Online ISSN: 2249-4618
Print ISSN: 0975-5888

Global Journal

of Medical Research: J

Dentistry and Otolaryngology

Dilemma of Inferior Turbinate

Different Levels Socioeconomic

Highlights

Results of a Test of Temporal

Oral Health Related Knowledge

Discovering Thoughts, Inventing Future

VOLUME 15 ISSUE 1 VERSION 1.0

Global Journal of Medical Research: J
Dentistry and Otolaryngology

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Dentistry and Otolaryngology

Volume 15 Issue 1 (Ver. 1.0)

Open Association of Research Society

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USA Tax ID: 98-0673427

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Contents of the Issue

Global Journal of Medical Research: J
Dentistry and Otolaryngology
Volume 15 Issue 1 Version 1.0 Year 2015
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 2249-4618 & Print ISSN: 0975-5888

Oral Health Related Knowledge Attitude and Practices Amongst School Children in Himachal Pradesh, India

By Vasundhara Pathania, Vinod Sachdev, BC Kirtaniya & H.S jaj

Himachal Dental College, India

Abstract- *Aim:* To assess the Knowledge Attitude and Practices in oral health in school children.

Material and Method: The study was carried out on a total 649 children in the age range of 7-14 years selected randomly from different schools. KAP regarding oral health was recorded with the means of a self-administered questionnaire. Statistical significance was determined by Chi-square test.

Results: 78.7% children considered brush to be the effective method of maintaining the oral hygiene. 61% children had the knowledge that brushing should be done twice per day. Poor knowledge attitude and practices regarding the role of fluoride and gum diseases was observed. Most of the children were using brushes to clean the teeth but only 39.1% were brushing twice.

Conclusion: Results of this study suggested that the present oral health knowledge attitude & practice of study participants was poor and needed to be improved.

Keywords: *knowledge, practices, dental caries.*

GJMR-J Classification: *NLMC Code: WU 113*

Strictly as per the compliance and regulations of:

Oral Health Related Knowledge Attitude and Practices Amongst School Children in Himachal Pradesh, India

Vasundhara Pathania [α], Vinod Sachdev [σ], BC Kirtaniya [ρ] & H.S jaj [ω]

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I. Introduction

In 1970s dental caries was more severe in developed and industrialized parts of the world due to frequent consumption of refined sugars and cariogenic diets, compared to the developing and underdeveloped countries. In recent years, however, this pattern has been reversed where in the most industrialized countries, prevalence of dental caries and mean dental caries experience in children have declined in spite of high sugar consumption, due to effective use of oral health services, implementation of school based oral health programmes, adaptation of regular health care practices, use of fluoride tooth paste and improved socioeconomic conditions and lifestyles[1-5].

In developing countries like India, against this, increasing levels of dental caries among children are observed due to increasing level of refined sugar available and high sugar and processed food consumption but at the same time insufficient knowledge about brushing and fluoridation due to lack of oral health education and community based preventive oral programmes.[1] During 1940 the prevalence of dental caries in India was 55.5% in 5-14 year age group while during 1960 it was reported to be 62%[6]. National Health Survey conducted in 2004 in India reported the percent prevalence of dental caries as 80.2%.[7] A similar caries prevalence of 77.7% and 80.92% in the age group of 7-12 years has been seen in the studies done by H Grewal, M Verma, A Kumar (2009)[8] and Shingare P (2012)[9].

Numerous studies regarding oral health have been conducted and reported in India, but as far as Himachal Pradesh is concerned no data is available for the knowledge attitude and practices of the school children regarding oral health. The above factors prompted us to conduct the present study with the following objective-

To assess the Knowledge Attitude and Practices in oral health in school children in the age range of 7-14 in Sundernagar city, Himachal Pradesh.

II. Materials and Methods

According to the Guidelines for Conducting Knowledge, Attitude and Practice (KAP) Study, the sample should be sufficiently large so as to represent the population yet not so large that the data collection and analysis is prohibitively difficult. At 95% confidence interval and 5% confidence level, the sample size calculated was 600. The epidimological study was carried out on 649 children in the age range of 7-14 years randomly selected from schools of Sundernagar city in Himachal Pradesh, India in 2012. Children younger than 7 years required indirect communication through the parents and children older than 14 years are usually not available for the subsequent visits because of their random shifting of institutions and hence they were not included in the study. Baseline data collected will be used for future planning of school oral health programmes.

Ethical approval to conduct the study was obtained from the Institutional Review Board of Himachal Dental College, Sundernagar. Written consent for the participation of the children in the study was obtained from the Principals of the concerned schools.

a) The inclusion criteria

- Schoolchildren (male and female) in the age range of 7-14
- Children present on the day of examination

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b) Number of investigators

. 3

The children from each class were selected on the basis of systematic random sampling. Data on oral health KAP was collected by means of self administered close-ended questionnaires focusing on brushing frequencies, frequency of sugar intake, sugar and caries, role of fluoride, gum diseases, dental plaque and importance of deciduous teeth etc. The final questionnaire was subsequently discussed among the experts who judged the face and content validity of the questionnaire. Reliability and internal consistency of the questionnaire was assessed using Cronbach's coefficient of alpha test. Only questions scoring > 0.7 were approved for conducting the survey.

A specially prepared computerized proforma in both English and Hindi was used which contained 17 questions,7 on knowledge (K), 5 on attitude (A) and 5 practice (P). The questions were easily understandable by the children and did not contain high flown, technical or scientific words. The questionnaire was pretested by conducting pilot study among 10% of sample size to assess the children's ability to understand the questions and answer them without any help. It took about 15 - 20 min to fill all the questionnaires. Interpersonal communication was not allowed and the children were informed of the importance of answering the questions honestly. Questionnaires were completed under the supervision of investigators.

The data obtained was recorded by using statistical package for social sciences version 11. Associations were assessed using Chi square test and p value of less than 0.05 was considered significant.

III. Results

a) Knowledge and attitude of the children regarding oral health (Table1)

Table 1: Knowledge And Attitude Of The Children

Questions	At baseline evaluation	
Brushing as best method	78.7%	
Frequency of cleaning teeth in a day	a. Once daily	18.3%
	b. Twice daily	61%
	c. Thrice daily	13.1%
	d. After every meal	5.7%
Role of fluoride on dental diseases	a. Don't know	71.2%
	b. Has got no role	5.5%
	c. Makes teeth stronger & protects from decay	11.3%
Foods which cause tooth decay	a. Don't know	7.4%
	b. Sugars	84.9%
	c. Fruits/vegetables	0.6%
Signs and symptoms of early stage of gum disease	a. Don't know	56.9%
	b. Gums swollen and bleeding	8%
Knowledge about dental plaque	a. Don't know	87.7%
	b. Layer of bacteria, bacterial products and food debris on teeth	3.7%
Knowledge of importance of milk teeth	a. Not important	37.8%
	b. Don't know	26.2%
	c. Important	36%

78.7% children considered brush to be the effective method of maintaining the oral hygiene. 61% children had the knowledge that brushing should be done twice per day. Poor knowledge and attitude towards Fluoride was observed. Most of the children were well aware with the fact that sugar is the main food which causes dental caries. 56.9% and 87.7% children in the present study did not know about gum diseases and dental plaque respectively. Most of the children had the knowledge that permanent teeth are important for various functions, but for deciduous teeth 37.8% children stated that they are not important and 26.2% children had no knowledge about the importance of milk teeth.

b) Oral Health Practices of the children (Table 2)

Table 2 : Oral Health Practices Of The Children

Questions	At baseline evaluation	
Children using tooth brush to clean their teeth	95.8%	
Frequency of brushing practiced in a day	a. Once daily	58.9%
	b. Twice daily	39.1%
	c.Thrice daily	1.7%

Type of paste/solution/powder used for brushing	a. Don't know	76.9%
	b. Fluoridated toothpaste	9.7%
	c. Non Fluoridated paste	0.6%
Frequency of sugar intake by the children per day	a. Thrice	9.1%
	b. Four times	39%
	c. Five times	25.4%
	d. Six times	14.8%

95.8% children in the study were already using brushes to clean the teeth. Only 39.1% were brushing twice a day. Of all the children, only 9.7% children were using fluoridated tooth paste to clean the teeth. 9.1% children knew about three sugar exposures and were consuming sugar thrice a day.

IV. Discussion

The baseline evaluation of oral hygiene practice revealed that 95.8% children were already using brushes to clean their teeth (Table 2). The advertisements and some other educational programs on television have helped children to gain knowledge about the use of toothbrush. Similar results were seen with the study done by Humagain M[10] and Walsh M.M[11] in which 100% and 96% children respectively used tooth brush for cleaning the teeth. In the present study, though 95.8% children were using brushes to clean the teeth but only 78.7% children considered brush to be the effective method of maintaining the oral hygiene (Table 1). The results were comparable with the questionnaire survey of Linn E L[12], where 99% children were using tooth brushes but 93% had the correct knowledge about tooth brush as the best effective tool for cleaning the teeth.

At the start of the study, again 61% children (Table 1) had the knowledge that brushing should be done twice per day but regarding the practice, only 39.1% were brushing twice a day (Table 2). These results were comparable to Petersen PE[13], Harikiran AG[14] and Humagin M[10] in which at baseline 31.3%, 38.5% and 35.1% children were brushing twice. 76.7% children at baseline had poor knowledge and attitude towards Fluoride (Table 1) and only 9.7% children were using fluoridated tooth paste to clean the teeth where as majority (76.9%) of children were not aware whether they were using fluoridated or nonflouridated toothpaste (Table2). These findings were similar to Harikiran AG[14] in which low values of knowledge attitude and practice towards the role of fluoride was noticed at the baseline. In contrast adequate baseline information was observed in the study done by Peterson PE[13] in which 74.9% children were aware of fluoridated tooth paste and were practicing with it. Jensen O[15], Smyth E[16] and Whye C[17] also showed the appreciable knowledge and attitude towards Fluoride tooth paste in the school going children. This lack of information in the present study was due to lack of proper guidance by the teachers or parents and due to lack of dental educational camps..

At the start of the study 84.9% children had the knowledge that sugar is the main food which causes dental caries (Table 1). These findings were in contrast to study done by Shenoy RP[18] and Harikiran AG[14] where only 31% and 48.9% children knew that sugar causes dental caries. Low socioeconomic strata of most of participants in the above mentioned studies could be the reason for these differences. In the present study only 9.1% children had the correct knowledge of three sugar exposures and were consuming sugar thrice a day (Table 2)

It was observed that only 6 to 8% of the children at baseline knew correct answers about the signs and symptoms of gum diseases (Table 1). Casual approach of the children and their parents towards the bleeding gums may be the basic cause for this neglect. Similar findings were observed in a study done in India by Punitha VC[19] and Shenoy RP[18] in which at baseline only 1.23% and 19% children respectively were aware of gum diseases, where as these findings were in contrast to studies done by Whye C[17] and Al-Omiri MK [20] in which 48.3% and 70% children respectively were aware that gingival bleeding reflects gingivitis. This might be explained by the fact that dental schools in the areas of above studies have been consciously promoting the role of prevention and proper management of young patient's oral health.

When the knowledge of the children about dental plaque was analysed at baseline, it was observed that 87.7% children in the present study did not know about dental plaque (Table 1). This lack of knowledge could reflect the dental health education, which was limited to certain levels of understanding and the contact with relevant dental personnel was confined only to the treatment hour. Poor knowledge about dental plaque among children was also noticed by Al Ansari J [21] and Whye C [17] where in both the studies found that 85.6% children were not aware of dental plaque. These findings were in contrast to the study done by Al –Omiri MK[20] and Humagain M [10] in which only 36.3% and 26.2% children respectively lacked knowledge about dental plaque.

Most of the children in the present study had the knowledge that permanent teeth are important for various functions, but for deciduous teeth, 37.8% children stated that they are not important and 26.2% children had no knowledge about the importance of milk teeth (Table11). This lack of knowledge is due to the lack of information of the parents, teachers and caretakers. About 62% of the caretakers in the study done by Mani SA [22] agreed that it was not necessary to do fillings in deciduous teeth, with similar results reported from a study done by Szatko F[23] where two-thirds of the mothers agreed that care of deciduous

dentition was unnecessary. Similar results were seen in the study done by Nagaveni[24] in which majority of parents of were unaware of the importance of the primary teeth.

V. Conclusion

Results of this study suggested that the present oral health knowledge attitude & practice of study participants was poor and needed to be improved. Systematic community-oriented oral health promotion programs are needed to improve oral health Knowledge attitude & practices of school children. Baseline data collected will be used for future planning of school oral health programmes.

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Global Journal of Medical Research: J
Dentistry and Otolaryngology
Volume 15 Issue 1 Version 1.0 Year 2015
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 2249-4618 & Print ISSN: 0975-5888

Dilemma of Inferior Turbinate Surgery

By Khaled Mohamed Bofares
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Abstract- *Back ground and objectives:* Inferior turbinate surgery is considered as one of common surgical procedures which performed in rhinology. It is usually done for the purpose of reduction of the bulk of inferior turbinates. It can be conducted for different indication as to relieve the mechanical nasal obstruction due to hypertrophied inferior turbinates, or to achieve a sufficient nasal surgical access during endoscopic sinus surgery, or to remove the inferior turbinates as a part of wide and complete resection of rhino-sinus neoplastic lesions.

The inferior turbinates have important role in the maintenance of nasal breathing function via providing the nasal valve mechanism that is necessary for regulation of air flow through the nose. Therefore in spite of availability of well-established variable techniques for this surgery but the main goal of this surgery still yet not completely achieved by preserving the balance in between the mechanical as well as the functional patency of the nose. This can be explained by the effect of different factors which usually difficult to be predicted and controlled.

Keywords: *inferior turbinate surgery, inferior turbinectomy, sub-mucosal diathermy, turbinoplasty.*

GJMR-J Classification: *NLMC Code: WV 324*

Strictly as per the compliance and regulations of:

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Thus this pattern of surgery became one of big dilemmas in rhinology which need to be deeply evaluated and subsequently resolved. For this reason, this serial study was conducted prospectively as analytic trial to assess the different aspects of this dilemma and to give finally further suggested recommendation as possible solutions for the clarification of this issue.

Patients and methods: 1337 patients aged 3-65 years of hypertrophied inferior turbinates , presented with clinical pictures of mechanical nasal obstruction related presentations at ENT department – Althowra central hospital and Al-tarahom private center Elbyda city- Libya at period in between September 2005 to September 2014 who operated by variable techniques of inferior turbinate surgery, namely sub-mucosal diathermy (SMD) (n=864), partial inferior turbinectomy (PIT) (n=427), CO2 laser vaporization of inferior turbinate (n=21), and turbinoplasty (n=25) . The outcomes namely post-operative atrophic rhinitis, and persistence or recurrence of the mechanical nasal obstruction was studied in relation to different factors to postulate as much as possible the clear answers for many complex questions which form this dilemma.

Results and Conclusion: The proper selection of patient for this pattern of surgery is considered as one of main aspects of this issue and one of significant steps toward the resolving of this dilemma it is very necessary to select the most suitable candidate for this surgery. On the other hand, the type of the technique for this surgery is needed to be selected probably; it was found that there are many factors, according to which the most proper technique will be selected. In addition the amount of the inferior turbinate which needed to be resected must be decided probably too. In accordance, it is necessary to confirm whether the accompanied septoplasty required to be performed in association with the inferior turbinate surgery, it was found that the septoplasty for even mild DNS (grade-I) may significantly reduce the risk of postoperative atrophic rhinitis as well as persistent functional nasal obstruction by minimizing as much as possible the resection action for inferior turbinates.

Keywords: *inferior turbinate surgery, inferior turbinectomy, sub-mucosal diathermy, turbinoplasty.*

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I. Introduction

The inferior turbinate surgery constitutes one of common patterns of surgical procedures which widely performed in rhinology. It represents that kind of surgery which aimed basically for reduction of inferior turbinate bulk. Hence this type of surgery is considered as very effective modality of surgery in relieving the mechanical nasal obstruction due to hypertrophied inferior turbinate therefore there were a lot of trials during last and presenting centuries to create new and more advanced manners of this important procedure. In deed all these trials were targeted for the purpose of the improvement of outcomes of this surgery. The cornerstone for improvement of outcomes of this surgery will be via the maintenance of optimum size for the inferior turbinates [(1-20)]. Anatomically as well as functionally speaking, the inferior turbinates are considered as very significant anatomical structures that acting through their size and position to preserve the one of primary and vital functions of the nose which is the sufficient nasal breathing this will be achieved by the committing the normal nasal valve mechanism at the most anterior part of nasal cavity that facilitate the eddy current flow of the air [(1-20)]. Therefore the difficulties for preservation of unique size of inferior turbinates can be recognized as a main reason on top of which the dilemma of this variety of surgery in rhinology was appeared [(10-27)].

Although the enough bulk of inferior turbinate is necessary for maintenance of normal nasal breathing function and in accordance the hypertrophied inferior turbinate that occupy more than one-third of nasal lumen may be manifested with significant nasal obstruction related symptomology thus the main goal of the inferior turbinate surgery is keeping the balance in between the over-resection and under-resection of inferior turbinate at optimum level that provide the preservation of sufficient breathing function through the nose and in the same time relieving the mechanical obstruction due to inferior turbinate hypertrophy [(1-20 and 33-35)].

There are variable etiologies for inferior turbinate hypertrophy which could be allergic rhinitis, rhinitis

medica-mentosa, vasomotor rhinitis, chronic hypertrophic rhinitis, and chronic infective rhinitis as fungal rhinitis. As it is well established that all previously mentioned causes can be treated and controlled sufficiently by medical treatment before the decision of any surgical interventions. Hence the bulk as well as the contour of inferior turbinates is required for maintenance of normal nasal breathing function thus the medical therapy for inferior turbinate hypertrophy still is considered as the mainstay of treatment before the surgery [1-53].

On the other hand, broadly speaking the indications for inferior turbinate surgery can be classified as: a) for relieving of mechanical nasal obstruction due to confirmed persistent inferior turbinates hypertrophy, b) for providing a sufficient surgical access during certain internal nasal surgical procedures as functional endonasal endoscopic or microscopic sinus surgery, and c) as a part of wide resection for eradication of lateral nasal wall neoplastic lesions [1-60].

In fact, during the last century as well as the presenting century as one of developing aspects in the rhinology is the inferior turbinate surgery and in accordance there are many modalities of this surgery were performed namely; submucosal diathermy, partial inferior turbinectomy, CO2 laser vaporization, Argon laser vaporization, turbinoplasty, and lateral nasal wall lateralization. Each of these patterns has advantages and disadvantages which need to be correlated with each patient who had been decided as a candidate for inferior turbinate surgery to improve as much as possible the postoperative outcomes of this surgery. For some extent there will be certain difficulties which may interfere with the proper selection of most suitable modality for each particular patient and subsequently the achieved sequels of this surgery will not be as wished therefore this type of surgery was described as one of big dilemmas in rhinology[1-35] .

Thus this serial study was aimed as prospective analytic study to resolve as much as possible this dilemma. We tried in this presenting study to put a frame-work for the solution of this dilemma via the finding of answers for these difficult questions:

Q1- who is the patient that can be considered as most suitable patient for this surgery?

Q2- which modality of this surgery will be selected as most unique technique for this particular patient?

Q3- how much the bulk of inferior turbinate is recommended to be removed for the purpose of maintenance of sufficient size and contour of it?

Q4- and as a trial to maintain the proper size and contour of inferior turbinate, is it advisable to perform concomitant septoplasty with inferior turbinate surgery or not?

II. Patients and Methods

1337 patients aged 3-65 years of persistent inferior turbinates hypertrophy due to different causes namely allergic rhinitis, rhinitis medica-mentosa, and vasomotor rhinitis, presented with mechanical nasal obstruction that not responding to enough medical treatment at ENT department – Althowra central hospital and Altarahom private center – Elbyda city – Libya at period in between September 2005 to September 2014 who operated by different techniques of inferior turbinate surgery, namely sub-mucosal diathermy (SMD) (n=864), partial inferior turbinectomy (PIT) (n=427), CO2 laser vaporization of inferior turbinate (n=21), and turbinoplasty (n=25). The mechanical nasal obstruction was confirmed clinically by the gross appearance of inferior turbinates at pre-operative anterior rhinoscopic as well as endoscopic evaluation as enlarged turbinates that occupied more than one-third of nasal lumen, with non-shiny, thick and pale mucosa, in addition to postulation of positive Cottle's sign. According to intra-operative performed technique, SMD group was divided in relation to conducted cauterization points into three sub-groups (two points sub-group, three points sub-group, and four points sub-group), also PIT group was classified according to the amount of resected tissue into three sub-groups too (sub-group-A that include those patients who underwent for the resection of one-third of hypertrophied inferior turbinate, sub-group-B that include those patients who underwent for the resection of two-thirds of hypertrophied inferior turbinate, and sub-group-C that include those patients who underwent for the subtotal resection of hypertrophied inferior turbinate), in addition CO2 laser vaporization group was categorized in relation to the used laser power into four sub-groups (sub-goup1, sub-group2, sub-group3, and sub-group4) which include those patients who underwent CO2 laser vaporization with different powers in Watts (2, 3, 4, and 5 Watts consecutively). On the other hand, the part of patients who interfered with SMD and PIT were operated concomitantly with septoplasty (n= 355, n= 235 consecutively), and compared to those who operated by solitary SMD and PIT (n= 509, n= 192 consecutively) to assess the effect of concomitant septoplasty on outcomes of inferior turbinate surgery. The outcomes of the surgery were studied and compared between the groups and sub-groups in relation to different patients' demographic, environmental, habitual, socio-economic, pathological as well as technical factors. The patients postoperatively were evaluated throughout first week for any nasal bleeding and followed up for 3-36 months to be assessed for common late complications of the surgery which are mainly the persistence or recurrence of mechanical nasal obstruction, and post-operative atrophic rhinitis. The nasal obstruction was assessed post-operatively by elucidation of any olfactory

impairment in addition to application of cottle's test and atrophic rhinitis was diagnosed clinically by recognition of local atrophic changes.

In accordance and from economic point of view the expense of each technique was assessed in relation to drugs consumption (this was including anesthesia drugs, systemic antibiotics, analgesic drugs, intravenous fluids, post-operative local irrigation solutions, and sometimes anticoagulant drugs as tranxiemic acid which may be required to be administered for patients with uncontrolled post-operative epistaxis), any expense related to specific machine which is used in the inferior turbinate surgery technique as CO2 laser machine, used local nasal packs, expense related to patient's word admission, and finally expense related to patient post-operative follow-up. The total price for each technique was roughly calculated in Libyan dinars and equaled to American dollars.

An informed consent was taken from the patients involved in the research prior to their participation.

Data were expressed by using descriptive analysis as means + standard error of mean (s. e. m) and percentages, test of significance was carried out, using Chi-square test and two way analysis of variance. A probability less than 0.05 was considered as significant, the degree of significance was determined by using level of standard deviation test. Student -t- test was used for dependent sample, as well as contingency coefficient was calculated as measurement of association between nominal variables.

III. Results

As shown in (Figure – I & II) the incidence of post-operative nasal bleeding and atrophic rhinitis was correlated to two significant factors which are the age of patient and the type of performed technique, it was found that the PIT increased significantly the risk of post-operative bleeding and atrophic rhinitis up to (20%) and (35%) consecutively among elderly patients as compared to SMD and CO2 laser vaporization ($P < 0.05$). On the other hand, as illustrated in (Figure – III) the incidence of post-operative recurrence of hypertrophied inferior turbinates was correlated to the patient related environmental as well as habitual factors, it was found that SMD and CO2 laser vaporization are associated with higher percentage of recurrence (30% and 80%) consecutively as compared to PIT among heavy smoking patients as well as those patients with history of frequent exposure to allergic rhinitis inducing allergens ($P < 0.05$). In accordance the (Table-I) postulated the effect of patients' local health status on outcomes of the inferior turbinate surgery, it was found that the patients with allergic rhinitis and vasomotor rhinitis who interfered by PIT as well as turbinoplasty showed a significant longstanding improvement may reach up to 93% as compared to those who interfered by SMD and CO2 laser vaporization ($P < 0.05$). As demonstrated in (Table – II) the effect of patients' general health status in relation to the type of performed technique outcomes, it was confirmed that the patients with uncontrolled systemic hypertension had a significant raising in the risk of post-operative epistaxis after PIT as compared to other techniques and also those patients with uncontrolled diabetes mellitus shown higher risk of recurrence of nasal obstruction after SMD as well as CO2 laser vaporization as compared to other techniques ($P < 0.05$). on the other hand, (Figure – IV) was elucidated the comparison between different techniques in relation to intraoperative time consumption, it was found that the duration of turbinoplasty was significantly longer as compared to PIT, CO2 laser vaporization, and SMD technique which was associated with the minimal duration ($P < 0.05$). Therefore from economic point of view, as illustrated at (Table-III) the CO2 laser vaporization can be considered significantly with higher expense as compared to other techniques ($P < 0.05$). From the other aspect, technically speaking as can be noted from (Table – IV) the amount of direct or indirect reduction of inferior turbinate bulk had a significant effect on outcomes of the performed procedure, and as it is presented at the same table these results was correlated with number of cauterization points in SMD, the used power in CO2 laser vaporization, as well as the resected size of inferior turbinate among PIT, it was found that the three sub-groups of SMD technique according to number of cauterization points (two points\ three points\ four points) did not show any significant difference in relation to post-operative outcomes namely local atrophic changes and persistent or recurrence of nasal obstruction ($P > 0.5$). In accordance the risk of post-operative atrophic rhinitis as well as persistence or recurrent nasal obstruction increased significantly among third sub-group of PIT as compared to other two sub-groups ($P < 0.05$). In addition it was observed that there is no direct proportional relation-ship between the used power of CO2 laser and postoperative outcomes ($P > 0.5$). On the other hand, as shown in (Table- V) there was significant improvement for outcomes of SMD as well as PIT if they are performed concomitantly with septoplasty procedure ($P < 0.05$).

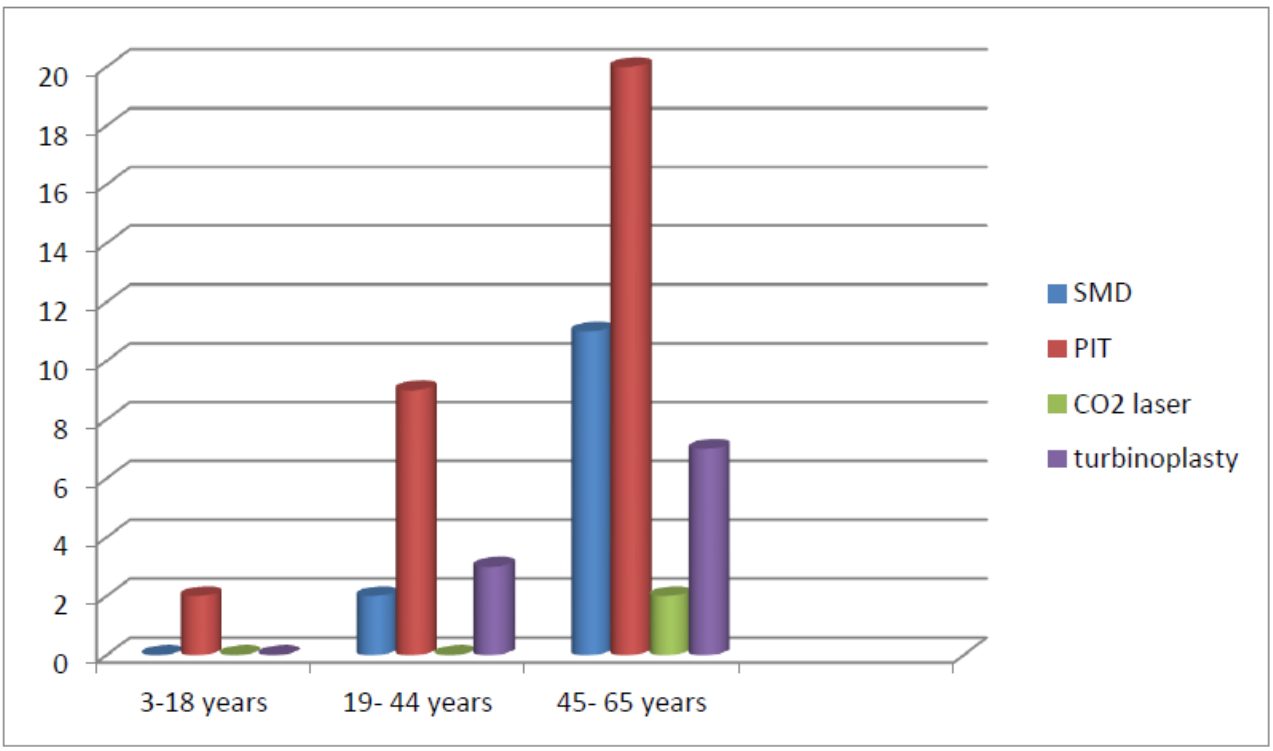

Figure I : the incidence of post-operative epistaxis (%) in relation to type of procedure and patients' age ($P < 0.05$)

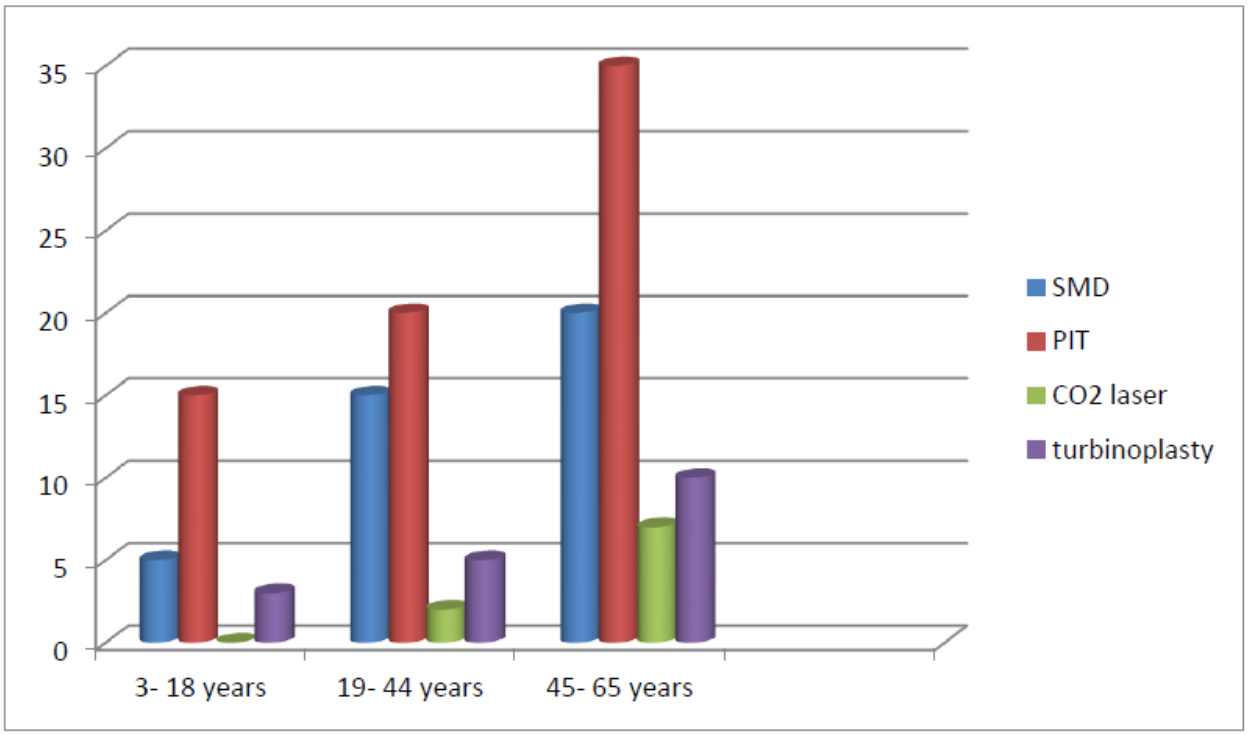

Figure II : the incidence of post-operative atrophic rhinitis (%) in relation to type of procedure and patients' age ($P < 0.05$)

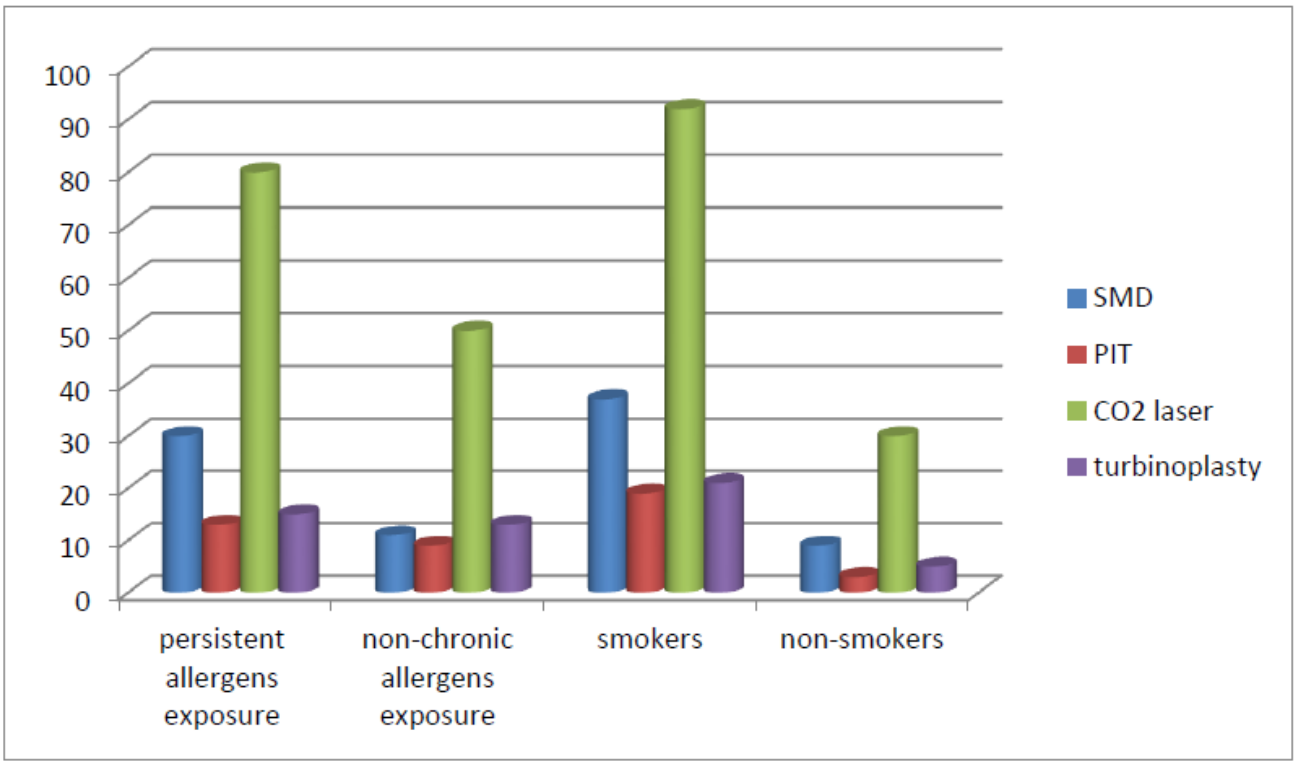

Figure III : the incidence of post-operative recurrence of hypertrophied inferior turbinates (%) in correlation with the patient related environmental as well as habitual factors ($P < 0.05$)

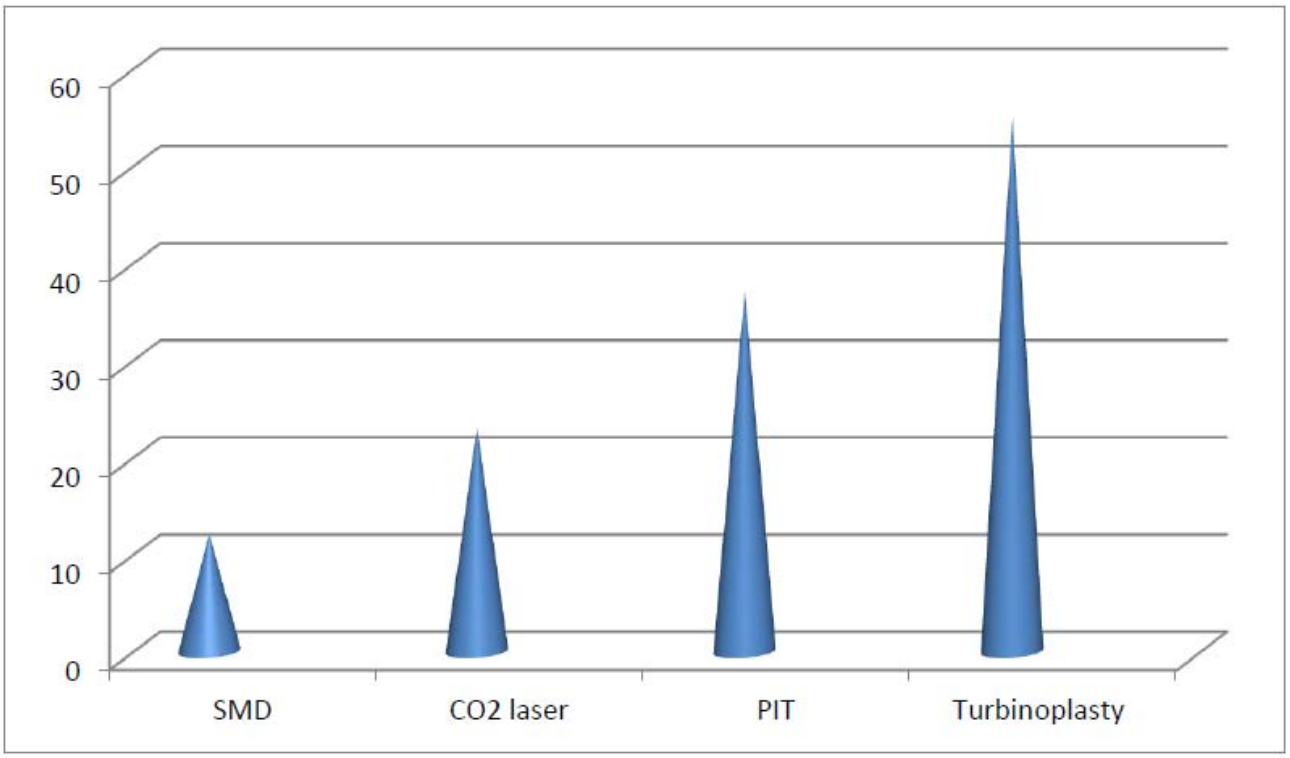

Figure IV : the comparison between different techniques in relation to intraoperative time consumption in minutes ($P < 0.05$)

Table I : the effect of patients' local health status on the persistence of post-operative relief of mechanical nasal obstruction for three years after inferior turbinate surgery ($P < 0.05$). [ARn means number of cases with allergic rhinitis; VMRn means number of cases with vasomotor rhinitis]

Type of local pathology	Percentage (%) of persistence of nasal patency improvement for 36 months in relation to type of procedure				
	SMD (N=864) [ARn= 536 & VMRn =264]	PIT (N=427) [ARn= 269 & VMRn =133]	CO2 laser (N=21) [ARn= 13 & VMRn =8]	Turbinoplasty (N=25) [ARn= 20 & VMRn =5]	Total n &%
Allergic rhinitis (AR) (N= 838)	(n=306) 57%	(n= 250) 93%	(n= 8) 63%	(n= 16) 80%	(n= 580) 69%
Vasomotor rhinitis (VMR) (N= 410)	(n=129) 49%	(n= 118) 89%	(n= 3) 37%	(n=4) 83%	(n= 254) 62%
Total N= 1248	(n=435) 54%	(n= 368) 92%	(n=11) 53%	(n=20) 80%	(n= 834) 67%

Table II : the effect of patients' general health status on outcomes of inferior turbinate surgery ($P < 0.05$). [HTNn means number of cases with systemic hypertension; DMn means number of cases with diabetes mellitus]

Type of general pathology	Percentage (%) of post-operative epistaxis (E) and recurrence of nasal obstruction (RNO) at each procedure in relation to patients' general health status							
	SMD (N=864) [HTNn= 47 & DMn =81]		PIT (N=427) [HTNn= 13& DMn =37]		CO2 laser (N=21) [HTNn= 3 & DMn =2]		Turbinoplasty (N=25) [HTNn= 4 & DMn =2]	
	E	RNO	E	RNO	E	RNO	E	RNO
Systemic hypertension (N= 67)	n= 13 27%	n= 18 39%	n= 12 91%	n= 2 13%	n= 0 0%	n= 1 34%	n= 2 50%	n= 0 0%
Diabetes mellitus (N= 122)	n= 15 19%	n= 70 87%	n= 27 73%	n= 6 17%	n= 0 0%	n= 0 0%	n= 0 0%	n= 0 0%

Table III : the comparison between the expenses of different techniques of inferior turbinate surgery ($P < 0.05$)

The items	The expenses for different inferior turbine surgery techniques in Libyan dinars (mean± standard error of mean (s. e. m))			
	SMD	PIT	CO2 laser	turbinoplasty
Drugs	36±4.7	108±5.3	55±7.9	103±1.9
Nasal packing	15±11.5	33±0.2	0	31±0.5
Patients word stay	126±3.9	299±0.7	44±1.2	209±0.3
Specific machine expense	0	0	139±4.1	0
Post-operative patient follow-up	35±4.3	77±6.3	43±5.7	53±0.7
The total in Libyan dinars	212±5.7	517±7.1	281±4.9	396±0.3
The total in American dollars	106±2.9	258±3.7	140±2.5	198±0.16

Table IV : The outcomes of CO2 laser vaporization of hypertrophied inferior turbinate (%) in relation to used power in Watts ($P < 0.05$)

Outcomes of technique	The outcomes of CO2 laser vaporization of hypertrophied inferior turbinate (%) in relation to used power in Watts (N=21)			
	2 Watts (n=5)	3 Watts (n=6)	4 Watts (n=5)	5 Watts (n=5)
Local atrophic changes	40% (n=2)	17% (n=1)	20% (n=1)	60% (n=3)
Persistence or recurrence of mechanical nasal obstruction	60% (n=3)	34% (n=2)	60% (n=3)	80% (n=4)

Table V : The comparative illustration of outcomes of SMD as well as PIT with and without septoplasty ($P < 0.05$)

Outcomes	Percentage of outcomes with septoplasty N=590		Percentage of outcomes without septoplasty N=701	
	One point SMD n= 355	One-third PIT n= 235	Two point SMD n=509	Two -thirds PIT n=192
Atrophic changes	0	2% n=5	31% n=158	47% n=90
Persistent nasal obstruction	0	0	12% n=61	9% n=17

IV. Discussion

The inferior turbinate surgery is considered as one of big issues in rhinology. Hence this pattern of surgery is frequently indicated and widely performed therefore it always needs to improve its outcomes. Although during last two centuries there are many conducted clinical studies which tried to present new techniques that may had been proved with better outcomes of this surgery but still as shown at other many clinical trials and observations that it may become very difficult to decide which technique is most suitable variety for certain particular patient. In accordance, it was found that there are many factors which may be responsible for creation of difficulties regarding the selection of most proper manner of inferior turbinate surgery [15-65]. However most of the recent studies tried to resolve these difficult situations but from the clinical aspect it was noted that in spite of following of these studies recommendations, unpredicted post-operative outcomes still appearing. Thus this type of surgery can be classified as one of the dilemmas at rhinology and according to our experience the main points that in favor of this dilemma innovation are:

a. Who is the patient that can be considered as most suitable candidate for inferior turbinate surgery?
b. Which is the technique that can be selected as most proper technique for certain particular patient?
c. How much uniquely is required to remove from the bulk of hypertrophied inferior turbinate?
d. Is the solitary inferior turbinate surgery sufficient to relief the mechanical nasal obstruction or it needs to be performed with the septoplasty as concomitant procedure to improve outcomes of the surgery as much as possible?

In this serial study we tried to find out optimum answers for all these questions. In the same manner as it is noted from this presenting study the number of cases and the time of follow up of patients can be considered as very sufficient as well as very conclusive for any final recommendation which were given via this study.

Regarding the selection of the patient who should be considered as most suitable candidate for inferior turbinate surgery, generally speaking the inferior turbinate surgery can be elective and non-elective i.e. when this pattern of surgery is decided to be performed for the management of persistent mechanical nasal obstruction at this case it will be classified as elective surgery [1-20]. On the other hand, the inferior turbinatectomy can be conducted non-electively as a part of wide resection of sino-nasal neoplastic lesions [36-50]. Our discussion is mainly highlight the elective category of this surgery. Basically there are five major criteria according to which the patient might be indicated for inferior turbinate surgery:

a) The patient has chronic nasal obstruction related presentations that mainly of five varieties, partial or complete inability to breathe through the nose, frequent or persistent opened mouth for mouth breathing, olfaction function impairment, sleep related breathing disorders, and recurrent sore throat, pharyngitis, as well as oral ulcers due to persistent mouth breathing.
b) The patient received sufficient medical therapy in form of local steroids, local nasal douching, systemic steroids, and systemic anti-histamines for enough time which is 3-6 months but the patient did not show any significant clinical improvement.
c) The patient proved locally by anterior rhinoscopic as well as endoscopic evaluations that has significant hypertrophied inferior turbinate which occupies more than one-third of nasal cavity.
d) The hypertrophied inferior turbinate grossly appears as enlarged turbinate with thick, pale, grayish-white, and non-shiny covering mucosa.
e) The significant nasal obstruction due to hypertrophied inferior turbinate must be elucidated objectively by positive rhino-metric evaluation, and\ or positive Cottle's sign, and\ or positive impairment of olfactory function.

Hence the patient was selected as indicated candidate for inferior turbinate surgery; the next step will be the selection of most suitable technique for that particular patient. Generally speaking there are five patterns of inferior turbinate surgical techniques namely; a) partial turbinectomy which can be done by lateral resection of maximum up to one-third of hypertrophied inferior turbinate either by using curved scissors, or shaver, or radio-frequency ablation, or co-ablation [1-20 and 37-71]. b) submucosal diathermy, this technique is considered as old fashion for inferior turbinate surgery. It is performed by creation of electrical cauterization at multiple points (2-5 points) through sub-mucosal layer of hypertrophied inferior turbinate. This technique acts mainly by cauterization of sub-mucosal venous sinusoids among hypertrophied inferior turbinate with active sensitization inflammatory process due to allergic rhinitis, vasomotor rhinitis, or rhinitis medica-mentosa. Thus the sub-mucosal fibrosis will be induced subsequently as a reaction to venous sinusoids cauterization and this will result in the shrinkage of inferior turbinate bulk. However the submucosal diathermy technique was proved to be very effective and simple technique but still it is of no benefits among those patients with hypertrophied inferior turbinate due to increase in bulk of concha bone rather than soft tissue [1-20]. c) CO2 laser vaporization of hypertrophied inferior turbinate, this technique was confirmed to be very effective with minimal post-operative local atrophic changes as compared to other previously mentioned two techniques. It acts by same mechanism of submucosal diathermy through its penetration effect into sub-mucosal layer of hypertrophied inferior turbinate and as compared to submucosal diathermy technique it has less destructive effect on the mucosal glandular acini as well as venous sinusoids therefore the incidence of post-operative atrophic rhinitis after CO2 laser vaporization is limited but in the same time its action to relief the mechanical nasal obstruction due to hypertrophied inferior turbinate will be lesser as compared to other techniques [20-35]. d) turbinoplasty, simply this technique can be described as that inferior turbinate surgical modality which is conducted via the reduction of bone bulk of inferior concha. In accordance this technique is aimed to maintain the mucosal cover of inferior turbinate therefore the eddy current mechanism of air flow by inferior turbinate mucosal lining will be preserved in addition to the maintenance of moisture consistency of inspired air by mucosal glandular acinic secretions thus the turbinoplasty is the technique which associated with minimal post-operative nasal atrophic changes. Although the turbinoplasty is the recommended technique for hypertrophied inferior turbinate due thickened concha bone but for some extent it can be performed even for reduction of inferior turbinate soft tissue [36-72]. e) lateral nasal wall lateralization, which was first described by Daniel simmen on 2013 and this technique is simply performed by submucosal resection of lateral nasal wall bone just in front to lacrimal sac and this can give sufficient access for more lateralization of ipsilateral inferior turbinate[72].

In fact we observed throughout our long practical experience that the following of the recommendations which frequently come out from several old as well as recent studies regarding inferior turbinate surgeries did not sufficiently give the predicted results as those studies concluded. For this reason we tried through this planned serial study to suggest certain possible factors that may had been thought to be effective factors on the outcomes of this pattern of surgery and the further conclusions from this study can be roughly considered as a first step toward the resolving of this big dilemma in rhinology. Accordingly in this serial study these suggested factors were mainly correlated to the answer of the second question of this dilemma (Which is the technique that can be selected as most proper technique for certain particular patient?). Moreover these studied factors can be discussed as: a) Patient's age, generally speaking, the elderly patients showed higher incidence of post-operative epistaxis as well as the atrophic rhinitis among four performed procedures namely PIT, SMD, CO2 laser vaporization, and turbinoplasty as compared to the young ages. On the other hand, specifically speaking, the incidence of post-operative epistaxis as well as atrophic rhinitis significantly increased by interfering with PIT as compared to other inferior turbinate surgical techniques

i.e. the risk of post-operative epistaxis and atrophic rhinitis is direct proportionally to increasing of patient's age. This can be explained by a scientific and basic-physiological fact that vascular related aging process among elderly patients contributes the main predisposing factor for the impairment of local homeostasis control after the surgery as well as the delay of proper healing process at the site of surgery, in addition to the significant decrease in the number of venous sinusoids and mucosal glandular acini at sub-mucosal layer of the turbinate among elderly patient due to local physiological aging changes too [1-20 and 37-71]. Thus PIT might not be considered as most suitable technique for inferior turbinate surgery among old ages because technically speaking PIT can be described as highly invasive procedure that associated with cutting action and wide resection of the turbinate's soft tissue that may increase significantly the risk of intra-operative as well as post-operative bleeding in addition to the increasing of risk of post-operative local atrophic changes particularly among elderly patients [15-20]. b) Patient related habitual and environmental factors, the results of this study postulated that the incidence of post-operative recurrence of inferior turbinate hypertrophy increased significantly by smoking and chronic exposure to certain allergens as pollens, animal epithelials, house dust mites, and chemical irritants as compared to the non-smokers as well as those patients who are not frequently exposed to environmental irritants. In accordance the incidence of recurrence of inferior turbinate hypertrophy by smoking and persistent allergens exposure was significantly higher after CO2 laser vaporization as compared to other techniques this can be explained by the insufficient reduction of sub-mucosal venous sinusoids as the histological changes on the inferior turbinate mucosa after CO2 laser vaporization this will increase the incidence of the inferior turbinate re-congestion and subsequent hypertrophy as the result of IgE –hypersensitivity reaction activation due to the persistent smoking and exposure to the allergens. On the other hand, the SMD, PIT, and turbinoplasty are associated with significant lowering of the incidence of inferior turbinate hypertrophy after the surgery this is because of obvious reduction of the number of sub-mucosal venous sinusoids due to sub-mucosal cauterization by SMD and enough tissue bulk resection by PIT as well as turbinoplasty techniques. Therefore CO2 laser vaporization might not be selected as most suitable technique for inferior turbinate surgery among smokers and those patients who live or work at contaminated environment [18-20 and 23-27]. c) Patient's local health status, this serial study confirmed that the local nasal pathological status of the patient may affect significantly the decision regarding the selection of most proper technique of inferior turbinate surgery i.e. those patients who presented as cases of allergic rhinitis and vasomotor rhinitis got significant long standing improvement regarding the patency of nose after PIT and turbinoplasty as compared to SMD and CO2 laser vaporization. This can be discussed in relation to the sufficient amount of tissue which resected either by PIT or turbinoplasty. On the other hand, the basic idea behind the performance of SMD as well as CO2 laser vaporization is the reduction of number of venous sinusoids and enhancement of diffuse fibrosis at the level of sub-mucosal layer of inferior turbinate either by cauterization effect of SMD or penetration effect of CO2 laser vaporization; these effects had been proved to be not sufficient to fulfill the adequate maintenance of optimum size of inferior turbinate because still there is risk of proliferation of the venous sinusoids and subsequent recurrence of congestion as well as hypertrophy of inferior turbinate due to the allergic or autonomic nervous system disturbance phenomena predisposition. Thus the most suitable techniques for inferior turbinate surgery among patients with allergic rhinitis or vasomotor rhinitis are PIT or turbinoplasty [1-51]. d) Patient's systemic health status, this presenting study demonstrated that the risk of epistaxis is increased after PIT among hypertensive patients as well as diabetic patients; this can be explained by extensive local tissue injury due to PIT as compared to other less invasive techniques. Moreover the SMD creates higher risk of recurrence of nasal obstruction among diabetic patients as compared to other techniques; this can be reasoned to that the patients with diabetes mellitus are more prone for local atrophic changes and diffuse fibrosis as compared to non-diabetic patients due to high incidence of local diabetic angiopathic changes this can result in functional nasal obstruction rather than mechanical nasal obstruction, in addition to the higher incidence of vasomotor rhinitis among diabetic patients as compared to non-diabetic patients this will increase the risk of post-operative recurrence of mechanical nasal obstruction due to inferior turbinate hypertrophy. Accordingly we can judge that the PIT is not the advised technique for hypertensive as well as diabetic patients and SMD is not the curable procedure for patient with diabetes mellitus[1-19].

In accordance there is another important factor which may has significant interaction for rooting of this dilemma namely the socio-economic factor. As it was elucidated at this serial study and via the rough evaluation of different economic aspects for each performed technique including the expense of used drugs, nasal packing, patient word stay, specific machine expense, and post-operative patient follow-up it was found that PIT and turbinoplasty had higher prices as compared to SMD as well as CO2 laser vaporization. Although the machine expense for CO2 laser vaporization is very significantly higher but still the total price is obviously lower as compared to other procedures. This can be discussed in relation to the

other aspects rather than the machine expense i.e. PIT and turbinoplasty are considered as more invasive techniques which consume longer intra-operative duration therefore there will be more utilization of intra-operative anesthesia drugs in addition to certain specific drugs which might be needed to be administrated as tranxiemic acid for purpose of epistaxis control which of higher incidence among these two procedures (20-45). On the other hand, patients after PIT as well as turbinoplasty need to be observed and cared more as compared to other techniques this will result in the prolongation of patient's post-operative stay at word. Also the patients after PIT and turbinoplasty need frequent follow-up sessions after their discharge this is because of high tendency for recurrent local dryness and crusts formation during first 4-6 weeks post-operatively which may predispose to infective rhinitis that result in subsequent healing by scaring and synaechia creation, for this reason the repetitive sessions of local irrigation and suction- clearance after PIT as well as turbinoplasty are recommended to reduce all previously mentioned risks. However the PIT and turbinoplasty are considered as very effective technique for the surgical management of persistent mechanical nasal obstruction due to inferior turbinate hypertrophy but at the same time they are considered as expensive procedures as compared to SMD and CO2 laser vaporization [(20-45)].

In the same manner, we thought that the used power during CO2 laser vaporization constitutes one of important issues which may play a role in building-up of this big dilemma thus we tried via this clinical study to assess which is the most suitable power for CO2 laser vaporization. As it was illustrated at the results of this serial study the power of 3-4 watts were associated with lower incidence of post-operative atrophic rhinitis as well as persistence or recurrence of nasal obstruction as compared to lower powers which had been proved with significantly high incidence of post-operative persistent or recurrent nasal obstruction and higher powers which showed significant raising in the incidence of both post-operative atrophic rhinitis as well as persistence or recurrence of nasal obstruction.

These observations can be explained by inability of low powers to destroy sufficient number of sub-mucosal venous sinusoids that may increase the risk of persistence and recurrence of mechanical nasal obstruction due to the inferior turbinate congestion and hyperemia and on the other hand the high powers are more destructive powers that lead to extensive venous sinusoids and glandular acini loss this will result in higher incidence of local atrophic changes after the surgery which can be considered as main cause for persistence or recurrence of functional nasal obstruction [(19-33)].

From the other aspect, we tried at our serial clinical trial to evaluate whether the concomitant septoplasty has any role regarding improvement of outcomes of inferior turbinate surgery, in accordance we found that the performance of septoplasty even for mild deviated nasal septum as bothersome procedure with inferior turbinate surgery may improve significantly the outcomes of this surgery and this can be explained simply by the reduction of points of cauterization among SMD cases and limitation of the tissue resection among PIT cases therefore the risk of post-operative atrophic rhinitis and subsequent functional nasal obstruction is significantly decreased in addition that the patient get important relieve regarding the mechanical nasal obstruction because of the interfering with both deviated septum as well as hypertrophied inferior turbinate[(53)] .

Finally we can conclude to that really the inferior turbinate surgery is considered as one of big dilemmas at rhinology and because it is widely conducted surgery thus always it needs frequent research to resolve all possible associated problems and issues. The cornerstone of this dilemma is how to avoid the adverse outcomes of inferior turbinate surgery mainly post-operative epistaxis as early complication and atrophic rhinitis as well persistent or recurrent nasal obstruction as late complications. As it can be noted from the results of this serial study which tried to evaluate different patterns of inferior turbinate surgery and correlated with variable groups of factors the proper selection of most suitable candidate for this surgery is very necessary and we mean by suitable candidate that the patient who is strongly indicated for this surgery, in addition the proper selection of the most suitable technique is another significant key point toward the resolving of this dilemma. In accordance and as suggested recommendation the selection of proper technique needs to be based up on certain patient's related factors namely age, local as well as general health status, surrounding environment, habitus, and socio-economic status.

Although this study was well-controlled, long-standing, and of adequate number of cases but it may be considered as non-formative study regarding CO2 laser vaporization, and turbinoplasty because the number of operated cases among these two procedures is not sufficient as compared to other two procedures thus the comparative elucidations of CO2 laser vaporization as well as turbinoplasty with SMD and PIT will be non-conclusive therefore as other suggested recommendation the further clinical studies are advised to be committed to confirm these concepts which obtained from this presenting study and in the same time the new aims may be suggested to be postulated toward the resolving of this dilemma.

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Global Journal of Medical Research: J
Dentistry and Otolaryngology
Volume 15 Issue 1 Version 1.0 Year 2015
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 2249-4618 & Print ISSN: 0975-5888

Hearing Loss and M.1555a>G Mitochondrial Mutation

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Abstract- *Introduction:* Hearing loss (HL), one of the commonest sensory disorders, can be caused by a variety of environmental and genetic factors 1. Genetic HL of nonsyndromic form can be caused by mutations in both nuclear and mitochondrial genes 3. Mitochondrial mutation (m.1555A>G) in the MTRNR1 gene is related to HL. The aim of this study is to describe the m.1555A>G genetic mutation in the MTRNR1 gene and its relationship with hearing loss plus medical literature review.

Methods: A retrospective study of medical records of a patient who was diagnosed with profound hearing loss and m.1555A>G mutation. The medical literature review was performed using the MeshTerms: genetic hearing loss; non-syndromic hearing loss and m.1555A>G.

Keywords: *genetic deafness; A155G; hearing loss.*

GJMR-J Classification: *NLMC Code: WV 270*

Strictly as per the compliance and regulations of:

Hearing Loss and M.1555a>G Mitochondrial Mutation

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Abstract- *Introduction:* Hearing loss (HL), one of the commonest sensory disorders, can be caused by a variety of environmental and genetic factors [1]. Genetic HL of nonsyndromic form can be caused by mutations in both nuclear and mitochondrial genes [3]. Mitochondrial mutation (m.1555A>G) in the MTRNR1 gene is related to HL. The aim of this study is to describe the m.1555A>G genetic mutation in the MTRNR1 gene and its relationship with hearing loss plus medical literature review.

Methods: A retrospective study of medical records of a patient who was diagnosed with profound hearing loss and m.1555A>G mutation. The medical literature review was performed using the MeshTerms: genetic hearing loss; non-syndromic hearing loss and m.1555A>G.

Results: Female, 16 years-old, hearing loss since birth, whith a sister and niece profoundly deaf since birth too, no change in the physical examination. Imaging studies without anatomical alterations. Auditory evoked potential in 90 dB HL bilaterally. Genetic study identified the presence of m.1555A>G mutation in the MTRNR1 gene without aminoglycoside exposure. Discussion: The m.1555A>G mutation is a common cause of genetic HL in Brazil. Genetic counseling regarding maternal inheritance, and assist pharmacological strategies for the prevention or diminution of HL progression.

Conclusions: Early treatment can allow many infants to develop normal language skills, using hearing aids, cochlear implants, audiologic rehabilitation, speech-language therapy and pharmacological therapy. Gene transfer by viral vectors or nanoparticles represents a promising approach for delivering therapeutic genes into the inner ear[18]. Stem cells have been the subject of intense speculation as they open radically new therapeutic possibilities[18].

Keywords: *genetic deafness; A155G; hearing loss.*

I. Introduction

Hearing loss (HL) is one of the commonest sensory disorders and can be caused by a variety of environmental and genetic factors [1]. More than 70% of hereditary HL is non-syndromic, while the remaining cases are accompanied by other clinical features and categorized as syndromic ones [2].

Genetic HL of non-syndromic form can be caused by mutations in both nuclear and mitochondrial genes [3]. It is estimated that the inheritance of non-syndromic HL is autosomal recessive in 80% of cases, autosomal dominant in 20%, X-linked in 1% and mitochondrial in 1% of cases [2].

In 1993, Prezant et al. first reported the association of HL with a mitochondrial mutation, the m.1555A>G in the *MTRNR1* gene. It has been found that this mutation is related to aminoglycoside-induced HL, since it alters 12S rRNA subunit, making it more similar to the bacterial ribosomal 16S rRNA and thereby enhancing aminoglycoside binding and its toxic effects on the ear [4].

An overview of reported mitochondrial mutations can be found in the Human Mitochondrial Genome Database – MITOMAP (http://www.mitomap.org) [5].

The aim of this study is to describe the m.1555A>G genetic mutation in the *MTRNR1* gene and its relationship with hearing loss plus medical literature review of this topic.

II. Materials and Methods

A retrospective study of medical records of a patient who was diagnosed with profound hearing loss and m.1555A>G mutation.

The medical literature review was performed using the MeshTerms: *genetic hearing loss; non-syndromic hearing loss and* m.1555A>G.

a) Audiometric Testing

The subject had unaided pure tone audiometry tests at 250, 500, 1000, 2000, 3000, 4000, 6000, and 8000Hz. We used an AC30-SD25 audiometer, calibrated according to ISO389/64. The same audiologist conducted all the pre- and postoperative tests.

b) Molecular study

Genomic DNA was extracted from the peripheral venous blood of patients, according to standard protocols.

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Genetic testing for mutations in the *GJB2* gene, as well as the del (*GJB6*- D13S1830) and del (*GJB6*-D13S1854) mutations in the *GJB6* gene, and the m.1555A>G mutation in the *MTRNR1* gene was performed. *GJB2* mutations were screened by direct sequencing of the gene coding region [6,7].

A multiplex PCR methodology was used to detect del (*GJB6*-D13S1830) and del (*GJB6*-D13S1854), according to the procedures reported previously [8,9].

Analysis of m.1555A>G was performed by PCR amplification followed by digestion with the *Bsm*AI restriction endonuclease, as described by Prezant et al.[4].

c) Ethics

The institutional review board approved this study and all subjects gave written
informed consent.

Recognizes only loud noises and alert sounds. Denies tinnitus, dizziness or otorrhea. Do not have gestational or perinatal history.

Sister and niece (sister's daughter) has profoundly deaf since birth, with the use of hearing aids.

Patient oral language, is literate, but have poorly developed speech.

No change in the physical examination.

The imaging studies (CT and MRI) do not reveal anatomical alterations of the peripheral and central auditory system of the patient.

Audiological evaluation showed remnants hearing in the low frequencies bilaterally, as shown in Table 1. Tympanometry is normal bilaterally, with the acoustic reflections.

The auditory evoked potential (ABR) showed electrophysiological hearing threshold 90 dB HL bilaterally.

III. Results

Female, 16 years-old, complaints of hearing loss since birth.

Tabela 1 : Audiometric pure tone thresholds.

kHz/dB	0,25	0,5	1	2	3	4	6	8	SD
Right Ear	75	85	95	105	115	120	Aus	110	80
Left ear	85	95	100	105	120	Aus	Aus	110	85

Legend: SD: detection threshold speaks in monosyllables.

Genetic study identified the presence of m.1555A>G mutation in the *MTRNR1* gene in a homoplasmic state. The patient with the m.1555A>G mutation had not aminoglycoside exposure. A family history of HL was also noted, with a strong matrilineal inheritance.

IV. Discussion

According to previous studies, this is a common cause of genetic HL in Brazil. It was found in approximately 2% of unselected subjects with HL, and was recommended for inclusion in molecular diagnostic testing for HL [10, 11]. Additonally, mutation screening is especially important in countries where aminoglycosides are widely used, as in Brazil.

Early identification of patients with SNHL due to mutations in mitochondrial DNA can influence genetic counseling regarding maternal inheritance, enable avoidance of known risk factors, and assist pharmacological strategies for the prevention or diminution of HL progression [12]. Of the children who develop childhood-onset HL with a genetic basis, the majority (around 70%) are non-syndromic, and arise predominantly from mutations inherited in an autosomal recessive pattern. In less than 1% of cases, inheritance is either X-linked, or mitochondrial13. The most frequent causative genes that have been identified in autosomal recessive non-syndromic HL, in ordem of frequency are GJB2, SLC26A4, MYO15A, OTOF, CDH23, and TMC1[13].

Maternally-inherited hearing impairment due to mutations in the mitochondrial genome appears to be a rare cause of prelingual HL, but the most commom mitochondrial mutation, m.1555A>G, can predispose to irreversible HL resulting from aminoglycoside exposure[13].

A recent study from China analyzed 658 unrelated patients with NSHL and 462 normal-hearing individuals for a mutational screening including GJB2 and mtDNA 12S rRNA genes using PCR and DNA sequencing technology. There were 7 pathogenic mutations in the 12S rRNA gene and 39 subjects harbored the m.1555A>G mutation
(5,93%) in mtDNA 12S rRNA[14].

A Taiwanese study was performed to explore the factors that might contribute to the differences in the phenotypes, including aminoglycoside exposure, mutation load and mitochondrial DNA background. As

the result it was found that the mitochondrial m.1555A>G mutation accounted for 3,2% of the Taiwanese families with sensorineural hearing impairment of unknown etiology[15].

Another study was performed in China to make a clinical, molecular, and genetic characterization of maternal hereditary pedigree in a Province from that country. The G7598A mutation was absent in 100 unrelated healthy controls in that region. Therefore, it may have a modifying role, enhancing its penetrance and severity, in the aminoglycoside antibiotic-induced deafness associated with the 12S rRNA A1555G mutation in the Han Chinese pedigree[16].

A previous Spanish study found a prevalence of the A1555G mutation of 25,8% among patients with family history of HL, of 75% in patients with cochlear ototoxicity and family history of HL and 100% in patients with cochlear ototoxicity and family history of aminoglycoside cochlear ototoxicity via maternal transmission[17]. In general, the prevalence of the A1555G mutation has been shown to be between 20-30% in deaf individuals in Spain and Asia, of which 15% had a history of aminoglycoside ototoxicity.

In Italy, the A1555G mutation is responsible for 5,4% of cases affected with isolated idiopathic sensorineural hearing impairment[18]. Genetic screening for the A1555G mutation is still laborious, and no cost-effective has been demonstrated; thus,
the use of aminoglycosides should be limited to very severe infections[18].

Early treatment of HL can allow many infants to develop normal language skills. Current approaches of SNHL are represented by hearing aids and cochlear implants, although recent advances in human genomics and molecular biology have led to the identification of mechanisms and defective genes causing deafness, which represent novel putative therapeutic targets[18].

a) Conventional hearing aids

Conventional hearing aids are indicated in children with moderate to severe hearing loss inducting delayed speech or articulation disorders. Indication for hearing aids in children with bilateral severe SNHL is also discussed in relation to the cochlear implant and depends on the benefits of amplification[18].

b) Bone-anchored hearing device (BAHD)

The principle of a bone-anchored hearing aid (BAHA) is based on sound conduction through bone via a percutaneous osseointegrated implant. In the pediatric population, the indications for BAHA include congenital aural atresia and microtia, and unilateral profound and mixed HL.

BAHA has also been used in children with chronic suppurative otitis media, chronic otitis externa and traumatic ossicular chain disruption after failure with conventional aids[18]. Marsella et al. described that the main indications for BAHA are a minimum age of three years at the time of implantation and/or cortical bone thickness ≥ 3mm as documented by CT[19].

c) Implantable middle-ear devices

These devices stimulate the ossicles and improve comfort by allowing the ear canal to remain open and not occluded. Currently, implantable middle-ear devices are indicated for patients aged 18 years or older, as an alternative to conventional hearing aids for individuals who are either unable to wear hearing aids or reject them for a variety of reasons[20].

d) Cochlear implants

Indications for cochlear implantation are constantly changing and are influenced by developments in technology, disease knowledge and experience of the physicians involved. The guidelines adopted by most European centres are those issued by the National Institute for Health and Clinical Excellence (NICE, UK, 2009). The timing for surgery is still controversial: in the US, the FDA requires waiting until the child is one year of age, while NICE does not establish a lower limit of age. According to the literature, the age limit below which the cochlear implant guarantees the development of languages skills and understanding closer to those of normal hearing subjects is around 18 months of age[18].

e) Auditory brainstem implant (ABI)

The auditory brainstem implant (ABI) is similar in terms of design and function to a CI except that the electrode is placed in the cochlear nucleus in the brainstem. ABI is designed for individuals with HL due a non-functional auditory nerve such as those affected by VIII nerve aplasia, temporal bone fractures, bilateral vestibular schwannomas (from neurofibromatosis type 2; NF2) or severe ossification of the cochlea and modiolus.

Limitations for good performance of ABI are represented by the lower stimulation selectivity due to the positioning of the electrode on the surface of the brainstem that allows large electric field interactions between electrodes[18].

f) Audiologic rehabilitation and speech-language therapy

Audiologic rehabilitation is the process of providing training and treatment to improve hearing for children who are hearing impaired. The services provided will depend on each individual´s needs and are based on the following factors: age, age of onset of the HL, age when HL was discovered, degree of HL, type of HL and age when hearing aids were first used[21].

g) Pharmacological therapy

Several experimental drugs have been proposed for treatment of SNHL, although few clinical trails have been conducted. Clinically, antioxidant strategies can be used as add-on neuroprotective

therapy after perinatal oxidative stress, but they are not studied in preventing deafness.

Corticosteroids have been proposed for the treatment of the trauma after the insertion of a cochlear implant electrode and in preventing sequelae of meningitis.

Antiviral therapy has been proposed in the treatment of CMV: ganciclovir, valganciclovir, foscarnet, cidofovir and CMV hyperimmune globulin.

V. Final Comments

Finally, knowledge of molecular mechanisms of developmental process (i.e. Sox 2, Atoh1 and Notch signaling pathways) or genes involved in differentiation (i.e. espin, myosin VII, whirlin) offers hope for the treatment of inner ear diseases.

Gene therapy involves the up-regulation or down-regulation of specific genes in order to treat human disease[22]. Genes can be inserted in to cells using electric pulses, encasement in lipid-like spheres, or by packaging into viruses[22]. Gene transfer by viral vectors or nanoparticles represents a promising and novel approach for delivering therapeutic genes or molecules into the inner ear[18].

Stem cells have been the subject of intense speculation and controversy for many years as they open radically new therapeutic possibilities[18].

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Global Journal of Medical Research: J
Dentistry and Otolaryngology
Volume 15 Issue 1 Version 1.0 Year 2015
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 2249-4618 & Print ISSN: 0975-5888

Results of a Test of Temporal Resolution in Elderly With Different Levels Socioeconomic Cultural

By Angela Ribas, Ana Paula Vinci, Congeta Brunieri Xavier Fadel, Gleide Viviani Maciel Almeida, Nicoli Valverde Mafra & Lorena Kozlowski

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Abstract- *Purpose:* to apply, analyze and discuss the results of the Random Gap Detection Test (RGDT) in two groups of elderly people with hearing loss, consistent with presbycusis, who wear hearing aids, but are in different socioeconomic and cultural levels. Methods: cross-sectional descriptive study. The study included 85 elderly people with presbycusis, divided into: Group A (those in a higher cultural socioeconomic level); and Group B (subjects with less favored socioeconomic cultural status). All participants responded to a specific interview, underwent pure tone audiometry for air and bone conduction and underwent a Random Gap Detection Test.

Results: the group with higher socioeconomic and cultural status responded significantly better to the test, while the less favored group had significant difficulties in understanding the purpose of the test.

Conclusion: The RGDT seems to be influenced by socioeconomic and cultural issues. We suggest caution in its use in disadvantaged cultural and socioeconomic populations.

Keywords: *presbycusis; elderly; temporal resolution; hearing test.*

GJMR-J Classification: *NLMC Code: WV 270*

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Abstract- ***Purpose:*** to apply, analyze and discuss the results of the Random Gap Detection Test (RGDT) in two groups of elderly people with hearing loss, consistent with presbycusis, who wear hearing aids, but are in different socioeconomic and cultural levels. ***Methods:*** cross-sectional descriptive study. The study included 85 elderly people with presbycusis, divided into: Group A (those in a higher cultural socioeconomic level); and Group B (subjects with less favored socioeconomic cultural status). All participants responded to a specific interview, underwent pure tone audiometry for air and bone conduction and underwent a Random Gap Detection Test.

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I. Introduction

Aging may affect the processing of auditory information, either by peripheral changes, in the case of presbycusis, for central alterations, in the case of decreased efficiency of auditory skills.[1]

One of the complaints that most annoys elderly individuals with cochlear hearing loss, a characteristic of presbycusis, is the difficulty in understanding speech sounds even when wearing hearing aids.[2] Such complaints may be associated with temporal processing, which in turn, is the ability to process minimum acoustic events that are fundamental to the perception of speech and music, or changes in the sound within a restricted period, translating into an essential component of a larger capacity for auditory processing.[3-4]

Temporal resolution (RT) is defined as the minimum time required for the central nervous system to differentiate two acoustic stimuli. The ability of the auditory system to detect rapid changes in sound stimulus is an important factor in speech perception because it contributes to the identification of small phonetic elements in speech, and alterations in this auditory ability suggest interference in the perception of normal speech and the recognition of phonemes.[5] The minimum interval identified by the patient is called the temporal resolution threshold.[3]

Currently there is a growing interest by healthcare professionals who treat elderly patients with hearing aids to expand audiological research and include tests of auditory processing in order to identify conditions favorable or unfavorable to the use of sound amplification.

A test used in speech-language therapy to investigate RT is the Random Gap Detection Test (RGDT). The test consists of the production of pure tones randomly paired with time intervals ranging from zero to 40ms, and the test subject is oriented to respond upon hearing one or two stimuli. According to the test's author[6], it is expected that individuals without RT alterations can identify gaps up to 20ms.

Individuals with higher thresholds than 20ms can have difficulty in understanding speech because if the subject's RT threshold is greater than the duration of the sounds formed in the word, there is a reduction of the extrinsic redundancies in speech and thus this person may have hearing differentiation difficulties.[7]

The RGDT has been used in research on populations of different age groups.[1,8-9] Because of this, it is known, for example, that the RT threshold increases in elderly individuals.[10]

Also investigated has been the variable of "social level", and surveys show that auditory processing tests and RT may be influenced by socioeconomic factors in the infant population.[9,11]

Could such data be extrapolated to the elderly? After all, it is known that individuals in the lower income strata, regardless of age, have worse health and poorer use for health services.[12]

As the authors of this article develop their activities with elderly people, an objective of this work has become to apply, analyze and discuss the results of RGDT in two groups of elderly subjects with hearing loss consistent with presbycusis, and who are hearing aid users, but are of different socioeconomic cultural backgrounds.

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II. Methods

This is an exploratory, descriptive study. The research was approved by the Research Ethics Committee under number CEP/027/2008. All participants signed a consent form, authorizing the use of the collected data.

The participants were 100 individuals divided into two groups:

Group A - 46 individuals of both genders, suffering from presbycusis, hearing aid users, and of a higher socioeconomic and cultural class (all with degrees of higher learning and personal assets).

Group B - 39 individuals of both genders, suffering from presbycusis, hearing aid users, and of a lower socioeconomic and cultural class (with an education only until primary school).

It was established as inclusion criteria to have a diagnosis of symmetrical sensorineural hearing loss, mild to moderately severe, consistent with presbycusis, and bilateral hearing aids indicated for more than six months.

Data collection occurred in two speech-language clinics – one private and the other public and accredited to the Unified Health System (SUS). The sample was selected from the follow-up visits of the service users.

All participants responded to a specific interview, which collected data on their hearing and the effective use of hearing aids.

Following that, they underwent threshold audiometry by air and bone conduction and were subjected to the RGDT at 50dbSL.

The RGDT results were classified according to the following categorization: up to 5ms, from 5.1 to 9.9ms, from 10 to 14.9ms, from 15 to 19.9ms and greater than 20ms. Subjects were considered normal if the RGDT results were between 2 and 20ms.

The studies were performed in an audiometric booth and the audiometer was evaluated according to the standards of the Federal Council of Speech Therapy (CFFa).

The results were statistically analyzed using descriptive methods (mean, standard deviation, figures) and inferential methods (Chi-square), adopting a 0.05 significance level (5%).

III. Results

In Group A, 42% of the respondents were women and 58% were men. The minimum age was 61, the maximum age 83, and the mean age 68. In Group B, 47% were women and 53% were men, with a minimum age of 60, a maximum of 79, and an average age of 71.

The categorization of the sample according to the degree and configuration of hearing loss is recorded in Table 1. Hearing loss from mild to moderate was significantly higher in both groups.

Table 1 : comparison of the sample by level and configuration of loss (n = 85)

HEARING LOSS	GROUP A		GROUP B		P
	Frequency	%	Frequency	%	
LEVEL					
Light to Moderate	46	100	32	82	0.0000*
Moderately Severe	-	0	7	18	
TOTAL	46	100	39	100	
CONFIGURATION					
Horizontal	1	2	4	10	0.1684
Sloping	44	96	34	87	
U-Shaped	1	2	-	0	
Notched	-	0	1	3	
TOTAL	46	100	39	100	

Note: Chi-square test ($p<0.05$). For the application of statistical tests, only two variables were considered: Horizontal and Sloping.

The comparison between the groups according to the results of the RGDT is described in Table 2 and 3.

Table 2 : comparison of the sample by rgdt results

Results in ms	GROUP A		GROUP B	
	Frequency	%	Frequency	%
Up to 5ms	7	15	0	--
5.1 – 9.9ms	10	21	0	--
10 - 14.9ms	11	23	0	--
15 - 19.9ms	16	34	0	--
Over 20ms	2	4	39	100
TOTAL	46	100	39	100

Table 3 : comparison of the sample by rgdt results

GAPS	GROUP A		GROUP B		P
	Frequency	%	Frequency	%	
Less than 20ms	44	96	-	0	0.0000*
More than 20ms	2	4	39	100	

Note: Chi-square test ($p<0.05$)

There is a significant difference between the groups, and the measured intervals in Group A were predominantly less than 20ms, while for Group B measured intervals were mostly higher than 20ms.

All subjects underwent training prior to the test in order to understand the methodological process. Group A showed no difficulties in understanding the way the test worked, with the prior training being sufficient. However, Group B, made up of individuals with lower socioeconomic and cultural levels, required at least three training sessions.

IV. Discussion

In both groups, the predominant type of hearing loss was sensorineural of a mild to moderate degree, and downward sloping, i.e., results compatible with hearing loss that may be associated with aging, considering the age of the sample. This type of loss interferes greatly in the auditory discrimination of speech, especially in noisy or degraded environments.[3,13-14]

The RGDT allows for a training session prior to the application of the test. Normally at this time, the speech therapist guides the examinee about the type of stimulus to be heard and the type of response to be given. Respondents in Group A received the guidelines only once, while in Group B there was need for three training sessions. This greater difficulty in understanding the test may be related to the hearing loss itself; however, this possibility could be ruled out because in Group A, which also had hearing loss, this was not an impediment in the exam. We therefore believe that socioeconomic and cultural class may influence the understanding of the examination in question.

In the same way, we can make this inference in the analysis of the answers to the test presented by the two studied groups, since in Group A the score ranged from 5ms to 20ms and in Group B it was higher than 20ms. This difference was significant from a statistical point of view.

Making a purely auditory analysis, it is clear through the evidence[15], that the elderly often demonstrate the need for more time to process the information received and the speed with which these processes are carried out, which can affect hearing abilities.

Queiroz et al.[10] state that temporal resolution thresholds are increased in the elderly compared to young adults with the same peripheral auditory conditions, as recorded in this work, where more than 38% of Group A and 100% of Group B showed RGDT results that were greater than 14ms.

However, in our study we found that socioeconomic and cultural conditions can also affect the quality of answers in auditory perception, because the less favored group had worse RGDT results. This fact is supported by the literature. Balen et al.[9] investigated the influence of socioeconomic status in the temporal resolution of schoolchildren in two evaluation protocols. 44 children were evaluated and divided into three groups: Group 1: high socioeconomic status; Group 2: average socioeconomic status; Group 3: low socioeconomic status. The RGDT was applied as well as a Gaps-In-Noise (GIN) test. The average performance of Groups 1, 2 and 3 were higher in the RGDT in GIN. Regarding socioeconomic level, both tests showed statistically significant differences among the groups, i.e., there was an influence by socioeconomic status on the temporal resolution measured by the above tests.

The RGDT is an important tool in assessing the functional integrity of temporal processing in the elderly.[10]

V. Conclusions

From the data obtained in this study, it is concluded that socioeconomic and cultural factors influence the quality of the responses in the RGDT because:

a) The group with lower socioeconomic-cultural conditions showed worse results and;
b) The same group had difficulty understanding the proposed examination.

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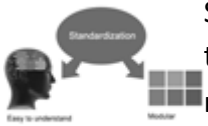

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Note :

"

- In future, if the board feels the necessity to change any board member, the same can be done with the consent of the chairperson along with anyone board member without our approval.
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"

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2. Ethical Guidelines,

3. Submission of Manuscripts,

4. Manuscript's Category,

5. Structure and Format of Manuscript,

6. After Acceptance.

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Abstract:

The summary should be two hundred words or less. It should briefly and clearly explain the key findings reported in the manuscript--must have precise statistics. It should not have abnormal acronyms or abbreviations. It should be logical in itself. Shun citing 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 approach 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. Yet, use comprehensive sentences and do not let go readability for briefness. You can maintain it succinct by phrasing sentences so that they provide more than 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 maintain the initial two items to no more than one ruling each.

- Reason of the study - 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 quantitative data; results of any numerical analysis should be reported
- Significant conclusions or questions that track from the research(es)

Approach:

- Single section, and succinct
- As a outline of job done, it is always written in past tense
- A conceptual should situate on its own, and not submit to any other part of the paper such as a form or table
- Center on shortening results - bound background information to a verdict or two, if completely necessary
- What you account in an conceptual must be regular with what you reported in the manuscript
- Exact spelling, clearness 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 to comprehend and calculate the purpose of your study without having to submit to other works. The basis for the study should be offered. Give most important references but shun difficult to make a comprehensive appraisal of the topic. In the introduction, describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will have no attention in your result. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here. Following approach can create a valuable beginning:

- Explain the value (significance) of the study
- Shield the model - why did you employ this particular system or method? What is its compensation? You strength remark on its appropriateness from a abstract point of vision as well as point out sensible reasons for using it.
- Present a justification. Status your particular theory (es) or aim(s), and describe the logic that led you to choose them.
- Very for a short time explain the tentative propose and how it skilled 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 with every section. If you make the four points listed above, you will need a least of four paragraphs.

- Present surroundings information only as desirable in order hold up a situation. The reviewer does not desire to read the whole thing you know about a topic.
- Shape the theory/purpose 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 sound written Procedures segment allows a capable scientist to replacement 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 for the least amount of information that would permit another capable scientist to spare 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 object, mention the specific item describing a way but draw the basic principle while stating the situation. The purpose is to text 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:

- Explain materials individually only if the study is so complex that it saves liberty this way.
- Embrace particular materials, and any tools or provisions that are not frequently found in laboratories.
- Do not take in frequently found.
- If use of a definite type of tools.
- Materials may be reported in a part section or else they may be recognized along with your measures.

Methods:

- Report the method (not 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 - details how procedures were completed not how they were exclusively performed on a particular day.
- If well known procedures were used, account the procedure by name, possibly with reference, and that's all.

Approach:

- It is embarrassed or not possible to use vigorous voice when documenting methods with no using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result when script up the methods most authors use third person passive voice.
- Use standard style in this and in every other part of the paper - avoid familiar lists, and use full sentences.

What to keep away from

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

Results:

The principle of a results segment is to present and demonstrate your conclusion. Create this part a 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. Carry on to be to the point, by means of statistics and tables, if suitable, to present consequences most efficiently.You must obviously differentiate material that would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matter should not be submitted at all except requested by the instructor.

Content

- Sum up your conclusion in text and demonstrate them, if suitable, with figures and tables.
- In manuscript, explain each of your consequences, point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation an exacting study.
- Explain results of control experiments and comprise 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 in manuscript form.

What to stay away from

- Do not discuss or infer your outcome, report surroundings information, or try to explain anything.
- Not at all, take in raw data or intermediate calculations in a research manuscript.
- Do not present the similar data more than once.
- Manuscript should complement any figures or tables, not duplicate the identical information.
- Never confuse figures with tables - there is a difference.

Approach

- As forever, use past tense when you submit to 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 part.

Figures and tables

- If you put figures and tables at the end of the details, make certain that they are visibly distinguished from any attach appendix materials, such as raw facts
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- In spite of position, each table must be titled, numbered one after the other and complete with heading
- All figure and table must be adequately complete that it could situate on its own, divide from text

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- Make a decision if each premise is supported, discarded, or if you cannot make a conclusion with assurance. Do not just dismiss a study or part of a study as "uncertain."
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- You may propose future guidelines, such as how the experiment might be personalized to accomplish a new idea.
- Give details all of your remarks as much as possible, focus on mechanisms.
- Make a decision if the tentative design sufficiently addressed the theory, and whether or not it was correctly restricted.
- Try to present substitute explanations if sensible alternatives be present.
- One 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 available information
- Submit to work done by specific persons (including you) in past tense.
- Submit to generally acknowledged facts and main beliefs in present tense.

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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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ISSN 9755896