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Serum Testosterone Levels

Type 2 Diabetes Mellitus (T2DM)

Highlights

Vitamin D Status of Sudanese

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Discovering Thoughts, Inventing Future

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Treatment Characteristics and Determinants of Poor glycaemic Control among Type 2 Diabetes Mellitus (T2DM) Patients Attending Clinics at the Three Selected Health Centres in Suva, Fiji between 2011-2016

By Pablo C. Romakin, Masoud Mohammadnezhad, Donald Wilson & Sabiha Khan
Fiji National University

Abstract- *Introduction and Aim:* Type 2 Diabetes Mellitus (T2DM) is a global health problem that is reaching epidemic proportions. It Fiji, it has a high admission rate due to complications and is the number one cause of disease specific mortality. The aim of this study was to determine the proportion of poor glycaemic control level among adult T2DM patients, their treatment characteristics and determinants.
Methods: This was a 5-year retrospective medical folder audit on randomly selected folders registered between August 1, 2011 to August 1, 2016 from the three selected health centres in Suva, Fiji who all met the following inclusion criteria: T2DM adults $\geq$ 18 years old, has recent HbA1c test result in 2017, on treatment for $\geq$ one year and $\geq$ 4 clinic visits. A total sample of 338 was derived out of 2,073 T2DM registered during the 5-year period and was calculated using proportionate sampling method. The most recent HbA1c was the parameter used to measure glycaemic control. Logistic regression analysis in SPSS version 22 was used to assess the effect of patient's treatment determinants on glycaemic control with $p < .05$ considered as significant.

Keywords: *treatment characteristics, determinants, glycaemic control, type 2 diabetes, fiji.*

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TREATMENTCHARACTERISTICSANDDETERMINANTSOFPOORGLYCAEMICCONTROLAMONGTYPE2DIABETESMELLITUSTOMPATIENTSATTENDINGCLINICSATTHETHREESELECTEDHEALTHCENTRESINSUVAFIJIBETWEEN20112016

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Treatment Characteristics and Determinants of Poor Glycaemic Control among Type 2 Diabetes Mellitus (T2DM) Patients Attending Clinics at the Three Selected Health Centres in Suva, Fiji between 2011-2016

Pablo C. Romakin [α], Masoud Mohammadnezhad [σ], Donald Wilson [ρ] & Sabiha Khan [ω]

Abstract- Introduction and Aim: Type 2 Diabetes Mellitus (T2DM) is a global health problem that is reaching epidemic proportions. It Fiji, it has a high admission rate due to complications and is the number one cause of disease specific mortality. The aim of this study was to determine the proportion of poor glycaemic control level among adult T2DM patients, their treatment characteristics and determinants.

Methods: This was a 5-year retrospective medical folder audit on randomly selected folders registered between August 1, 2011 to August 1, 2016 from the three selected health centres in Suva, Fiji who all met the following inclusion criteria: T2DM adults ≥ 18 years old, has recent HbA1c test result in 2017, on treatment for ≥ one year and ≥ 4 clinic visits. A total sample of 338 was derived out of 2,073 T2DM registered during the 5-year period and was calculated using proportionate sampling method. The most recent HbA1c was the parameter used to measure glycaemic control. Logistic regression analysis in SPSS version 22 was used to assess the effect of patient's treatment determinants on glycaemic control with $p < .05$ considered as significant.

Results: There were 200 female (59.2%) and 138 male (40.8%) T2DM patients 30 - 82 years studied with a mean age of 56.5 years (SD = ± 9.9). The proportion of poor glycaemic control was 77.2%. The HbA1c ranged from 5.0% - 16.6% with a mean of 8.6% (SD = ± 2.4). Majority of T2DM patients were on oral anti-diabetic medications (74.3%). Logistic regression analysis showed T2DM patients on insulin treatment regimen, (OR = 6.72, 95% CI = 2.20, 20.59, $p < .001$) have 7 times more chances of having poor glycaemic control compared to those taking oral anti-diabetic medications only.

Conclusion: There was a high proportion of poor glycaemic control among T2DM patients attending clinics in Suva, Fiji. Those on insulin treatment were significant determinant of poor glycaemic control. Health care providers should consider treatment determinants when managing T2DM patients to ensure better glycaemic control.

Keywords: treatment characteristics, determinants, glycaemic control, type 2 diabetes, fiji.

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I. Introduction

Type 2 Diabetes Mellitus (T2DM) is the most common form of diabetes mellitus which constitute 90 - 95% of all cases. [1-3]. It is a global health problem reaching epidemic proportions where 425 million globally or 8.8% of adults 20 - 79 years of age are estimated to have T2DM and accounted for 10.7% of global all-cause mortality in this age group. [4]

In the Pacific Island countries and Territories (PICTs), diabetes prevalence rates of 40% is common with high rates of complications and poor clinical outcomes with over 70% of T2DM patients having poor glycaemic control. [5]

In Fiji, T2DM has a prevalence rate of 15.6% in adults 25 - 64 years and is projected to rise to 19.3% in 2020 due to rising obesity with consequences for premature mortality and reduced life expectancy. [6, 7] It is also the number one cause of disease specific mortality accounting for 19.7% of all deaths in 2015 with a mortality rate of 151.8 per 1,000 population and hospital admission rate due to complications of 134.5 per 1,000 admissions. [8]

T2DM is a heterogeneous metabolic disorder characterized by hyperglycaemia secondary to impairment of insulin secretion, defective insulin action or combination of both. [9, 10] It comes in various forms and can range from those with predominantly resistant phenotype with sufficient beta cell reserve that can be managed by oral anti-hyperglycaemic medications to those with impaired insulin secretion that need to be managed with insulin upon diagnosis or in the early course of the disease. [10] T2DM is diagnosed using the diagnostic criteria recommended by the International Diabetes Federation (IDF) and World Health Organization (WHO) in which most of the diabetes management guidelines used worldwide. This diagnostic criteria include the following: (1) Fasting Blood Sugar (FBS) ≥ 7.0 mmol/L (126 mg/dL) or (2) 2-hour plasma glucose reading of ≥ 11.1 mmol/L (≥ 200mg/dL) following ingestion of 75 g glucose load or Random Blood Sugar

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(RBS) of ≥ 11.1 mmol/L (≥ 200mg/dL) in a symptomatic patient or HbA1c ≥ 6.5% (48 mmol/L). [1, 11, 12]. T2DM when poorly controlled increases risk of complications which require frequent hospitalizations, increasing medical care costs, lowering quality of life, disability and premature deaths. [13]

Research studies have shown that treatment factors are highly associated with glycaemic control. Treatment factors include the anti-diabetic medications being used, the number of medications T2DM patients are taking daily, adherence to treatment and clinic attendance. There have been no current studies conducted in Fiji to determine the treatment characteristics and determinants of T2DM with glycaemic control. Hence, the aim of this retrospective study was to determine the proportion of poor glycaemic control level among adult T2DM adult patients attending clinics at the three selected Suva health centres between 2011 - 2016, their treatment characteristics and determinants that were associated with it.

The findings of this study will be beneficial to the Fiji Ministry of Health and Medical services by providing information on the current proportion of poor glycaemic control among T2DM patients as well as the significant treatment determinants that will assist health care providers in providing effective diabetes management plan and interventions tailored to the individual T2DM patient's needs.

II. Methodology

This was a health centre-based 5-year retrospective study using randomly selected T2DM patients medical records registered between August 1, 2011- August 2016 at the three randomly selected health centres in Suva, Fiji. The following inclusion criteria were used in this study: (1) T2DM adults ≥ 18 years old, (2) has recent HbA1c test result available in 2017, (3) on treatment for ≥ one year and (4) ≥ 4 clinic visits. Type 1 diabetics and those that did not meet the inclusion criteria including those with incomplete medical records (medical information and blood results) were excluded from the study. A total sample of 338 was derived out of 2,073 T2DM patients registered during the 5 year period who met the inclusion criteria and was calculated using proportionate sampling method (with 5% margin of error and 95% Confidence Interval (CI), with 32.2% proportion of uncontrolled T2DM. [14] The sample was proportionately distributed among the three selected health centres. The 338 T2DM medical records were selected using systematic random sampling method where every third folder were chosen from the diabetes register (sampling frame) of the selected health centres. A pre-tested data collection form was used to collect information from the T2DM patient's folders. The International Business Machine (IBM) Statistical Package for Social Science (SPSS) version 22 was used to analyze the data. The continuous variables were analyzed using descriptive statistics and presented as mean, median, standard deviation and range values while the categorical variables were presented as frequency and percentage distribution. The most recent HbA1c test result in 2017 was the parameter used to evaluate glycaemic control where HbA1c ≥ 7% defined poor glycaemic control while HbA1c < 7% defined good glycaemic control. [1,11,12] HbA1c is the gold standard in evaluating glycaemic control as it measures the patient's average blood glucose level during the preceding three months [15-17] and has a predictive value for diabetes complications. [18, 19].

Logistic regression analysis was performed to assess the effect of treatment characteristics on glycaemic control. This was first done using bivariate regression analysis to determine the association of each independent variable to glycaemic control. Then, model 1 was created where all the independent variables were put together in the model to determine their probabilities of contributing to poor glycaemic control to eliminate confounding effects as there were more than one independent variables. Statistical variables with $p < .05$ were considered significant. Further analysis was done using forward stepwise logistic regression to test the likelihood ratio (chi square difference), starting with the constant only model and adding independent variables one at a time. All the factors that were significant were ultimately introduced in the final model where statistical variables with $p < .05$ were accepted.

Ethics approval were obtained from the Fiji National University College Health Research Ethics Committee (CHREC) and the Fiji National Health Research Ethics and Review Committee (FNHRECRC).

III. Results

Out of the total 354 T2DM patient records that were considered eligible for this study, data were collated from 338 records with a response rate of 95%. Sixteen records were excluded due to incomplete information. There were 200 female (59.2%) and 138 male (40.8%) T2DM patients 30 - 82 years studied with a mean age of 56.5 years (SD = ± 9.9).

a) *Glycaemic Control of T2DM Patients*

This study found 77.2% of T2DM patients were poorly controlled (HbA1c ≥ 7% while only 22.8% achieved good glycaemic control (HbA1c < 7%). The HbA1c ranged from 5.0% to 16.6% with a mean of 8.6% (SD ± 2.4). The frequency and percentage distribution of glycaemic control is presented in Table 1.

Table 1: Frequency and Percentage Distribution of Glycaemic Control among T2DM Patients.

Glycaemic Control	Frequency (n)	Percentage (%)
Good (HbA1c < 7%)	77	22.8
Poor (HbA1c ≥7%)	261	77.2
Total	338	100.0

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b) Treatment Characteristics of T2DM Patients

The T2DM patient's treatment characteristics are presented in Table 2. Majority were on oral anti-diabetic medications (74.3%). The mean number of anti-diabetic medications taken daily was 6.46 tablets/injections (SD = ± 3.93). Most of them did not miss taking their daily medications (85.8%) and did not default their clinic appointments (84.0%).

Table 2: Treatment Characteristics of T2DM attending Clinics in Three Selected Health Centres in Suva, Fiji between 2011 - 2016

Variable	n (%) (n = 338)
Type of Treatment	
Oral Anti-Diabetics Only	252 (74.3)
Insulin Alone +/- Oral	86 (25.7)
Number of Medication Taken Daily (*M = 6.46, **SD = ± 3.93)	
< 5	132 (39.1)
5-10	157 (46.4)
> 10	49 (14.5)
Missed Taking Medications	
No	290 (85.8)
Yes	48 (14.2)
Defaulted Clinic	
No	284 (84.0)
Yes	54 (16.0)

**M - Mean, **SD - Standard Deviation*

c) Association of T2DM Patient's Treatment Characteristics on Glycaemic Control

Table 3 presents the bivariate analysis results of participant's treatment factors on HbA1c control. As shown in Table 3, more than half of T2DM patients with poor glycaemic control were on oral anti-diabetics only (53.3%). More than one-third of those taking 5-10 medications daily (36.1%), those who did not miss their medications (66.3%) and those who were regular with their clinic attendance (65.1%) have poor glycaemic control. However, in logistic regression analysis, T2DM patients on insulin as part of treatment regimen, was significantly associated with poor glycaemic control ($p<.001$).

Table 3: Bivariate Analysis of Participant's Treatment Characteristics on Glycaemic Control

Treatment Factors	Glycaemic Level		ß	Crude OR [95% CI]	*p* value
	Good	Poor			
Type of Treatment					
Oral Anti-Diabetics Only	71 (21.0)	180 (53.3)	0	1	-
Insulin Included (Insulin +/- Oral Anti-Diabetics)	6 (1.8)	81 (24.0)	1.67	5.33 [2.22, 12.76]	- *.001
Number of Medications Taken Daily (Tablet / Injection)					
< 5	34 (10.1)	98 (29.0)	0	1	-
5 - 10	35 (10.4)	122 (36.1)	0.19	1.21 [0.70, 2.08]	.492
> 10	8 (2.4)	41 (12.1)	0.58	1.78 [0.76, 4.17]	.186
Missed Medications					
No	66 (19.5)	224 (66.3)	0	1	-
Yes	11 (3.3)	37 (10.9)	0.01	0.99 [0.48, 2.05]	.981
Defaulted Clinic					
No	64 (18.9)	220 (65.1)	0	1	-
Yes	13 (3.8)	41 (12.1)	0.09	0.92 [0.46, 1.82]	.805

** Significant p value < 0.05*

d) Logistic Regression Analysis of Treatment Factors Associated with Glycaemic Control

Logistic regression analysis was conducted to determine the factors associated with poor glycaemic control. Forward stepwise regression analysis was used to determine the final model. A p value < .05 was considered statistically significant. In the final model, T2DM patients on insulin treatment regimen (OR = 6.72, 95% CI = 2.20, 20.59, p < .001) have 7 times more chances of having poor glycaemic control compared to

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those on oral anti-diabetic medications only. The final logistic regression model was statistically significant, X2 = 147.05, p < .001 (< .05). The model explained 53.8% (NagelkerkeR2) of the variance in those with poor glycaemic control and correctly classified 83.0% of the cases. The predicted probability using Receiver Operating Characteristics (ROC) curve was 90.10% (area under curve).

IV. Discussion

The aim of this study was to determine the proportion of poor glycaemic control, its treatment characteristics and determinants among T2DM patients attending clinic at three selected health centres in Suva, Fiji between 2011 - 2016 using a 5 year retrospective folder audit. The results of this study found a mean HbA1c of 8.6% (SD = ± 2.04). This was higher compared to the results of the study conducted by Brian et al among 1,131 T2DM patients in Fiji as part of the HbA1c data collected during the Fiji Eye Health Survey 2009 (FEHS2009) where they found a mean HbA1c of 6.5% (SD = ± 1.3). This study found 77.2% of T2DM patients had poor glycaemic control (HbA1c $\geq$ 7%) which is similar to the results of the study conducted in Fiji by Kumar et al on their descriptive analysis of diabetes-related amputations at the Colonial War Memorial Hospital (CWMH) in Fiji between 2010-2012. [20] This proportion of poor glycaemic control is also comparable to the results of studies conducted in low and middle income countries. [21-23] Research had shown that generally over 60% of T2DM patients do not achieve the recommended glycaemic targets (HbA1c < 7%) despite stringent control to prevent complications. [24].

Using logistic regression analysis, this study found that thoseT2DM patients on insulin treatment regimen (OR = 6.72, 95% Confidence Interval = 2.20, 20.59, p <.001) have 7 times more chances of having poor glycaemic control compared to those on oral anti-diabetic medications only. This is similar to studies conducted by Ahmad et al after studying 557 T2DM patients in Malaysia where they found that those receiving oral anti-diabetics were more likely to have good glycaemic control compared to those receiving a combination of insulin and oral anti-diabetics [25] and by Huri et al after studying 220 T2DM patients where they found that insulin in combination with oral anti-diabetic medications were associated with poor glycaemic control.[26] Also, De-Pablos Velasco et al after studying 5,817 T2DM patients across Europe found that those T2DM patients on more complex anti-diabetic treatment were strongly associated with poor glycaemic control (OR = 11.19: 95% CI = 6.94, 18.04: p <.001). [27] This maybe because the use of insulin or combination of insulin and oral anti-diabetic medications are usually reserved to T2DM patients with complicated and progressive disease to control their diabetes. Insulin resistance increased due to diabetes deterioration over the years resulting from decline in β-cells function. [28].

In this study, the number of medications taken daily was not associated with poor glycaemic control. Studies, however, confirmed that T2DM patients taking 5 or more medications were likely to have poor glycaemic control compared with patients taking fewer than 5 medications. [27, 29-31] Also in this study, T2DM patients who missed taking medications was not significantly associated with poor glycaemic control. However, a study in the US on missed doses of oral anti-hyperglycaemic medications by Vietri et al found 30% of T2DM patients who reported missing oral anti-diabetic medications in the prior 4 weeks is associated with poor glycaemic control. [32] This study found that missing their clinic attendance is not significantly associated with poor glycaemic control. This is similar to the results of the study by Chung et al where they found no statistically significant difference in the clinical outcomes between diabetes clinic attendees and non-attendees. [33] Most studies, however, found that clinic nonattendance or one or two missed clinics were found to be a significant risk factor for poor glycaemic control as it resulted to poor treatment adherence. [21, 34, 35]

V. Conclusion

T2DM is the most common form of diabetes mellitus which constitute 90%-95% of all diabetes mellitus cases. It is a global health issue reaching epidemic proportions. T2DM prevalence rates of 40% is common in PICTs including Fiji with poor clinical outcomes. The aim of this 5- year retrospective study was to determine the proportion of poor glycaemic control among adult T2DM patients attending clinics at the three selected health centres in Suva between 2011-2016, their associated treatment characteristics and determinants.

The results of this study showed the age of T2DM patients ranged from 30 to 82 years with a mean age of 56.5 years (SD = ± 9.9) with majority of them females (59.2%). The proportion of poor glycaemic control was 77.2% with a mean HbA1c of 8.6% (± 2.4). On logistic regression analysis, T2DM patients on insulin treatment regimen had 7 times more chances of having poor glycaemic control compared to those on oral anti-diabetic medications only (p < .001). This may be because the use of insulin is usually reserved for T2DM patients with complicated and progressive disease to control their diabetes. Other treatment determinants such as number of medications taken daily, missed taking medications and defaulted clinic appointments were not significantly associated with poor glycaemic control.

This study has a number of strengths worth noting. The results of this study provide an updated proportion of poor glycaemic control among T2DM patients attending clinics in Suva, Fiji and has also

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identified the treatment determinant of poor glycaemic control.

The results of this study must be interpreted in the context of its limitations. Since this study was done on secondary data taken from T2DM patient's folders, and variance in the it has some limitations in terms of incomplete documentation, problem with verification of information and variance in the quality of information recorded by the different medical professionals who provided consultation for a particular patient.

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Behçet's Disease Revealed by Two Ruptured False Aneurysms and Literature Review

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Abstract- Behçet's disease is an uncommon systemic process generally developing during the third or fourth decade of life. Recurrent inflammatory lesions are characteristic. Cardiovascular involvement, which may be arterial or venous, is rare but with particularly severe prognosis. One case of concomitant aortic and iliac aneurysms is reported. The patient underwent emergency surgery for acute rupture. Surgical revascularization was performed, mainly with prosthetic grafts, and patch aortoplasty.

On the basis of this case and cases reported in the literature, it can be concluded that morbidity and mortality are high because of the etiology underlying vascular involvement in Behçet's disease.

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Behçet's Disease Revealed by Two Ruptured False Aneurysms and Literature Review

A. Rezziki [α], H. ALzaarir [σ], O. Anane [ρ], A. Benzirar [ω] & O. Elmahi [¥]

Abstract- Behçet's disease is an uncommon systemic process generally developing during the third or fourth decade of life. Recurrent inflammatory lesions are characteristic. Cardiovascular involvement, which may be arterial or venous, is rare but with particularly severe prognosis. One case of concomitant aortic and iliac aneurysms is reported. The patient underwent emergency surgery for acute rupture. Surgical revascularization was performed, mainly with prosthetic grafts, and patch aortoplasty.

On the basis of this case and cases reported in the literature, it can be concluded that morbidity and mortality are high because of the etiology underlying vascular involvement in Behçet's disease.

I. Introduction

Behçet disease is a clinical syndrome, initially defined by the presence of aphthous stomatitis, recurrent uveitis, and genital ulcers that now is recognized as a multisystemic vasculitis with an undulating course of exacerbations and remissions [1, 2]. There is no universally accepted diagnostic test for Behçet disease. In view of this rare and concomitant localization, we present this unusual clinical case of angio-Behçet.

II. Case Report

A 42-year-old woman was admitted to the emergency department with complaints of severe abdominal and back pain, progressive fatigue, and dizziness. At physical examination her abdomen was tender, and femoral artery pulses were present. The history of the patient found a notion of bipolar aphthous. Blood pressure was 70/40 mm Hg, and cardiac auscultation was normal except for sinusal tachycardia. Chest x-ray films were normal. Laboratory investigations revealed a hemoglobin level of 9.2 g/dL and hematocrit of 25%. Bedside abdominal ultrasound revealed a retroperitoneal hematoma. The CT scan revealed a rupture of the sus-renal aorta and the iliac bifurcation.

The patient was taken to the operating theater urgently. After thoraco-lombotomy, the large hematoma was seen in the retroperitoneal field. The thoracic aorta above the coeliac trunk was clamped, and the false aneurysm sac was opened. Massive fresh hematoma and blood were aspirated from the operative field, and the first perforation site was seen on the left posterior wall of the proximal abdominal aorta (Figure 1), the second perforation site was in the distal abdominal aorta (Figure 2), approximately 4 cm in diameter including the proximal left common iliac artery.

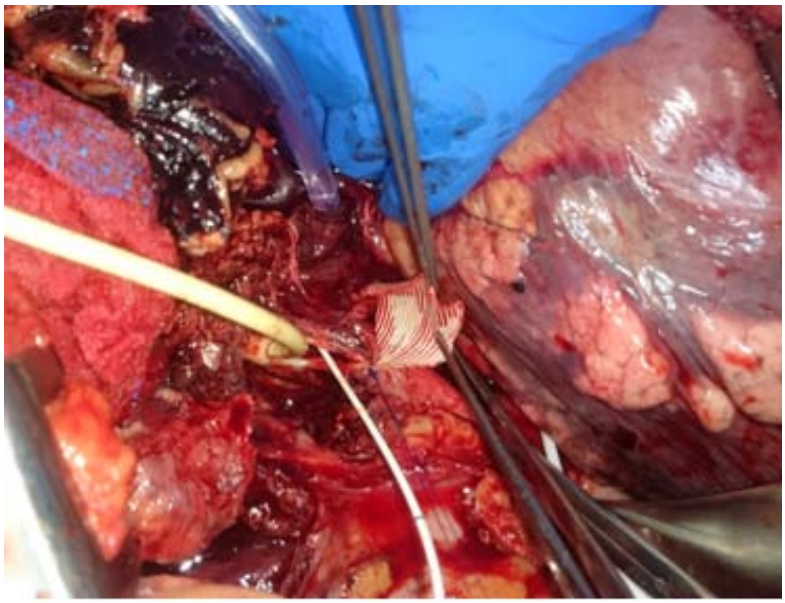


Fig. 1: Perforation Site on Left Posterior Wall of the Proximal Abdominal Aorta

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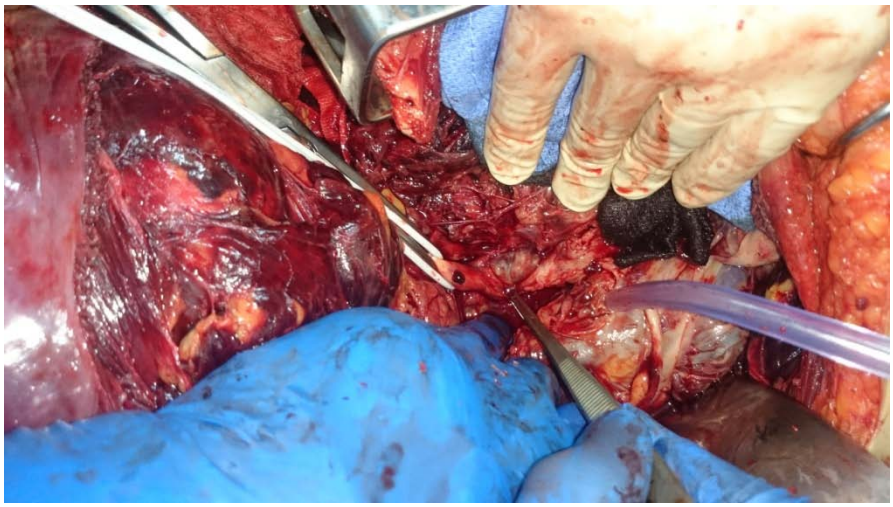


Fig. 2: Second Perforation Site in the Distal Abdominal Aorta

The proximal ulcer of the aorta was performed with a Dacron-patch (Figure 3), and an 8-mm PTFE graft was used for reconstruction of the left common iliac artery, the distal side of the graft was anatomized end-to-side to the left common femoral iliac artery, and the proximal side was anatomized end-to-side to the distal aorta (Figure 4). The common right iliac artery was re-implanted to the graft (Figure 5). After intensive care therapy for 5 days, rapid healing was observed, and the patient was transferred to the department of vascular surgery.

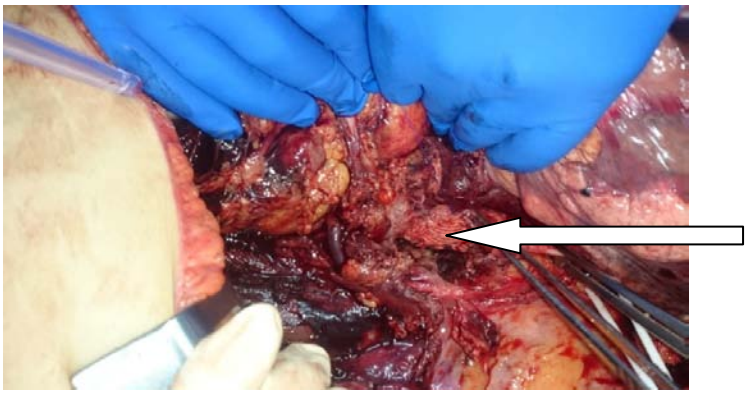


Fig. 3: Proximal Ulcer of the Aorta Performed with a Dacron-Patch (Arrow)

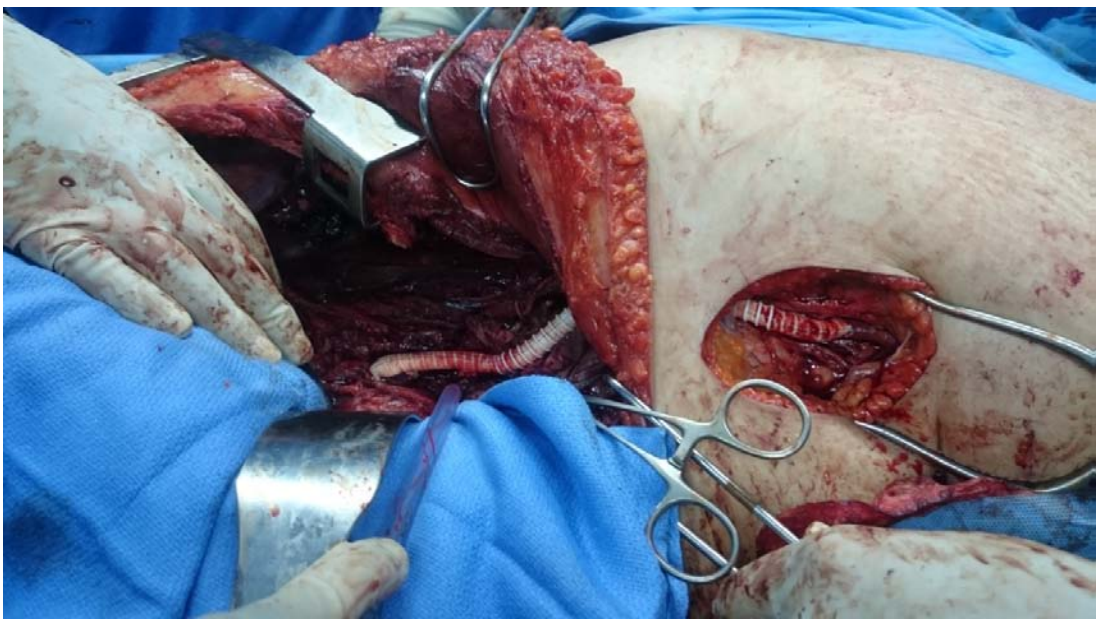


Fig. 4: PTFE Graft for Reconstruction of the Left Common Iliac Artery, (A): Distal Anastomosis on the Left Common Femoral Artery, (B): Proximal Anastomosis to the Distal Aorta

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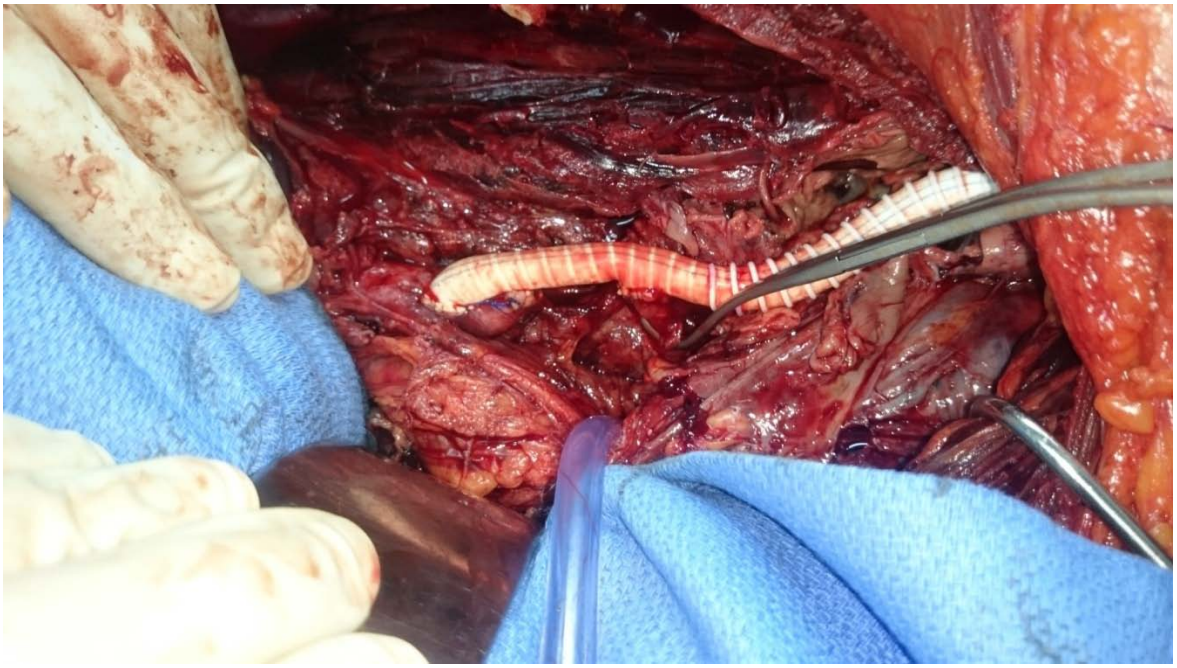


Fig. 5: Common Right Iliac Artery was Reimplanted to the Graft

The patient has had complaints of arthralgia of the knees, oral aphthous lesions, anorexia, and weakness for the last 3 months. At physical examination we find a minor genital ulceration. The pathergy reaction, a hypersensitivity of the skin to a needle prick, which is peculiar to this syndrome, was positive. Rheumatoid factor, anti-DNA, human leukocyte antigen–B5, and antinuclear antibody were normal.

The erythrocyte sedimentation rate and C-reactive protein concentration were mildly elevated. Ocular involvement (uveitis) was not detected at fundoscopic examination.

The diagnosis of Behçet's disease has been retained a posteriori according to the criteria of the International Study group for Behçet disease.

III. Discussion

Behçet's disease is a systemic vasculitis reported for the first time by Hulusi Behçet in 1937 [1]. The common anatomical substrate is different from vasculitis that can affect all vessels, their nature and size, with predominance for venous involvement [2].

Arterial complications may be a mode of revelation and in most cases constitute a medical-surgical emergency [3]. The diagnosis is based on diagnostic criteria established by the International Study group for Behçet disease [4].

The frequency of vascular involvement in Behçet's disease is highly variable from one population to another ranging from 2 to 46% [2, 3, 5]. Arterial damage is more rare and its prognosis is darker than that of venous involvement.

Its frequency is between 2 and 7% of cases of MB [6,7], in the retrospective series of Sekkach conducted on 92 patients with Behçet's disease among them 30 cases had vascular damage, venous involvement was observed in 29.3% of cases versus 14.1% of arterial damage [8]. It is probably underestimated, taking into account the frequency of 34% noted in the autopsy series of Lakhanpal [9].

This vasculitis can affect all arteries, and can be manifested by aneurysmal lesions or arterial thrombosis: the latter being less frequently reported [2, 8, 10].

The localization of aneurysmal involvement is ubiquitous: it can be seen in the different arterial territories and can be life-threatening [6]. The mortality by rupture is estimated at 60% [3, 11].

The presence of aneurysmal lesions represents a medical-surgical emergency, and requires a focus on the initial pathology in order to establish a suitable medical treatment including corticosteroids and immune suppressants, their rapid evolution towards rupture being the rule, without the size aneurysm is considered a predictive factor [11].

The pulmonary arteries and the abdominal aorta are the preferred sites of arterial aneurysms [3, 12]. The other localizations concern the territories of the superficial femoral artery, the brachiocephalic arterial trunk and the popliteal artery [2, 8, 13].

In the Bensaid series [3], aortic aneurysmal involvement was of the order of 28% of cases, femoral 38.5% of cases, popliteal 7.5% of cases, leg arteries 7.5% of cases, carotid 8.7% of cases, primary iliac arteries 8.7% of cases.

Concomitant damage to the thoracic aorta and iliac bifurcation is never currently described in the literature. Tuzun [14], in a series of 24 cases of arterial

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aneurysms, finds 9 cases of aortic involvement. Association with other arterial aneurysms is common in BD. In a Japanese meta-analysis [15], the multiple attainment rate is 36%. Freyrie [16] published a case of BD with 5 aneurysms including 1 aortic, 2 femoral, 1 anastomotic and one at the puncture site that were operated on over a period of 6 years.

Abdominal ultrasound with Doppler complement allows to specify the vascular nature of the lesion and sometimes the topography of the lesions. Abdominal CT angiography is the best positive and topographic diagnostic examination of aneurysmal lesions [1, 2, 14].

The angio-MRI provides the same data as the CT with a better study of the wall and arterial arborization.

It is necessary to proscribe in this malady angiography providing false aneurisms at the point of puncture [1]. In our patient, the abdominal ultrasound and the angio-CT allowed to make the diagnosis of the false aneurism.

Medical treatment is urgently needed, including immunosuppressive agents based on bolus corticosteroid therapy and cyclophosphamide IV, and is routinely performed postoperatively to avoid the risk of suture release [1, 2, 3, 6].

The surgical treatment consisted of flattening the false aortic aneurysm with closing the breach with a dacron patch and aorto-femoral bypass for the second false aneurysm.

This surgery is particularly delicate, because of the inflammatory terrain with advanced peripatitis, and exposes to a high risk of postoperative complications reported in 30 to 40% of cases. [6, 14].

Recently, endovascular treatment has been used as an interesting therapeutic alternative, simultaneous involvement of the thoracic aorta and iliac bifurcation is rare and treatment with a stent-graft has been performed in only one case [19]. Conceive without associated medical treatment (corticosteroids + immune suppressants), [6, 18].

IV. Conclusion

Arterial damage in Behçet's disease is uncommon and is mainly represented by abdominal aortic aneurysm. The aneurysm with double localization thoracic aorta and iliac bifurcation is extremely rare.

CT angiography CT has a place of choice in the diagnostic and topographic approach of these lesions, especially in the emergency framework, thus allowing a fast management of the patient.

Medical treatment with corticosteroids and immunosuppressants is still needed to stabilize the lesions and prevent the outbreaks of this disease.

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Vitamin D Status of Sudanese Children with Sickle Cell Anemia

By Fathelrahman E. Ahmed & Manal A Mohammed
Alneelain University

Abstract- A low level of 25 hydroxy vitamin D (25 OHD) is seen more in children with sickle cell anemia (SCA) than healthy children. SCA is common in Sudan, but the status of vitamin D is unknown in Sudanese children with SCA. We aimed to determine the prevalence rate of low level of vitamin D in this population and its relation to the painful crisis, bonefracture, osteomyelitis and hemoglobin level and biochemical data.

This was a prospective cross-sectional hospital-based study. Children with SCA age six months to 18 years who met the recruitment criteria made the study group, and sex and age- matched healthy children were the control group.

There were 64 children in the study group and 21 in the control group. Low 25 OHD, low mean serum calcium, hypocalcemia and high serum alkaline phosphatase were significantly prevalent in the study group (P.0001, P.0001, P.0001, P.003) respectively. Painful crisis, bone fracture, osteomyelitis, and anemia were not increased in these patients.

Keywords: sickle cell anemia, 25 hydroxy vitamin d, calcium, alkaline phosphatase, bone fracture, osteomyelitis. body mass index, hemoglobin.

GJMR-F Classification: NLMC Code: WH 155



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Keywords: sickle cell anemia, 25 hydroxy vitamin D, calcium, alkaline phosphatase, bone fracture, osteomyelitis. body mass index, hemoglobin.

I. Introduction

Sickle cell anemia (SCA), a heterogeneous disorder, is characterized by the presence of Hemoglobin S where Glutamic Acid is replaced by valine at position 6 of the beta globin chain. Its clinical manifestation includes chronic hemolysis, increased susceptibility to infection and vaso-occlusive crisis (1,2). SCA is prevalent in Sudan, it ranges from 0.8%-30.4% depending on the geographical location (3).Khartoum, capital of Sudan, is a multiethnic town that contains almost all Sudanese tribes. Patients with SCA are mostly from the tribes (predominantly of African descent) that migrated from the West during the drought that struck the area in 1980 (3).

Children with sickle cell anemia are at higher risk of low 25 OHD level than healthy children. Approximately 65-100% of children with SCA were found to have vitamin D deficiency (4). Black Americans were found to have Vitamin D insufficiency more than other Americans (5, 6). This is because pigmentation probably reduces vitamin D production in the skin (7).

Vitamin D deficiency is a serum level of 25 OHD below 20 ng/ml (50 nmmol/l), insufficiency is 25 OHD level 21-29 ng/ml (52.5-72.5 nmmol/l), while severe deficiency is level between 5-10 ng/ml, and it is very severe if less than 5 ng/ml (8).

We hypothesized that Sudanese children with SCA have low plasma 25 OHD level. This study aimed to determine vitamin D status in this population, to identify risk factors associated with low vitamin D level and to determine the relation between low serum vitamin D level and the frequency of bone pain, bone fracture and osteomyelitis.

II. Patients and Method

This was a prospective Cross -sectional hospital-based study done in the outpatient clinics of a major pediatric hospital (Jafar Ibn Ouf children hospital) and a general teaching hospital (Ibrahim Malik) in Khartoum, Sudan from June 2013 to October 2013.

Study Population: Sudanese Children six months to 18 years old with a confirmed diagnosis of sickle cell anemia making the study group, age and sex- matched healthy children making the control group.

Children with liver disease, renal disease, chronic diarrhea, on vitamin D, oral calcium or had received blood transfusion in the past three months were excluded from the study. A questionnaire was used to collect data. It included: demographic data, number of admissions for painful crisis, number of blood transfusions, history of bone fracture, bone infection and 24hours dietary record. Hemoglobin level and hemoglobin electrophoresis were obtained from the patient medical records.5.5 ml of venous blood were drawn from each patient: 3.0ml were placed in a Lithium Heparin tube for 25OHD assay. Serum was separated and frozen at -20 degrees .Assay for 25OHD was performed after completion of sample collection using Tecanelisa machine (Tecan Trading AG, Switzerland). The remaining 2.5ml were put in a similar container for serum calcium, phosphate, and alkaline phosphatase measurement. These were assayed immediately using the U/V automation method using Bio system auto machine. We obtained a written informed consent from the patients or caregivers. Ethical approval was obtained from the Sudan medical specialization board and the hospitals ethical committees.

Were presented the results in the form of frequency, percentage and mean. Microsoft Excel 2007 program was used to form the graphs. Statistical tests

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were performed using Statistic Package for Social sciences (SPSS) version 19, and significance was considered at P value of < (.05).

III. Results

We enrolled 90 children in the study: 69 children with sickle cell anemia made the study group, and 21 healthy children were the control group. Five children were excluded from the study group (three were on calcium and vitamin D, and two were recently transfused with blood) leaving 64 children for analysis. All children were of the SS genotype. Patients characteristics are shown in Table (1).

Table 1: Patients Characteristics and Mean Values of Biochemical Parameters in Patients with SCA and Control Group

Parameters	SCA n = 64	Control n = 21	P - Value
Age (Mean ± SD)	7.8±4.92	7.03±4.64	.443
Male	55 %	87.5 %	.34
Female	45 %	12.5 %	.34
25 OHD (Mean ± SD)	30±13.5	33.7±13.7	0.0001
Serum Calcium (Mean ± SD)	8.5±.82	8.8±.55	0.0001
Alkaline Phosphatase (Mean ± SD)	245.8±232.4	161.95±68.4	.03
Serum Phosphate (Mean ± SD)	4.1±.89	3.95±.53	.280
Mean Body Mass Index (BMI)	14.9±2.56	16.15±3.78	.108

The mean serum 25 OHD level was significantly lower in the study group than in the control group Table (1). Low level of 25 OHD was found in 62.5 % of the children in the study group, and 38 % of children in the control group P (0.0001). Vitamin D deficiency was present in 18.8 % of those with low vitamin D in the study group (Table 2). In the control group eight children (38 %) had a low 25 OHD level (<30 ng/dl), all were having 25 OHD insufficiency.

Table 2: 25 OHD Level in the Study and Control Group

Serum Vitamin D Level	Study Group / Frequency (%)	Control Group / Frequency %
5 - 10 ng/Dl	4 (6.3%)	0 (0%)
11 - 20 ng/Dl	8 (12.5)	0 (0%)
21 - 29 ng/Dl	28 (43.8%)	8 (38.1%)
30 - 50 ng/Dl	19 (29.6%)	13 (61.9%)
51 - 70 ng/Dl	2 (3.1%)	
71 + ng/Dl	3 (4.7%)	
Total	64 (100%)	21 (100%)

In children with SCA a low 25 OHD was present in 55% of males and 45% of females (P 0.340). The majority (80%) of children with low 25 OHD (<30 ng/dl) level in the study group were 1-12 years old, and 91.6 % (11/12) of children with 25 OHD deficiency were present within this age. The percentage of those with low vitamin D level increases with increasing age (Figure 1).

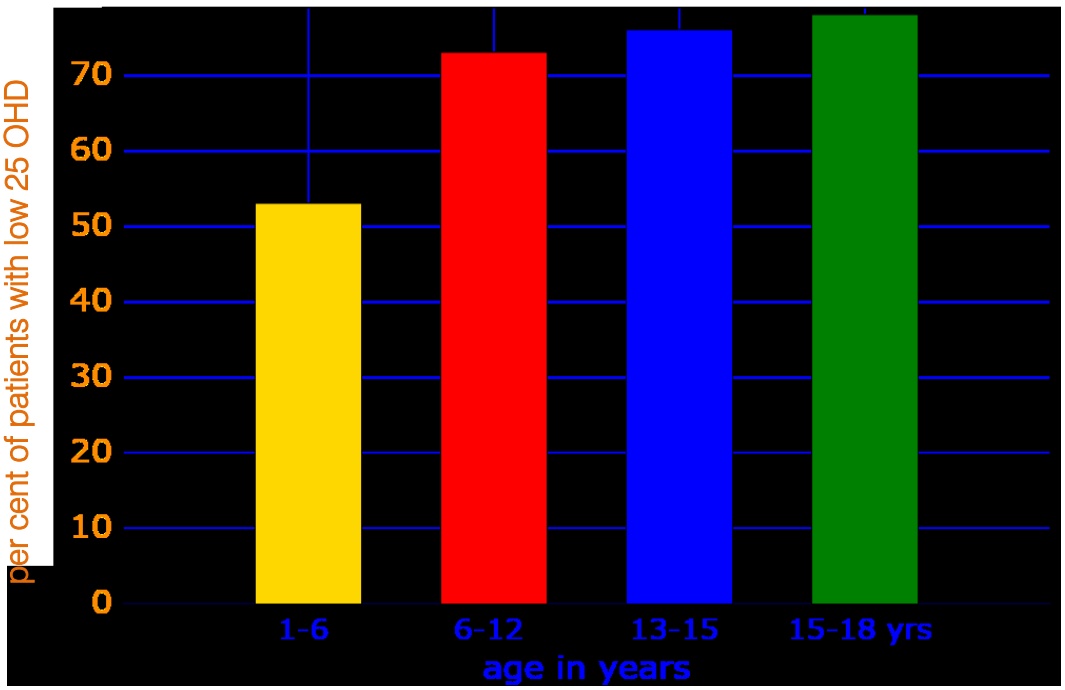


Fig. 1: Low Vitamin D Level according to Age

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52 children were diagnosed to have SCA before the age of one year and 32 (61.5%) of them had low 25 OHD. Twelve children were diagnosed to have SCA after the age of one year, and 8 (66.7%) had low 25 OHD (P 0.929).

In the study group, the mean serum calcium was significantly lower in patients with SCA than control (8.5 ± 0.82 mg/dl vs. 8.8 ± 0.55 mg/dl P.0001). Hypocalcemia (Serum calcium below 8.6 mg/dl) occurred in 30 children in the study group (43.4%), and none in the control group, and it developed more in children with low 25 OHD than in those with normal 25 OHD (70% vs. 8.3%) (P0.0001) Table (3).

Table 3: Serum Calcium and its Relation to 25 OHD Level in the Study Group

Serum Calcium	25 OHD Deficiency	%	25 OHD Insufficiency	%	Normal 25 OHD	%	Total	%
<8.6	11	91.7	17	60.7	2	8.3	30	46.9
8.6-10.3	1	8.3	10	35.7	22	91.7	33	51.6
10.4	-	-	1	3.6	-	-	1	1.5
Total	12	100	28	100.0	24	100%	64	100.0

Frequent painful crises (≥ Five attacks per year) were experienced by 60 % of children with low serum calcium compared to 48.8 % of those with normal calcium (P 0.368). The mean serum alkaline phosphatase level was significantly higher in those with low 25 OHD level than those with a normal level (460 IU vs. 237 IU P.0.0001). An elevated serum alkaline phosphatase (>320 IU) was more frequent in children with low 25 ODH than in those with normal level (62.5%% vs. 12.5% P value 0.030). High serum alkaline phosphatase level was not associated with frequent painful crises (37.5% vs. 25%P 0.883).

The mean serum phosphate in the study group was comparable to that in the control group (4.1 ± 0.89 meg/l vs. 3.95 ± 0.53meg/l P 0.28). Hypophosphatemia (serum phosphate level <2.5 mg/dl) was found in 9 (14.1%) children with low 25 OHD but none in those with normal 25 OHD (p 0.280). All hypophosphatemic children were hypocalcemic.

Low 25 OHD level in the study group was not associated with lower hemoglobin level, the need for blood transfusion, more painful crises, increased bone fractures or osteomyelitis (Table 4).

Table 4: Clinical Complications and its Relation to 25 OHD Level

Number	Study Group With Low 25 OHD	Study Group With Normal 25 OHD	P Value	Control Group	P Value
Painful Crisis per Patient per Year	1	0.95	0.135	0	-
Number of Hospital Admission for Pain per Year / Patient	3.3	2.6	0.453	0	-
Fractures	2**	2*		2	0.179
Osteomyelitis	2	0	NS	0	NS
Mean Hemoglobin (G/Dl	6.9	7.6	0.132	0	0
Number of Blood Transfusion	2.1	2.7	0.446	0	0

**: Caused by osteomyelitis.

*: Caused by a fall from one- meter height.

There were more children with BMI below the 3rd percentile in the study group than the control group (67.2% vs 33.3% P 0.003). Within the study group, there was no difference in the BMI between those with low and normal 25 OHD level (62.5% vs. 75%) (P 0.108) Table (5).

Table 5: Body Mass Index (BMI) in Relation to 25 OHD Level in the Study Group

BMI Percentile	25 OHD Deficiency (5-20 ng/Dl)	%	25 OHD Insufficiency (21-29 ng/Dl)	%	Normal 25 OHD (50-70 ng/Dl)	%	Total	Overall %
<3rd	9	75.0	16	57.1	18	75	43	67.1
At 10th	2	16.7	3	10.7	0	0	5	7.8
At 25th	1	8.3	5	17.9	4	16.7	10	15.6
At 50th	0	0	4	14.2	2	8.3	6	9.3
At 75th	0	0	0	0	0	0	0	0
Total	12	100.0	28	100.0	24	100.0	64	100.0

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Dietary intake of fish, meat, and milk, was comparable in the study group and the control group and within the study group (P value 0.117, 0.108) respectively.

In the study group, sun exposure for more than 15 minutes a day was comparable in those with low and normal 25 OHD (87.5% vs. 87.5 % P 0.163).

IV. Discussion

This is the first study in Sudan that determined vitamin D status in Sudanese children with sickle cell anemia .Like other studies we found a high prevalence of low 25 OHD level (62.5%) with 70% of them being deficient. Twelve studies reported vitamin D status in children and adolescent with sickle cell anemia (4, 9-20), four of them had used a definition similar to ours (10-13) Low vitamin D was present in 80-98% of children included in three of these studies and 81.5-100 % of them were deficient (10, 11, 13). These rates are higher than ours. The prevalence rate reported from Madrid, Spain (12), a sunny country like Sudan, is comparable to ours. We could explain this finding by the fact that our children had good sun exposure despite they had dark skin color: a factor that influences vitamin D synthesis. (21).

Males were more likely to have low 25OHD level than females although this was not statistically significant, a finding similar to that reported by Mohammed et al. (15) Low 25OHD level was present from the age of one year throughout childhood. Its frequency increased with increasing age. A similar observation was reported in normal children (22) as well as children with SCD (4, 9, 12). However, this effect of age on vitamin D status was not observed in studies from Kuwait and Saudi Arabia (10, 15).

We observed a tendency towards low serum calcium in the study group. A similar tendency was reported before in children and adults with sickle cell disease (15, 23- 26). This tendency was observed in the absence of low serum albumin (23). Hypocalcaemia was reported in 14 % of Saudi patients with sickle cell disease: in the same study low vitamin D was present in 12% of patients. We observed hypocalcaemia in almost half of our patients and the majority of them were those with low 25 OHD. Suggested causes of hypocalcemia include an increased activity of calcium magnesium ATPase (24, 27, 28), reduced intestinal calcium absorption, and impaired vitamin D synthesis .(15) Low dietary intake of vitamin D was found to be significantly associated with lower serum vitamin D levels in both healthy children and children with HbSS. (4) However, this is not the case in this study as adequate sun exposure and adequate intake of diet rich in vitamin D was seen in our patients. This is similar to what was reported by others (15).

Low serum 25OHD causes high level of ALP (29). In this study low 25OHD level was found to be associated with significantly high ALP and low calcium level. High alkaline phosphatase was reported in Kuwaiti children who had SCA and 25 OHD deficiencies (10). However, normal calcium and alkaline phosphatase level (13) or lack of association between ALP and 25 OHD level (12) were reported in children with SCA. Serum ALP in SCA may be elevated due to bone destruction and vaso-occlusive crisis (VOC) and it is considered a sensitive marker of bone turn over (30). This is unlikely to be the case in this study as those patients with low 25OHD were in their steady state and had no more painful crisis than those with normal level of 25 OHD. Furthermore painful crises were found not to affect serum calcium level (23).

The status of serum phosphate in children with SCD was reported by few studies (12, 23, 31, 32). Elevated levels were reported by two studies (23, 31). One of these studies suggested resistance to the phosphaturic effect of fibroblast growth factor 23 (FGF23) to be the cause. (31) Low serum phosphate level was reported by Al-harbi et al and that was attributed to elevated level of parathyroid growth hormone (PTH) (32). An inverse correlation between PTH and phosphorous level was observed by Garrido et al (12). In our study the serum phosphate level was normal in the majority of patients: however, 14% were hypophosphatemic. We did not measure PTH in this study but others had reported high level of the hormone when vitamin D or serum calcium were low (15) and all our patients with hypophosphatemia had hypocalcaemia. Thus, elevated levels of PTH could be the cause of low phosphate level in our patients. Therefore, in children with SCA elevated serum ALP, hypophosphatemia or hypocalcemia can be taken as a marker of low 25 OHD during steady state condition.

The significance of low 25 OHD and if there is a pathological association is hard to know. Our result did not suggest an association with increased painful episodes, as indicated by the number of pain episodes per year and number of hospital admissions due to pain. Similarly, two retrospective studies from America and the United Kingdom failed to demonstrate increased painful episodes with low 25 OHD (9, 33). Furthermore, Jackson etal did not find an increased rate of acute painful crisis or acute chest syndrome in 64% of their patients despite the presence of severe vitamin D deficiency (<10 ng/ml) (25). But, Adegoke et al. and Lee et al. found a possible association between low serum vitamin D levels and increased frequency of acute pain episodes (34, 35). In a randomized controlled trial, six weeks of a high oral dose of vitamin D in children and adolescent with SCA and low vitamin D level reduced the number of pain days per week irrespective of baseline 25 OHD levels (16).

The overall incidence of bone fracture in this study (6.3%) is not different from that in the control group. If we excluded those in whom fractures were

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associated with osteomyelitis then the incidence will be comparable to that reported in healthy British children (36). Reports regarding the prevalence of bone fractures in children with SCA are limited. Bone fractures were reported in 18.8% of Egyptian children, adolescent and young adults with SCA (37). Fung et al. reported a prevalence rate of 12.5% of bone fractures in children with SCA age 12-18 years, with falls and recreational sport being the commonest predisposing factors (38). Four cases, including two with pathological fractures, were reported from Spain (12). One pathological vertebral fracture was detected in 97 Omani children with SCA(39). The French Study Group on sickle cell disease reported the acute clinical events in 299 homozygous sickle cell patients (age 10.1+/-5.8 yrs.): there was no single case of bone fracture despite the presence of osteomyelitis in 12% of the cohort(40).

A slight decrease in bone mineral density (BMD) was reported in children with SCA (12, 37, 19). Low BMD was not found to be associated with vitamin D deficiency(12,36) or calcium and ALP level (38) .It is probably due to an abnormal bone formation (19).The relationship between low BMD and bone fractures was not evaluated in two studies that reported low BMD and bone fracture (12,37). In African American children (non-SCD) with fracture of the forearm, 25 OHD insufficiency was present in 59% of them, but all of them had normal BMD (41). BMD was not measured in this study. Despite a high prevalence rate of low vitamin D among our patients, the rate of bone fracture was similar to that in healthy children. Therefore, vitamin D insufficiency does not seem to predispose Sudanese children with SCA to bone fracture.

Staphylococcus aureus, salmonella, Pseudomonas aeruginosa, Escherichia coli (E. coli) and klebsiella pneumonae are causative organisms of osteomyelitis in children (42,43).Vitamin D3 was shown to have an inhibitory activity, in vitro, on strains of Streptococcus pyogenes, staphylococcus aureus, Klebsiella pneumoniae, E. coli and other bacteria (44). Gram-positive bacteria, meningococcal disease, invasive pneumococcal disease, and group A streptococcal disease are more common when vitamin D levels are low (45). However, the prevalence rate of osteomyelitis reported in this study (3.1%) is lower than rate reported in the literature (12%). (40). This means low 25 OHD did not predispose Sudanese children with SCA to osteomyelitis.

Vitamin D was found to have a positive effect on erythropoiesis. Therefore vitamin D deficiency is expected to limit erythropoiesis and to increase anemia in patients with anemia of chronic diseases. (46) In this study the were no differences in the mean hemoglobin level or requirement of blood transfusion in patients with low level of 25 OHD compared to vitamin D sufficient patients. Winters et al. found no correlation of baseline hemoglobin level and 25 OHD level in either pediatric or adult patients (9). Busse et al. supplemented 50 sickle cell disease patients aged 0 to 21years, who were vitamin D deficient, with vitamin. They studied the association between time- dependent 25 OHD level, hemoglobin concentration, and reticulocyte percentage over time in days. This did not improve the anemia: in fact a reduction in hemoglobin with reticulocytosis was observed with increasing 25-OHD suggesting hemolysis (47). A recent study had shown that Serum 25-hydroxyvitamin D correlated with biomarkers of hemolysis in SCD (48). Kaitlyn et al. from Canada found that a 1 g/L increase in hemoglobin concentration was associated with a 0.4 (95% CI: 0.1- 0.8) nmol/L increase in mean serum 25OHD concentration (P = 0.01) (49). Since patients with SCA are prone to low levels of 25 OHD and thus they are likely to receive vitamin D supplementation further studies are needed in this area to determine its safety.

High BMI was reported to be associated with low vitamin D level in normal children and adolescent (50, 51). A similar finding was also observed in young adults with SCA (52). Children with SCA are known to have low BMI {53). We had a similar finding in this study. However, we failed to demonstrate any difference in BMI between those with low and normal vitamin D level in the study group.

V. Conclusion

A high prevalence rate of vitamin D insufficiency or deficiency in Sudanese children with SCA was found. We could not identify the cause but it is probably multifactorial. Living in a country with enough sun light throughout the year does not guarantee adequate level of vitamin D. Low levels of serum calcium and phosphorus and high alkaline phosphatase can be used as marker of low vitamin D level. Despite low vitamin D level bone fractures were not increased.

Study Limitations: Most of the obtained clinical data were recall data which might had led to over or underestimation of the results. The number of children in the control group was small with possibility of overestimation of the prevalence rate of low vitamin D in the study group.

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Serum Testosterone Levels in Type 2 Diabetes Mellitus Patients

By Vrushali Dhongade, Oluseyi Abidoye, Bhargav Muppaneni, Sarah Walter John, Abhishek Vadher & Rono Korra

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Abstract- *Introduction:* There is a high prevalence of low serum testosterone in type 2 diabetes mellitus patients. In this study, we tried to determine the level of serum testosterone in type 2 diabetes mellitus patients.

Methods: A total of 241 patients were taken in the study. Out of this, 121 patients had type 2 diabetes mellitus and 120 were normal. For diagnosis of diabetes HbA1c level of ≥ 6.5 was taken. Serum testosterone levels were measured in all the participants.

Results: The mean age of the participants was 46.95 ± 6.89 in diabetic patients and 45.86 ± 5.45 in the controls. The mean serum testosterone levels in the diabetes population was 312 ± 14.6 ng/dl and in the control population was 678 ± 17.5ng/dl. On applying chi square test, the p value was calculated to be 0.02. This shows the difference is statistically significant.

Conclusion: Type 2 diabetes mellitus is associated with low levels of serum testosterone levels.

GJMR-F Classification: *NLMC Code: WK 810*



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Serum Testosterone Levels in Type 2 Diabetes Mellitus Patients

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I. Introduction

It is estimated that 285 million people worldwide are affected by diabetes mellitus. By 2030, around 438 million people will be affected by diabetes mellitus. About 66% of this population is in low to middle income countries (1). As compared to western population, Asian population has a much higher tendency to develop diabetes. This occurs at a younger age, at lower degrees of obesity and a much higher rate given for the same amount of weight compared to Western population(2).

Many studies have reported that there is a high prevalence of low serum testosterone in men with type 2 diabetes mellitus (3, 4, and 5). Some studies have also showed a co-relation between reduced total testosterone and insulin resistance and then subsequent development of diabetes mellitus (6,7). The symptoms of low serum testosterone are loss of libido, erectile dysfunction, reduced muscle mass, low energy, increased adiposity (8, 9).

Totaltestosterone is largely determined by circulating sex hormone binding globulin. In normal men, 54% testosterone is bound to albumin and other proteins, 44% is bound to sex hormone binding globulin and 2% is in unbound state. Some studies believe that low levels of serum testosterone are associated with changes in the levels of FSH and LH. There is an ongoing controversy about whether the low serum levels of serum testosterone are associated with hypogonadotropic hypogondotrophoism or not. The study by Ali et all showed that in patients with diabetic neuropathy, low serum testosterone levels were associated with low FSH and low LH. In this study, we tried to find a co-relation between levels of serum testosterone and type 2 diabetes mellitus.

II. Materials and Methods

A total of 121 patients were taken in the study who consistently attended the diabetes clinic from May 2017 to May 2018 were taken in the study. 120. For diagnosis of diabetes HbA1c level of ≥ 6.5 was taken. Serum testosterone levels were measured in all the participants. All calculations were done statistically. P value of <0.05 was considered to be statistically significant.

III. Results

Table 1: Baseline Characteristics of the Population

	Diabetic Patients	Normal Population
Age (yrs)	42 ±5.7	40 ±6.7
Height (cm)	168 ±5.3	170 ±4.2
Weight (kg)	73 ±6.5	69 ±7.4
Smoking : Never	66	72
Smoking : Former	12	10
Smoking: Current	43	38
Hypertension: Yes	39	2
Hypertension: No	118	92
Dyslipidaemia : Yes	17	14
Dyslipidaemia: No	104	106
Duration of Diabetes	5.6 ±1.67	
Mean HbA1c	7.8 ±0.8	4.7 ±0.3

As shown in the table above, the baseline characteristics of all the participants are showed in the table. The average age of the diabetic patients was 42 ± 5.7. The average age in the normal population was

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40 ± 6.7. Average height was 168 ±5.3cm in the diabetic patients and 170 ± 4.2cm in the normal population. Average weight was 73 ± 6.5kgs in the diabetic patients and 69 ± 7.4 in the normal population. 66 patients with diabetes never smoked while 72 participants in the normal population were non-smokers. The number of former smokers in the diabetic patients and normal pupation was 12 and 10 respectively. Current smokers are 43/121 in the diabetic patients and 38/120 in the normal population. 39 patients in the diabetic population were hypertensives and 118 were normotensives. 2 patients were hypertensive in the normal population and 92 were normotensive. 17 patients had dyslipidaemia and 104 did not have dyslipidaemia in the diabetic population. 14 participants had dyslipidaemia and 106 participants did not have dyslipidaemia in the normal population. Mean duration of diabetes was 5.6 ± 1.67. Mean HbA1c was 7.8 ± 0.8 in the diabetic population and 4.7 ± 0.3 in the normal population.

Table 2: Serum Testosterone Levels in Patients and Controls

	Type 2 Diabetes	Control	P Value
Serum Testosterone Levels (Ng/Dl)	312±14.6	678±17.5	0.02

Serum testosterone level in the diabetic population was 312±14.6 ng/dl. In the normal population, it was 678±17.5ng/dl. After applying student t test, the p value was calculated to be 0.02. This is less than 0.05 which shows that the difference in the two group is significant and not due to chance.

IV. Discussion

Many studies have shown that about 25% of patients with type 2 diabetes mellitus have low serum testosterone levels. About 4% have subnormal testosterone concentrations with high FSH and H (10). Some studies have also shown that low serum testosterone is associated with diabetes related sexual dysfunction.

A study from Australia showed that 43% of type 2 diabetes patients have total testosterone levels less than 10 (11). A study from United Kingdom showed that 355 men with type 2 diabetes mellitus have total testosterone levels of less than 8 and 25% had symptoms of hypogonadism associated with 8-12 total testosterone (12). 33.2% type 2 diabetes patients had hypogonadism in a study in Egypt (13). A study from Brazil also showed that free testosterone and total testosterone levels were low in type 2 diabetes patients (14). The Endocrine society also recommends measuring the levels of testosterone of patients with type 2 diabetes on a regular basis (15,16). Many cross-sectional and longitudinal studies have showed that with the increase in age the level of total testosterone reduces in men (17, 18, 19).

Many studies have also showed a co-relation between BMI and low serum testosterone levels in type 2 diabetes mellitus. However, these studies are controversial. Some studies have showed that the association between BMI and serum testosterone is significant (20,21). On the contrary, there is also a study that has showed no co-relation between BMI and low testosterone (22).

There are many limitations of this study. It is a cross-sectional study and so we could not find the trend of the serum testosterone levels in the participants. From our study and conclusion, we can strongly say that an early universal screening program can help in diagnosis of low serum testosterone levels and testosterone supplementation can be started accordingly. We recommend that all patients of type 2 diabetes mellitus undergo screening for serum testosterone. A hormonal baseline can also be established for comparison in future follow-ups.

V. Conclusion

Type 2 diabetes mellitus is associated with low levels of serum testosterone levels in our study population with a p value significance of 0.02.

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Ensuring Holistic Care: Application and Evaluation of Florence Nightingale's Environmental Theory on Tuberculosis Patient

By Mamoona Iram
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Abstract- Theoretical frameworks serve as the basis for best nursing practice. This paper aims to highlight the importance of environmental theory on person's health, and application and evaluation of Florence's nightingale Environmental theory in the recovery of the patient suffering from tuberculosis. Florence Nightingale's Environmental theory was used to critically review and manage a clinical case scenario of a tuberculosis patient, and Walker and Avant (2011) theory evaluation criteria was used to evaluate it. Nightingale demarcated different canons of an environment including ventilation, light, noise, cleanliness of walls, bed and bedding, personal cleanliness, and taking food, etc. to describe the application of her theory. She emphasized that nurses should manipulate and mediate the patient's environment by taking care of all these cannons to restore their standard health or bring into recovery. Application of this theory yields a positive impact on patient's health, ensures the speedy recovery from illness and promotes individual comfort. It has clinical implication and a significant role in a patient's recovery. Nurses should apply this theory while dealing with their patient.

Keywords: *holistic care, environmental theory, florence nightingale, theoretical frameworks, tuberculosis.*

GJMR-F Classification: *NLMC Code: WF 200*

ENSURINGHOLISTICCAREAPPLICATIONANDEVALUATIONOFFLORENCENIGHTINGALESENVIRONMENTALTHEORYONTUBERCULOSISPATIENT

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Ensuring Holistic Care: Application and Evaluation of Florence Nightingale's Environmental Theory on Tuberculosis Patient

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Keywords: holistic care, environmental theory, florence nightingale, theoretical frameworks, tuberculosis.

I. Introduction

Florence Nightingale is considered as the mother of modern nursing, and famous for her contributions in developing a first theory in the nursing profession. As a nurse, she offered incredible nursing services and played a vital role of a leader in the Crimean War and got recognition as a lady with the lamp [1]. She vigilantly observed and found out the roots of hindering the recovery of wounded soldiers, and increases mortality were diet, dirt, and drains [1]. Likewise, she believed that certain entities such as cleanliness, fresh air, sanitation, comfort, and socialization are obligatory for a proper healing [2]. She applied her concepts to develop the environmental theory and helped in reducing the mortality rate as well as speedy recovery of wounded soldiers. Through her passion, devotion and hard work she changed the face of nursing and reported a decrease in casualties from 48% to 2% approximately within two years [3, 4, 5 & 6]. Furthermore, she wrote notes on nursing "What It Is and What It Is Not" to enlighten the different cannons that every nurse should take care while caring for the patient [2, 7]. This theory is globally recognized and widely used by nurses to help their patients in the natural ways of healing.

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II. Case Presentation

A 10-year-old female child X was seen during a clinical rotation in the community. She seemed very weak and malnourished. While asking her mother about the reason of her current health status she replied that firstly, she ate mud and not interested in taking her meal and secondly, from the last three months she is suffering from fever, cough and losing her weight gradually. She added that they had taken medicine for their child from Hakeem residing in the same community because they cannot afford the expensive treatment of hospitals or clinics. Due to increasing curiosity permission was taken for a complete physical examination and found the sign of infection as X was having fever 101°F, lymphadenopathy and hepatomegaly. A question was asked from mother for her child vaccination status as BCG mark was not evident, for which she replied that it is dangerous to vaccinate the kids as told by our community people. Further assessment revealed bilateral rates on the upper right lobe. Additionally, she was showing signs of poor hygiene wearing a dirty dress, untrimmed dirt filled nails and greasy hairs.

The house was showing poorly picture of infrastructure made by mud and consisted of one small room without any source of direct sunlight. In this deprived ventilated room this family was living with their three other children. Her father was a factory employee and a chain smoker who was unaware of the possible diagnosis of his child and keeps the same community beliefs regarding vaccination. However, the story does not end here. Unfortunately, the community was unaware of drinking polluted water because it was the factory area where the wastes were not disposing appropriately. The drainage system was the same as pictured the other domain where all the drainage was flowing near the

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house doors which shows the poor socioeconomic status and lack of awareness of this community regarding their basic needs.

III. Application of Nightingale's Environmental Theory to the Case Scenario

Analyzing the scenario in the light of nightingale's environmental theory clearly shows different possible causes of worsening the condition of child X that need to be addressed. She was a child only ten years old and secondly the negligent behavior of parents that they did not go to the doctor. They were unable to recognize the worsening of their child condition and were limited to community Hakeem for her treatment.

Firstly, Nightingale emphasized that nurses should pay keen attention towards one of the essential entity and that is air in which a person takes his breath; try to keep it as fresh as external natural air [7]. A pitiable ventilation system was the leading causes of worsening the child's disease because in this small house they all were sharing a single room, and the father was smoking without knowing the adverse effects of smoke upon his kids. In other words, X was a passive smoker. Added to it her grandfather died six months ago and had cough which indicates that he might be having tuberculosis and left the germs in the same room and X become a victim of these germs.

The health of houses is the second cannon of Florence's theory. "Pure air, pure water, efficient drainage, cleanliness, and light are five essential points in securing the health of houses" [7]. As a result of inappropriate infrastructure of house the sunlight was not reaching inside the small room that is necessary for purification of air. In addition to this, the untidy surrounding made the progression of disease very easily. According to Nightingale "The best wall for a sick-room or ward that could be made is pure white non-absorbent cement or glass, or glazed tiles, if they were made slightly enough" [7]. In scenario, she has mud house and it could not be considered as the healthy house.

Florence Nightingale furthermore addressed the importance of healthy food and food preferences. Taking healthy food and what food are the cannon in her notes on nursing. She highlighted that the most important and most neglected part of a patient recovery is food. Food provides energy a vital power to help in defeating disease [7]. In the above scenario, this element of food was also neglected. The patient was having complains of anorexia and weight loss, but her mother was saying that she is eating mud and not taking her regular meal, but in fact, the patient was suffering from tuberculosis, and the symptoms of anorexia and weight loose were due to the disease process.

Unavailability of clean water and poor sanitary condition of the community were also contributing factors in worsening the patient's symptoms. It shows the ignorant administrative role of municipal committee of that community. The timely efforts from the public or private sector can play a vital role in the prevention of such disease. But it is not only the duty of health care providers to look after for all the things. Likewise, Nightingale quotes in her notes that "By this, I do not mean that the nurse is always to blame. Therefore, bad sanitary, architectural and administrative arrangements often make it impossible to nurse" [7].

Personal cleanliness that starts at a very early stage of childhood is considered as a significant factor to keep the body healthy. Nightingale mentioned that patients feel comfortable and relax when their skin washed and dried properly [7]. Cleanliness accounts a lot for everyone so it should be maintained. But in the scenario patient cleanliness was not appropriate. She had untrimmed dirty nails wearing untidy dress and having greasy hair, so according to the Environmental Theory, this main point of patient care was missed from the parent's end.

IV. The Hypothesis to Test the Nursing Interventions for given Scenario

There are following possible hypothesis to test the nursing interventions:

1. Holistic care approach is needed to recover the patient from the disease.
2. Proper health education awareness session regarding sign and symptoms, diagnosis, treatment, complication and preventions of tuberculosis given to the community can help to early diagnosis and treatment.
3. Early diagnose of the disease can be treated in an outdoor clinic.
4. BCG vaccination of children at birth can reduce the risk of tuberculosis.
5. The proper infrastructure of home and community can reduce the risk of spreading communicable diseases.

V. Results

After examining the whole case, the parents of child X were counseled to go to the hospital for further investigation and assured that the finance would be managed by the patient welfare department of the hospital. Next day patient came in the hospital and went through the process of laboratory and other investigations (X-ray, Montour test, sputum culture) which revealed positive results for tuberculosis. Due to her worse condition X was admitted to the hospital and received meticulous treatment for tuberculosis. Successful outcome achieved when the environment of this patient mediated according to Florence Nightingale

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theory, and her condition started to improve. She was in the isolation room of medical ward, and standard precautions were followed appropriately to reduce the risk of disease transmission. She received antipyretic medicine to reduce her fever and the specific regime of anti-tuberculosis drugs. The nurses on duty were providing her the necessary hygiene care and regularly changing her bed sheet. As she was malnourished she was evaluated by a nutritionist, and now she was a high protein diet according to her caloric requirement. Her mother was staying with her in the hospital, and her father and siblings were visited her frequently. Her fever started to settle, and she underway to gain her weight gradually. Her condition started to get better, and she discharged on oral medicine.

Her parents were counseled for the importance of regular follow up necessary for her complete recovery. Moreover, they were informed about the relapse of disease and risk of developing multi-drug resistance tuberculosis in case of not compliance with the treatment. Health education was given to her parents regarding personal hygiene, the health of their house and the effect of smoking. In the next rotation in the community an awareness session on tuberculosis was conducted. Additionally, the importance of BCG vaccination at birth and role of environment in the prevention of communicable diseases also explained briefly.

VI. Theory Evaluation

Theory evaluation is a systematic process of examining a theory and several criteria's are available in the literature. Walker and Avant in 2011 gave criteria to examine the origin, meaning, logical adequacy, usefulness, generalizability, and testability of the theory. The eventual aim of theory evaluation is to define its possible role in the scientific knowledge [2].

Florence Nightingale utilized the environment of the patient to support him in his recovery, Nightingale's had developed her model of nursing before the general acceptance of the germ theory. She had identified that that cleanliness, fresh air, sanitation, comfort, and socialization were necessary for healing [2]. Her work for the environmental theory development is reflected as a broad philosophy. It was inductively derived, considered as a grand theory which is abstract in its nature. [4, 9].

The meaning of the theory is determined by the clarity in definitions of the concept and construct. [2.9]. Nightingale mentioned five points of the healthy house and then further explain human, environment, health, and nursing in her writings. She believed that healthy environment was in dispensable for the good healing [8, 9]. Therefore the meaning of concepts and the logical adequacy are evident in her theory.

Usefulness of the theory can be determined by how nurses are using this theory in their clinical practice along with knowledge and psychomotor skills [2, 8]. This theory can be generalized easily, and globally nurses are using this theory in the care of different patients in different settings. Nightingale briefly stated the information about nursing care, patient needs, proper buildings which were essential for caring of ill individuals. This theory is considered as parsimonious as her conceptual contents are free of jargons and used simple language [2, 8].

Nightingale's theory can be used to test the different hypotheses related to noise, environment, spirituality, etc. as she described concrete as well as abstract concepts [2].

VII. Contradictions of Nightingale Theory

There are few contradictions of Nightingale theory that cannot be applied while caring for the patient in today's health care delivery system. While addressing the noise, she stated that patients should never be awake intentionally or accidentally during the first part of sleep [7]. The noise is unavoidable in today's health care systems whereas patients need to be awakened up multiple times during night shift for taking their vital signs, giving medications to them, and collection of samples for the lab test. Additionally, there is a noise of medical equipment that cannot be controlled, so this point is hardly applicable in nowadays.

Moreover, she believed in varying colors from flowers to plants and paintings should be provided to the patients regularly [7]. In most of the setting, hospital rooms are neutral colors and only having wall clock. There is no trend of paintings in patient rooms. However different flowers can be brought by family members and relatives as a trend but it is not a common practice nor offered by the hospital, and it is not applicable in such settings where the hospitals are lack of resources.

VIII. Conclusion

Environmental theory of Florence Nightingale provides a theoretical framework for best nursing practices. It is the prime responsibility of nurses to critically analyze the patient scenario by all these aspects mention by Florence Nightingale and should focus on all these elements of human's life instead of just giving medications to the patients. Moreover, the best conceivable way is to provide the health teaching or awareness about disease its sign symptoms and its prevention to the community. It is important to explain to them that tuberculosis is a communicable infection, and if someone gets this how to take measures to prevent others. Additionally, the course of sickness is prolonged, and the patient needs to take medicine for a prolonged period. Likewise, the need to complete the treatment course should be explained in detail and informed them if the patient would not follow the treatment course then he/she would be on risk to develop multi-drug resistant

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tuberculosis that is very difficult to treat. Health teachings should also be given on personal hygiene, appropriate ventilation and the importance of direct sunlight. Additionally, the role of maintenance and cleanliness of the houses should be discussed to reduce the risk of spreading the communicable disease.

IX. Recommendation

Government and administrative bodies should pay attention to the provision of clean water, appropriate sanitary system and suitable housing for the communities. The government should take initiatives to provide the medical services for the early diagnosis of disease and its treatment to the basic health units near to their homes, and appropriate measures should be taken to make it possible that every child should receive BCG vaccination at birth.

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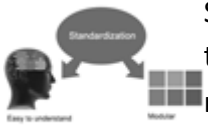


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Figures are supposed to be submitted as separate files. Always include a citation in the text for each figure using Arabic numbers, e.g., Fig. 4. Artwork must be submitted online in vector electronic form or by emailing it.

Preparation of Eletronic Figures for Publication

Although low-quality images are sufficient for review purposes, print publication requires high-quality images to prevent the final product being blurred or fuzzy. Submit (possibly by e-mail) EPS (line art) or TIFF (halftone/ photographs) files only. MS PowerPoint and Word Graphics are unsuitable for printed pictures. Avoid using pixel-oriented software. Scans (TIFF only) should have a resolution of at least 350 dpi (halftone) or 700 to 1100 dpi (line drawings). Please give the data for figures in black and white or submit a Color Work Agreement form. EPS files must be saved with fonts embedded (and with a TIFF preview, if possible).

For scanned images, the scanning resolution at final image size ought to be as follows to ensure good reproduction: line art: >650 dpi; halftones (including gel photographs): >350 dpi; figures containing both halftone and line images: >650 dpi.

Color charges: Authors are advised to pay the full cost for the reproduction of their color artwork. Hence, please note that if there is color artwork in your manuscript when it is accepted for publication, we would require you to complete and return a Color Work Agreement form before your paper can be published. Also, you can email your editor to remove the color fee after acceptance of the paper.

Tips for writing a good quality Medical Research Paper

1. Choosing the topic: In most cases, the topic is selected by the interests of the author, but it can also be suggested by the guides. You can have several topics, and then judge which you are most comfortable with. This may be done by asking several questions of yourself, like "Will I be able to carry out a search in this area? Will I find all necessary resources to accomplish the search? Will I be able to find all information in this field area?" If the answer to this type of question is "yes," then you ought to choose that topic. In most cases, you may have to conduct surveys and visit several places. Also, you might have to do a lot of work to find all the rises and falls of the various data on that subject. Sometimes, detailed information plays a vital role, instead of short information. Evaluators are human: The first thing to remember is that evaluators are also human beings. They are not only meant for rejecting a paper. They are here to evaluate your paper. So present your best aspect.

2. Think like evaluators: If you are in confusion or getting demotivated because your paper may not be accepted by the evaluators, then think, and try to evaluate your paper like an evaluator. Try to understand what an evaluator wants in your research paper, and you will automatically have your answer. Make blueprints of paper: The outline is the plan or framework that will help you to arrange your thoughts. It will make your paper logical. But remember that all points of your outline must be related to the topic you have chosen.

3. Ask your guides: If you are having any difficulty with your research, then do not hesitate to share your difficulty with your guide (if you have one). They will surely help you out and resolve your doubts. If you can't clarify what exactly you require for your work, then ask your supervisor to help you with an alternative. He or she might also provide you with a list of essential readings.

4. Use of computer is recommended: As you are doing research in the field of medical research then this point is quite obvious. Use right software: Always use good quality software packages. If you are not capable of judging good software, then you can lose the quality of your paper unknowingly. There are various programs available to help you which you can get through the internet.

5. Use the internet for help: An excellent start for your paper is using Google. It is a wondrous search engine, where you can have your doubts resolved. You may also read some answers for the frequent question of how to write your research paper or find a model research paper. You can download books from the internet. If you have all the required books, place importance on reading, selecting, and analyzing the specified information. Then sketch out your research paper. Use big pictures: You may use encyclopedias like Wikipedia to get pictures with the best resolution. At Global Journals, you should strictly follow here.



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6. Bookmarks are useful: When you read any book or magazine, you generally use bookmarks, right? It is a good habit which helps to not lose your continuity. You should always use bookmarks while searching on the internet also, which will make your search easier.

7. Revise what you wrote: When you write anything, always read it, summarize it, and then finalize it.

8. Make every effort: Make every effort to mention what you are going to write in your paper. That means always have a good start. Try to mention everything in the introduction—what is the need for a particular research paper. Polish your work with good writing skills and always give an evaluator what he wants. Make backups: When you are going to do any important thing like making a research paper, you should always have backup copies of it either on your computer or on paper. This protects you from losing any portion of your important data.

9. Produce good diagrams of your own: Always try to include good charts or diagrams in your paper to improve quality. Using several unnecessary diagrams will degrade the quality of your paper by creating a hodgepodge. So always try to include diagrams which were made by you to improve the readability of your paper. Use of direct quotes: When you do research relevant to literature, history, or current affairs, then use of quotes becomes essential, but if the study is relevant to science, use of quotes is not preferable.

10. Use proper verb tense: Use proper verb tenses in your paper. Use past tense to present those events that have happened. Use present tense to indicate events that are going on. Use future tense to indicate events that will happen in the future. Use of wrong tenses will confuse the evaluator. Avoid sentences that are incomplete.

11. Pick a good study spot: Always try to pick a spot for your research which is quiet. Not every spot is good for studying.

12. Know what you know: Always try to know what you know by making objectives, otherwise you will be confused and unable to achieve your target.

13. Use good grammar: Always use good grammar and words that will have a positive impact on the evaluator; use of good vocabulary does not mean using tough words which the evaluator has to find in a dictionary. Do not fragment sentences. Eliminate one-word sentences. Do not ever use a big word when a smaller one would suffice.

Verbs have to be in agreement with their subjects. In a research paper, do not start sentences with conjunctions or finish them with prepositions. When writing formally, it is advisable to never split an infinitive because someone will (wrongly) complain. Avoid clichés like a disease. Always shun irritating alliteration. Use language which is simple and straightforward. Put together a neat summary.

14. Arrangement of information: Each section of the main body should start with an opening sentence, and there should be a changeover at the end of the section. Give only valid and powerful arguments for your topic. You may also maintain your arguments with records.

15. Never start at the last minute: Always allow enough time for research work. Leaving everything to the last minute will degrade your paper and spoil your work.

16. Multitasking in research is not good: Doing several things at the same time is a bad habit in the case of research activity. Research is an area where everything has a particular time slot. Divide your research work into parts, and do a particular part in a particular time slot.

17. Never copy others' work: Never copy others' work and give it your name because if the evaluator has seen it anywhere, you will be in trouble. Take proper rest and food: No matter how many hours you spend on your research activity, if you are not taking care of your health, then all your efforts will have been in vain. For quality research, take proper rest and food.

18. Go to seminars: Attend seminars if the topic is relevant to your research area. Utilize all your resources.

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.



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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.



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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

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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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