to look for etiology.

We categorized our study subjects into Rural and Urban on the basis of addresses they provided in

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their hospital records (as per aim of the study). Based on investigations findings, we further categorized the etiological factors into Nutritional and Non- nutritional causes.

III. Statistical Analysis

The data collected were entered into MS Office Excel Worksheet Appropriate statistical test were wed to find the Significant Association. P value < 0.05 was considered to be statistically significant. The data collected was analysed using SPSS Software version 25. The data were expressed in terms of frequency and percentage. Mean and Standard Deviation (50) were calculated fat various parameters.

IV. Results

Anemia is a critical global health issue that affects growth and development especially in children. The present study investigates the prevalence of anemia among children aged 5-16 years in rural and urban areas, utilizing data from Mahatma Gandhi Medical College & Hospital, Jaipur, Rajasthan.

66.3% of participants were aged 5-11 years, and 33.7% were aged 12-16 years.

Moderate anemia was most prevalent among younger children (5-11 years), while severe anemia was more common in older children (12-16 years).

No significant association between gender and locality was observed.

A statistically significant association was found between age group and gender as depicted in Table 1, and between severity of anemia and age groups as depicted in Table 2.

V. Discussion

Anemia is a significant global health problem affecting children and reproductive age women. This Hospital based observational study was conducted at Mahatma Gandhi Medical College & Hospital, Jaipur, Rajasthan, with the aim to study the prevalence of anemia in rural and urban areas, of children aged 5-16 years, and also to study the epidemiological and etliological profile of anemia in the pediatric patients. A total 101 cases of anemic pediatric patients, aged 5-16 years who gave consent, were included.

In our study, out of total 101 cases, 46 i.e. 45.5% were female and 55 (54.4%) were male. Out of these total 101 cases, 41(40.8%) reside in rural areas, while 60 (59.4%) reside in urban areas. Distributing gender according to the locality, the present study shows that of the 46 females, 14 (34.14%) are from rural areas and 32 (53.33%) are from urban areas. Among the 55 males, 27 (65.85%) are from rural areas and 28 (46.66%) are from urban areas. No significant association was found between gender and locality.

Shikha Sharma et al (2018)[8] observed in her study that out of 210 school-going children. 56.66% were boys and 43.33% were girls. Out of 210 cases, 110 were from rural areas of Jammu district and 100 were from urban areas. Out of the 110 children from rural areas 55.45% were males and 44.54% were females. Out of 100 children from urban areas 58% were males and 42% were females.

Mathew AC et al (2023)[9] published a study which showed that the prevalence of anemia was higher among female children compared to male children.

We observed that out of total 101 cases, nutritional anemia affected 15 individuals (14.85%) whereas non-nutritional anaemia affected 86 individuals (85.14%) Distributing between genders, among females, 6 (13.04%) had nutritional anemia and 40 (86.95%) had non-nutritional anaemia. Among males, 9 (16.36%) had nutritional 46 (83.63%) had non-nutritional anaemia. In rural areas, & individuals (1463%) nutritional anaemia and 35 (85.36%) have non- nutritional anaemia. In urban areas, 9 (15%) base nutritional anaemia and 51 185%) have non-nutritional anaemia.

Kokku P K et al (2021)[10] showed in his study, that majority of the children 80.14% were diagnosed to have iron deficiency anemia, 4.97% children had features suggestive of megaloblastic anemia, 2.9% children had Thalassemia major.

Aradhana Kankane et al (2023)[11] included 100 patients of ages 10-19 years in her study, out of which maximum cases (48%) belonged to 10-12 years of age, followed by 40% of cases of 13-15 years and 12% of cases of 16-19 years. 33% of participants were male and 67% were female. The majority of adolescents enrolled in this study were found to have IDA comprising 36% of cases. Vitamin B12 deficiency was found to be the second-most common cause. 30% of cases, had non-nutritional anaemia.

In our study, we categorized the sample population in to two age groups one group comprising 5-11 years aged children and other group comprising 12-16 years aged children Among the 101 individuals, 67 (i.e. 66.3%) are aged between 5 and 11 years, while 34 tie 17%) are aged between 12 and 16 years Among those aged 5 to 11 years, there are 31 males and 36 females, out of total 67 individuals. Among those aged 12 to 16 years, there are 24 males and 10 females, out of total 34 individuals p-value: 0.041 Significant association between age group and gender was found in our study. Further, distribution of types of anaemia across different age groups showed that among those aged 5 to 11 years, 11 individuals have nutritional anaemia and 56 have non-nutritional anaemia. Among those aged 12 to 16 years, 4 individuals have nutritional anaemia and 30 have non-nutritional anaemia.

Harshpal Singh Sachdev et al (2021)[12] showed that their study's haemoglobin cut-offs defined a lower prevalence of anaemia in children and adolescents

throughout the age range of 1-19 years compared with the anaemia prevalence derived from WHO cut-offs. The gap between the two prevalence estimates was 19-2 percentage points, with marked gaps for ages 1- 4 years and 15-19 years, but a lower gap for 5-14 years. The gap in anaemia prevalence was higher for boys than girls aged 1-4 years, almost similar in both sexes for 5-9 years, and substantially higher for girls aged 10 years or older.

In our study, using the WHO standards for defining severity, it was found that among age group 5-11 years, out of total 67 children, 8 (11.9%) had mild anemia, 36 (53.7%) had moderate anemia, and 23 (34.3%) had severe anemia. While among age group 12-16 years, out of total 34 children, 5 had mild anemia, 9 had moderate anemia, and 20 had severe anemia. Thus, it was seen that in the 5-11 years' age group moderate anemia is the most prevalent (53.7%), followed by severe anemia (34.3%), and next mild anemia (11.9%). While in the 12-16 years' age group, severe anemia is the most prevalent (58.8%), followed by moderate anemia (26.5%), and then mild anemia (14.7%). This shows the noticeable increase in proportion of severe anemia from theyounger age group 43% to the older age group (58.8%) {p-value: 0.02} There is statistically significant association between the severity of anemia and age groups.

Scott et al (2021)[13] stated in his study that in terms of severity, 17.6% of adolescents had mild anemia, 10.0% had moderate anaemia and 0.9% had severe anemia.

Singh et al (2022)[14] stated that nearly 60% came in the mild anemic category both in the urban and rural area followed by moderate and severe anemia being least in rural area.

VI. Conclusion

The high prevalence of non-nutritional anemia underscores the necessity for public health strategies that go beyond dietary interventions. Addressing environmental, genetic, and chronic disease factors is crucial, Strengthening the healthcare system to include comprehensive screening and diagnostic services for identifying and managing non-nutritional causes of anemia is vital. There is a need for robust educational programs aimed at raising awareness about the various non-nutritional causes of anemia among parents, teachers, and children. Policies should be developed to include measures that address the non-nutritional causes.

VII. Limitations

Our Study has following limitations

1. *Sample Size:* The sample size of 101 may not be representative of the broader population, limiting the generalizability of the findings.
2. *Cross-Sectional Nature:* The cross-sectional design of the study limits the ability to establish causal relationships between anemia and its determinants.
3. *Geographical Scope:* Our study is confined to a single hospital in Jaipur, Rajasthan which may not reflect the anemia prevalence and factors in other regions.
4. *Data Collection:* Reliance on medical records and self-reported data might introduce biases and inaccuracies.

VIII. Recommendations

These limitations suggest the need for larger, multi-centric studies to validate the findings and develop more effective anemia prevention and treatment strategies. Continued research and policy efforts are essential to mitigate the impact of anemia on children's health and development.

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Table 1: Types of Anaemia According to Age Group

Age Group	Nutritional	Non-Nutritional	Total
5 years - 11 years	11	56	67
12 years - 16 years	4	30	34
Total	15	86	101
Chi square = 0.106, df =1, P = 0.74			

Table 2: Severity of Anaemia According to Age Group

	5-11 Years	12-16 Years
Mild	8 (11.9%)	5 (14.7%)
Moderate	36 (53.7%)	9 (26.5%)
Severe	23 (34.3%)	20 (58.8%)
Total	67 (100%)	34 (100%)
Chi square = 7.074, df = 2, P = 0.02		

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Impact of Reducing Intermammary Cleavage Gap on Breast Shape and Aesthetics in Hybrid Breast Augmentation: A Case Series

By Dr. Rajat Gupta, Dr. Priya Bansal, Dr. Gautam Chaudhury & Dr. Ranjita Hegde

Abstract- *Background:* Hybrid breast augmentation, a combination of silicone implants and autologous fat grafting, is an innovative approach aimed at achieving natural aesthetics. This study evaluates its impact on reducing intermammary distance and improving cleavage aesthetics.

Methods: A retrospective analysis was conducted on 131 female patients (30–55 years) who underwent hybrid breast augmentation between January 2021 and September 2024. The procedure involved subfascial silicone implant placement and fat grafting to the superomedial breast quadrant. Fat was harvested from the abdominal or thigh areas. Outcomes included cleavage distance measurements and patient satisfaction assessed via Breast-Q© scores.

Results: Postoperative cleavage distance decreased significantly (mean reduction from 9.5 ± 1.23 cm to 4.74 ± 0.48 cm, $p < 0.0001$). Implant sizes ranged from 230 cc to 320 cc (mean 271.64 ± 24.2 cc), while fat grafting volumes ranged from 50 to 100 cc (mean 63.11 ± 11 cc). High patient satisfaction was reported, with 93.9% rating their experience as “very satisfied.” Minor complications (e.g., wide scars) were noted in only 3.1% of cases.

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Conclusion: Hybrid breast augmentation effectively reduces intermammary distance, enhances cleavage, and achieves high patient satisfaction with minimal complications. This method represents a reliable technique for improving breast aesthetics, warranting further exploration in diverse patient populations.

I. Introduction

Breast augmentation is among the most popular elective cosmetic surgeries, reflecting the growing demand for procedures that enhance both form and confidence. Over the past 20 years, innovations in surgical methods have significantly reduced complications and improved patient satisfaction. The breast implant is widely regarded as one of the most pivotal devices in the history of plastic and reconstructive surgery. However, despite half a century of technological advancements, revision rates for breast prostheses remain high, reported at 24% at 4 years and 36% at 10 years [1].

In recent years, the perception of an attractive breast has shifted towards a three-dimensional analyses, with particular attention to shape and preferred proportion patterns [2-5]. Despite this progress, the intermammary cleft (or cleavage) has been insufficiently studied, despite its critical importance in surgical outcomes and patient satisfaction. A major drawback of traditional breast implants is the potential for an unnatural appearance when the balance between soft tissue volume and implant volume is disrupted. Breast implants cannot change the footprint of the breasts, and although they enhance cup size, they do not modify intermammary distance. Many females desire a narrow cleavage distance along with breast augmentation [6,7].

Hybrid breast augmentation offers a solution by combining breast implants with autologous fat grafting to achieve a natural-looking breast contour while reducing the intermammary distance [8]. This technique aims to improve cleavage shape as well as achieve a natural look and feel, which is facilitated by fat grafting. Transferred fat also ensures that the steep curve of the implant take off of the breast mound is modified to a gentle slope, resulting in a more natural shape [9].

The purpose of this study is to evaluate the outcomes of hybrid breast augmentation, particularly its role in remodelling the medial cleavage and reducing the intermammary distance during breast implant surgery. Additionally, the study assesses patient satisfaction with this combined approach.

II. Methods

Between January 2021 and September 2024, 131 female patients presented with concerns regarding aesthetically unsatisfactory breasts and sought breast enlargement surgery. A retrospective study was conducted on these patients, all of whom underwent hybrid breast augmentation combining fat injections with silicone breast implants, resulting in 262 treated breasts.

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Patients received small- to moderate-volume fat grafts, which were harvested, processed, and implanted using standardized methods. The age range of the patients was 30 to 55 years. Exclusion criteria included an intermammary distance of less than 8 cm, smoking, and a BMI above 30 kg/m^2. None of the patients had pre-existing comorbidities. Written informed consent was obtained from all participants before inclusion in the study.

The surgical procedure involved subfascial breast augmentation using silicone implants with a no-touch technique. [Fig.1-4] Fat tissue was harvested from the abdominal or thigh area based on patient preference, following tumescent infiltration. Harvesting was performed using a 2.4-mm cannula, and the fat was processed and prepared for grafting.

Fat grafting was performed in the superomedial quadrant of the breast in a fan-like pattern using a 10-mL Luer-Lock syringe attached to a 1.2-mm bulb-tip cannula, until the pre-marked area was visually covered. The volume of fat injected per breast ranged from 50 to 100 mL.

All procedures were conducted under general anesthesia. A single dose of 1 g ceftriaxone was administered intravenously as a prophylactic antibiotic one hour before surgery. Patients were ambulated within 4 hours postoperatively and discharged with compression garments over the fat graft harvest areas and sports bras over the breasts.

Data were collected on patient demographics, implant volume, fat graft volume, preoperative and postoperative Breast-Q© scores, pre and 6 months post op measurements of intermammary distance (measurement of between medial most take off point of each breast) and complications. Follow-up evaluations were conducted at 48 hours, 1 week, 3 weeks, 6 weeks, and 6 months, with additional follow-ups scheduled as needed for reported complications. [Fig. 5-8] A statistical analysis was performed comparing preoperative and postoperative Breast-Q© scores. Mean for each part of the questionnaire were collected and compared using a t-test.

Based on Breast-Q© results, patients were classified as follows: "dissatisfied" (total score between 0 and 50), "satisfied" (total score between 51 and 75), and "very satisfied" (total score between 76 and 100).

III. Results

A total of 131 patients undergoing hybrid breast augmentation were followed up for six months, yielding satisfactory results in terms of achieving a natural feel, enhanced shape, and less visible scarring.

The age of the patients ranged from 30 to over 55 years, with a mean age of 46.5 ± 5.3 years. Most patients were in the 41–45 age group (32.1%) and 46–50 age group (31.3%), reflecting a preference for the procedure among individuals in midlife (Table 1).

Postoperative outcomes were favorable, with a mean cleavage distance of 9.5 ± 1.23 cm preoperatively, ranging from 8 cm to 13 cm. The postoperative cleavage distance was reduced to 4.74 ± 0.48 cm, ranging from 3.4 cm to 5.8 cm, demonstrating consistent and aesthetically pleasing results (Table 2). The change in cleavage distance was statistically significant ($p < 0.0001$).

Implant sizes ranged from 230 cc to 320 cc, with a mean implant size of 271.64 ± 24.2 cc (Table 3). Fat grafting volumes varied between 50 cc and 100 cc. The majority of the population (38.9%) received fat graft volumes in the 50–60 cc range, highlighting the individualized approach of combining implants with fat grafting to achieve optimal outcomes (Table 4).

The procedure demonstrated excellent safety, with no major complications reported in 96.9% of cases. A small percentage of patients (3.1%) experienced wide scars as the only complication.

Patient satisfaction was high, with 84.0% of patients dissatisfied preoperatively (score 0–50) and 93.9% highly satisfied postoperatively (score 76–100) (Table 5). The mean preoperative satisfaction score was 42.88 ± 19.3, while the mean postoperative score was 84.83 ± 7.6, statistically highly significant improvement ($p < 0.0001$).

Table 1: Age Distribution

Age (In Years) (n=131)	Frequency	Percentage
30-35	2	1.5
36-40	14	10.7
41-45	42	32.1
46-50	41	31.3
51-55	26	19.8
>55	6	4.6
Mean ± SD	46.5 ± 5.3	

Table 2: Cleavage Distance

Cleavage Distance (cm)	Pre - Operative	Post - Operative
Mean ± SD	9.5 ± 1.23	4.74 ± 0.48
Range	13 cm - 8 cm	5.8 cm - 3.4 cm
Median (IQR)	9 (1.5)	4.7 (0.6)
p value < 0.0001		

Table 3: Implant Size

Implant Size (in cc)	Frequency	Percentage
230 - 250	22	35.9
251 - 270	27	29.0
271 - 290	48	23.7
291 - 320	34	11.5
Mean ± SD	271.64 ± 24.2	

Table 4: Amount of Fat Grafted

Fat Grafted Range	Frequency	Percentage
50 - 60	51	38.9
61 - 70	33	25.2
71 - 80	27	20.6
81 - 90	14	10.7
91 - 100	6	4.6
Mean ± SD	63.11 ± 11	

Table 5: Patient Satisfaction

Satisfaction level	Operative (Frequency)	Percentage	Operative (Frequency)	Percentage
Dissatisfied (0 - 50)	110	4.0	1	0.8
Satisfied (51 - 75)	21	6.0	7	5.3
ghly Satisfied (76 - 100)	0	0	123	3.9
Mean ± SD	42.88 ± 19.3		84.83 ± 7.6	
p value < 0.0001				

IV. Discussion

Autologous fat transplantation has long been utilized in facial rejuvenation, but its application in breast surgery has been more limited and controversial. The practice of infiltrating the breast with fat has been debated since its introduction by Neuber over a century ago. Fat grafting to the breast gained renewed interest after the reversal of the 1987 American

Society of Plastic Surgeons' moratorium in 2008 [10]. Over the past two decades, autologous fat injection has gained significant acceptance as a viable soft tissue filler for both small- and large-volume applications. Bircoll (1987) was one of the first to report a case of breast augmentation performed using autologous fat grafts [11].

The primary advantage of composite breast augmentation lies in the ability of the surgeon to customize both the shape and size of the breast by working with two versatile, complementary materials placed in distinct planes. In composite breast augmentation, the core volume projection of the implant is managed, while the natural look and feel of fat are used as an overlay, providing additional volume where necessary. Asymmetries in soft-tissue volume can be addressed by using equal-sized implants and differential fat transplantation to achieve a more natural contour and cleavage [12].

Hybrid breast augmentation is ideal for patients seeking breast implants with the contour and feel of natural breast tissue. The technique combines the advantages of both implants and fat: implants provide core volume projection, while the fat layer enhances the aesthetic outcome, ensuring a natural look and feel [13].

Implants can sometimes appear unnatural without adequate coverage, particularly where they meet the surrounding tissue. The addition of autologous fat helps soften these lines, blending the implant more seamlessly with the surrounding tissue. Fat grafting procedures also assist in correcting breast asymmetries. Women with uneven breast sizes may benefit from this method, as fat can be strategically placed to balance the appearance, enhancing patient satisfaction [14].

The primary goal of hybrid breast augmentation is to enhance breast size and shape. Patients typically seek a more voluptuous look while maintaining natural softness. The combination of implants and fat provides the necessary volume and texture, resulting in a realistic and aesthetically pleasing outcome. This technique is especially appreciated by patients desiring a natural silhouette without sacrificing the firmness and projection offered by implants [15].

In our study, implants were inserted in the subfascial plane. In alignment with Maximiliano et al. [16], autologous fat grafts (AFG) were injected into the superomedial breast quadrant, within the subcutaneous plane, to achieve natural cleavage. The results were satisfactory, achieving balanced volume and shape. A satisfactory aesthetic outcome was attained, with a harmonious breast contour and smooth transition from the upper poles to the implant site.

Advancements in AFG techniques, along with the development of new- generation silicone gel prostheses, have significantly improved the aesthetic results of breast augmentation.[17] Our technique has demonstrated that it is a manageable and predictable procedure, yielding optimal aesthetic results with a harmonious contour, adequate size, and projection. Hybrid breast augmentation, therefore, holds the potential to play a significant role in aesthetic breast surgery, refining the field and providing patients with a natural yet enhanced breast appearance.

V. Conclusion

By ingeniously combining the volumizing power of implants with the natural enhancement of fat grafting, we achieve a harmonious balance between projection and a soft, authentic look.

Fat grafting enhances key aesthetic features-softening the intermammary cleft, creating fullness in the upper and medial poles, and ensuring perfect symmetry between the breasts.

However, to truly understand its full potential, further studies with diverse implant types and a broader patient population are crucial.

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Ethical Clearance/Statement of Ethics

The study was approved by the Gene Bandhu ethics committee. (Ref- ECG005/2025) The meeting was held on January 17, 2025.

Declaration of conflicts of interest statement if applicable
Authors declare no conflict of interests.

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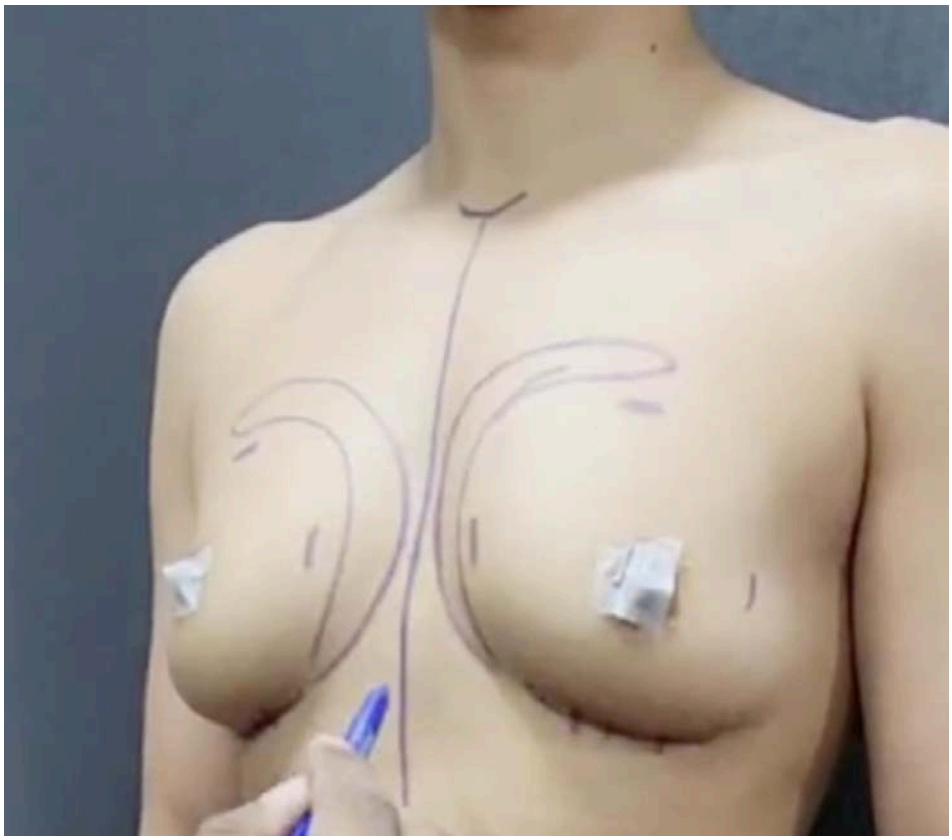

Fig. 1: Markings of the Procedure

Fig. 2: After Implant Placement, Fat Grafting Being Performed on Right Side using 1.2 Mm Cannula

Fig. 3: Fat Grafting Completed on Left Side (45cc Off At Transferred)

Fig. 4: Fat Grafting Being Performed on Left Side

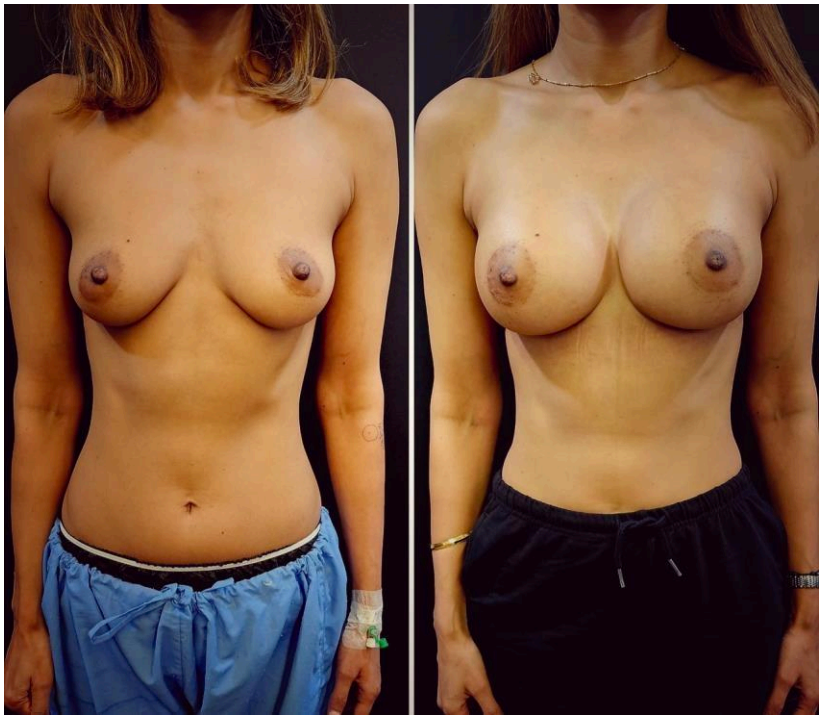

Fig. 5: Before and After of 27 Year Old, 6 Months after 285cc Smooth High Profile Implant In Sub Fascial Plane with 55cc Fat Grafting one Ach Side

Fig. 6: Before and After of 38 Year Old Tuberous Breast Deformity Correction, 6 Months after 275cc Smooth High Profile Implant in Sub Fascial Plane with 75cc Fat Grafting one Ach Side

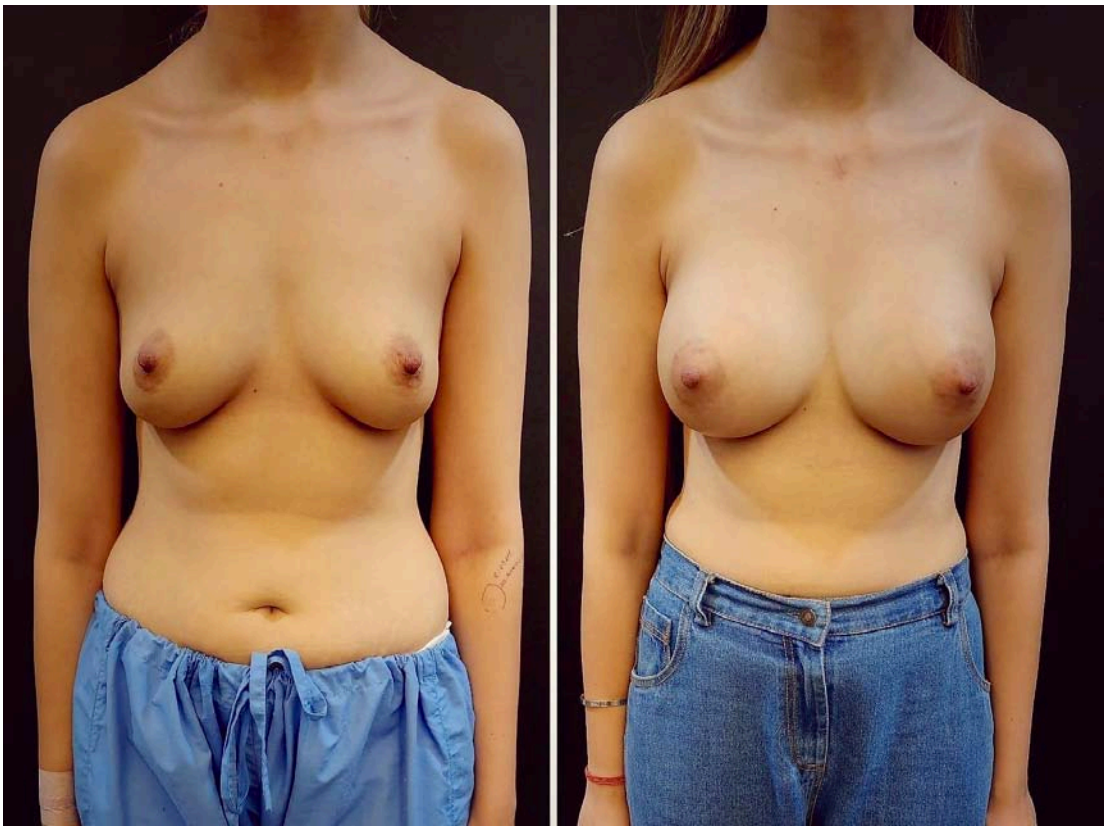

Fig. 7: Before and After of 34 Year Old, 6 Months after 235 cc Smooth High Profile Implant in Sub Fascial Plane with 45cc Fat Grafting one Ach Side

Fig. 8: Before and After of 33 Year Old, 6 Months after 305cc Smooth High Profile Implant in Sub Fascial Plane with 40 cc Fat Grafting One Ach Side

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Fellows/Associates of Medical Research Council

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- Author name in font size of 11 in one column.
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- First character must be three lines drop-capped.
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- Line spacing of 1 pt.
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- The names of first main headings (Heading 1) must be in Roman font, capital letters, and font size of 10.
- The names of second main headings (Heading 2) must not include numbers and must be in italics with a font size of 10.

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d) An introduction, giving fundamental background objectives.
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19. Refresh your mind after intervals: Try to give your mind a rest by listening to soft music or sleeping in intervals. This will also improve your memory. Acquire colleagues: Always try to acquire colleagues. No matter how sharp you are, if you acquire colleagues, they can give you ideas which will be helpful to your research.

20. Think technically: Always think technically. If anything happens, search for its reasons, benefits, and demerits. Think and then print: When you go to print your paper, check that tables are not split, headings are not detached from their descriptions, and page sequence is maintained.

21. Adding unnecessary information: Do not add unnecessary information like "I have used MS Excel to draw graphs." Irrelevant and inappropriate material is superfluous. Foreign terminology and phrases are not apropos. One should never take a broad view. Analogy is like feathers on a snake. Use words properly, regardless of how others use them. Remove quotations. Puns are for kids, not grunt readers. Never oversimplify: When adding material to your research paper, never go for oversimplification; this will definitely irritate the evaluator. Be specific. Never use rhythmic redundancies. Contractions shouldn't be used in a research paper. Comparisons are as terrible as clichés. Give up ampersands, abbreviations, and so on. Remove commas that are not necessary. Parenthetical words should be between brackets or commas. Understatement is always the best way to put forward earth-shaking thoughts. Give a detailed literary review.

22. Report concluded results: Use concluded results. From raw data, filter the results, and then conclude your studies based on measurements and observations taken. An appropriate number of decimal places should be used. Parenthetical remarks are prohibited here. Proofread carefully at the final stage. At the end, give an outline to your arguments. Spot perspectives of further study of the subject. Justify your conclusion at the bottom sufficiently, which will probably include examples.

23. Upon conclusion: Once you have concluded your research, the next most important step is to present your findings. Presentation is extremely important as it is the definite medium though which your research is going to be in print for the rest of the crowd. Care should be taken to categorize your thoughts well and present them in a logical and neat manner. A good quality research paper format is essential because it serves to highlight your research paper and bring to light all necessary aspects of your research.

Informal Guidelines of Research Paper Writing

Key points to remember:

- Submit all work in its final form.
- Write your paper in the form which is presented in the guidelines using the template.
- Please note the criteria peer reviewers will use for grading the final paper.

Final points:

One purpose of organizing a research paper is to let people interpret your efforts selectively. The journal requires the following sections, submitted in the order listed, with each section starting on a new page:

The introduction: This will be compiled from reference matter and reflect the design processes or outline of basis that directed you to make a study. As you carry out the process of study, the method and process section will be constructed like that. The results segment will show related statistics in nearly sequential order and direct reviewers to similar intellectual paths throughout the data that you gathered to carry out your study.

The discussion section:

This will provide understanding of the data and projections as to the implications of the results. The use of good quality references throughout the paper will give the effort trustworthiness by representing an alertness to prior workings.

Writing a research paper is not an easy job, no matter how trouble-free the actual research or concept. Practice, excellent preparation, and controlled record-keeping are the only means to make straightforward progression.

General style:

Specific editorial column necessities for compliance of a manuscript will always take over from directions in these general guidelines.

To make a paper clear: Adhere to recommended page limits.

Mistakes to avoid:

- Insertion of a title at the foot of a page with subsequent text on the next page.
- Separating a table, chart, or figure—confine each to a single page.
- Submitting a manuscript with pages out of sequence.
- In every section of your document, use standard writing style, including articles ("a" and "the").
- Keep paying attention to the topic of the paper.
- Use paragraphs to split each significant point (excluding the abstract).
- Align the primary line of each section.
- Present your points in sound order.
- Use present tense to report well-accepted matters.
- Use past tense to describe specific results.
- Do not use familiar wording; don't address the reviewer directly. Don't use slang or superlatives.
- Avoid use of extra pictures—include only those figures essential to presenting results.

Title page:

Choose a revealing title. It should be short and include the name(s) and address(es) of all authors. It should not have acronyms or abbreviations or exceed two printed lines.

Abstract: This summary should be two hundred words or less. It should clearly and briefly explain the key findings reported in the manuscript and must have precise statistics. It should not have acronyms or abbreviations. It should be logical in itself. Do not cite references at this point.

An abstract is a brief, distinct paragraph summary of finished work or work in development. In a minute or less, a reviewer can be taught the foundation behind the study, common approaches to the problem, relevant results, and significant conclusions or new questions.

Write your summary when your paper is completed because how can you write the summary of anything which is not yet written? Wealth of terminology is very essential in abstract. Use comprehensive sentences, and do not sacrifice readability for brevity; you can maintain it succinctly by phrasing sentences so that they provide more than a lone rationale. The author can at this moment go straight to shortening the outcome. Sum up the study with the subsequent elements in any summary. Try to limit the initial two items to no more than one line each.

Reason for writing the article—theory, overall issue, purpose.

- Fundamental goal.
- To-the-point depiction of the research.
- Consequences, including definite statistics—if the consequences are quantitative in nature, account for this; results of any numerical analysis should be reported. Significant conclusions or questions that emerge from the research.

Approach:

- Single section and succinct.
- An outline of the job done is always written in past tense.
- Concentrate on shortening results—limit background information to a verdict or two.
- Exact spelling, clarity of sentences and phrases, and appropriate reporting of quantities (proper units, important statistics) are just as significant in an abstract as they are anywhere else.

Introduction:

The introduction should "introduce" the manuscript. The reviewer should be presented with sufficient background information to be capable of comprehending and calculating the purpose of your study without having to refer to other works. The basis for the study should be offered. Give the most important references, but avoid making a comprehensive appraisal of the topic. Describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will give no attention to your results. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here.

The following approach can create a valuable beginning:

- Explain the value (significance) of the study.
- Defend the model—why did you employ this particular system or method? What is its compensation? Remark upon its appropriateness from an abstract point of view as well as pointing out sensible reasons for using it.
- Present a justification. State your particular theory(-ies) or aim(s), and describe the logic that led you to choose them.
- Briefly explain the study's tentative purpose and how it meets the declared objectives.

Approach:

Use past tense except for when referring to recognized facts. After all, the manuscript will be submitted after the entire job is done. Sort out your thoughts; manufacture one key point for every section. If you make the four points listed above, you will need at least four paragraphs. Present surrounding information only when it is necessary to support a situation. The reviewer does not desire to read everything you know about a topic. Shape the theory specifically—do not take a broad view.

As always, give awareness to spelling, simplicity, and correctness of sentences and phrases.

Procedures (methods and materials):

This part is supposed to be the easiest to carve if you have good skills. A soundly written procedures segment allows a capable scientist to replicate your results. Present precise information about your supplies. The suppliers and clarity of reagents can be helpful bits of information. Present methods in sequential order, but linked methodologies can be grouped as a segment. Be concise when relating the protocols. Attempt to give the least amount of information that would permit another capable scientist to replicate your outcome, but be cautious that vital information is integrated. The use of subheadings is suggested and ought to be synchronized with the results section.

When a technique is used that has been well-described in another section, mention the specific item describing the way, but draw the basic principle while stating the situation. The purpose is to show all particular resources and broad procedures so that another person may use some or all of the methods in one more study or referee the scientific value of your work. It is not to be a step-by-step report of the whole thing you did, nor is a methods section a set of orders.

Materials:

Materials may be reported in part of a section or else they may be recognized along with your measures.

Methods:

- Report the method and not the particulars of each process that engaged the same methodology.
- Describe the method entirely.
- To be succinct, present methods under headings dedicated to specific dealings or groups of measures.
- Simplify—detail how procedures were completed, not how they were performed on a particular day.
- If well-known procedures were used, account for the procedure by name, possibly with a reference, and that's all.

Approach:

It is embarrassing to use vigorous voice when documenting methods without using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result, when writing up the methods, most authors use third person passive voice.

Use standard style in this and every other part of the paper—avoid familiar lists, and use full sentences.

What to keep away from:

- Resources and methods are not a set of information.
- Skip all descriptive information and surroundings—save it for the argument.
- Leave out information that is immaterial to a third party.

Results:

The principle of a results segment is to present and demonstrate your conclusion. Create this part as entirely objective details of the outcome, and save all understanding for the discussion.

The page length of this segment is set by the sum and types of data to be reported. Use statistics and tables, if suitable, to present consequences most efficiently.

You must clearly differentiate material which would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matters should not be submitted at all except if requested by the instructor.

Content:

- Sum up your conclusions in text and demonstrate them, if suitable, with figures and tables.
- In the manuscript, explain each of your consequences, and point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation of an exacting study.
- Explain results of control experiments and give remarks that are not accessible in a prescribed figure or table, if appropriate.
- Examine your data, then prepare the analyzed (transformed) data in the form of a figure (graph), table, or manuscript.

What to stay away from:

- Do not discuss or infer your outcome, report surrounding information, or try to explain anything.
- Do not include raw data or intermediate calculations in a research manuscript.
- Do not present similar data more than once.
- A manuscript should complement any figures or tables, not duplicate information.
- Never confuse figures with tables—there is a difference.

Approach:

As always, use past tense when you submit your results, and put the whole thing in a reasonable order.

Put figures and tables, appropriately numbered, in order at the end of the report.

If you desire, you may place your figures and tables properly within the text of your results section.

Figures and tables:

If you put figures and tables at the end of some details, make certain that they are visibly distinguished from any attached appendix materials, such as raw facts. Whatever the position, each table must be titled, numbered one after the other, and include a heading. All figures and tables must be divided from the text.

Discussion:

The discussion is expected to be the trickiest segment to write. A lot of papers submitted to the journal are discarded based on problems with the discussion. There is no rule for how long an argument should be.

Position your understanding of the outcome visibly to lead the reviewer through your conclusions, and then finish the paper with a summing up of the implications of the study. The purpose here is to offer an understanding of your results and support all of your conclusions, using facts from your research and generally accepted information, if suitable. The implication of results should be fully described.

Infer your data in the conversation in suitable depth. This means that when you clarify an observable fact, you must explain mechanisms that may account for the observation. If your results vary from your prospect, make clear why that may have happened. If your results agree, then explain the theory that the proof supported. It is never suitable to just state that the data approved the prospect, and let it drop at that. Make a decision as to whether each premise is supported or discarded or if you cannot make a conclusion with assurance. Do not just dismiss a study or part of a study as "uncertain."

Research papers are not acknowledged if the work is imperfect. Draw what conclusions you can based upon the results that you have, and take care of the study as a finished work.

- You may propose future guidelines, such as how an experiment might be personalized to accomplish a new idea.
- Give details of all of your remarks as much as possible, focusing on mechanisms.
- Make a decision as to whether the tentative design sufficiently addressed the theory and whether or not it was correctly restricted. Try to present substitute explanations if they are sensible alternatives.
- One piece of research will not counter an overall question, so maintain the large picture in mind. Where do you go next? The best studies unlock new avenues of study. What questions remain?
- Recommendations for detailed papers will offer supplementary suggestions.

Approach:

When you refer to information, differentiate data generated by your own studies from other available information. Present work done by specific persons (including you) in past tense.

Describe generally acknowledged facts and main beliefs in present tense.

The Administration Rules

Administration Rules to Be Strictly Followed before Submitting Your Research Paper to Global Journals Inc.

Please read the following rules and regulations carefully before submitting your research paper to Global Journals Inc. to avoid rejection.

Segment draft and final research paper: You have to strictly follow the template of a research paper, failing which your paper may get rejected. You are expected to write each part of the paper wholly on your own. The peer reviewers need to identify your own perspective of the concepts in your own terms. Please do not extract straight from any other source, and do not rephrase someone else's analysis. Do not allow anyone else to proofread your manuscript.

Written material: You may discuss this with your guides and key sources. Do not copy anyone else's paper, even if this is only imitation, otherwise it will be rejected on the grounds of plagiarism, which is illegal. Various methods to avoid plagiarism are strictly applied by us to every paper, and, if found guilty, you may be blacklisted, which could affect your career adversely. To guard yourself and others from possible illegal use, please do not permit anyone to use or even read your paper and file.

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Please note that following table is only a Grading of "Paper Compilation" and not on "Performed/Stated Research" whose grading solely depends on Individual Assigned Peer Reviewer and Editorial Board Member. These can be available only on request and after decision of Paper. This report will be the property of Global Journals.

Topics	Grades		
	A-B	**C-D**	**E-F**
Abstract	Clear and concise with appropriate content, Correct format. 200 words or below	Unclear summary and no specific data, Incorrect form Above 200 words	No specific data with ambiguous information Above 250 words
Introduction	Containing all background details with clear goal and appropriate details, flow specification, no grammar and spelling mistake, well organized sentence and paragraph, reference cited	Unclear and confusing data, appropriate format, grammar and spelling errors with unorganized matter	Out of place depth and content, hazy format
Methods and Procedures	Clear and to the point with well arranged paragraph, precision and accuracy of facts and figures, well organized subheads	Difficult to comprehend with embarrassed text, too much explanation but completed	Incorrect and unorganized structure with hazy meaning
Result	Well organized, Clear and specific, Correct units with precision, correct data, well structuring of paragraph, no grammar and spelling mistake	Complete and embarrassed text, difficult to comprehend	Irregular format with wrong facts and figures
Discussion	Well organized, meaningful specification, sound conclusion, logical and concise explanation, highly structured paragraph reference cited	Wordy, unclear conclusion, spurious	Conclusion is not cited, unorganized, difficult to comprehend
References	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring

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