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Dentistry & Otolaryngology

Awareness of Prosthodontic

Otitis Media with Cholesteatoma

Highlights

Management of the Labyrinthine

Correlation between Chronological

Discovering Thoughts, Inventing Future

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Perception and Awareness of Prosthodontic Rehabilitation among Jazan Population in the Southern Region of Saudi Arabia

By Dr. R. Naveen Reddy, Dr. Elfatih Ibrahim Elamin, Dr. Swetha Vempalli
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Abstract- The Prosthodontic health status and Prosthodontic rehabilitation needs of Jazan local population in the southern region of Saudi Arabia were not well documented. This study evaluates the level of perception and awareness of a group of Jazan population towards Prosthodontic rehabilitation and the factors that prevent them from the treatment. Knowledge and perceived needs of subjects regarding Prosthodontics play an important role in their acceptance to prosthetic rehabilitation. A self-designed questionnaire containing eleven questions was designed and reasons for choosing or refusing treatments were measured using Likert scale. A survey of 467 randomly selected subjects was conducted among the patients and relatives reported to the College of Dentistry, Jazan University, Jazan. Collected data were statistically analysed using SPSS V.19 for descriptive statistics along with Chi-squared test at a significance level of $p < 0.05$.

Keywords: *knowledge; perception; prosthodontic treatment; awareness; survey; patient acceptance of health care; prosthetic replacements.*

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PERCEPTIONAND AWARENESS OF PROSTHODONTIC REHABILITATION AMONG JAZAN POPULATION IN THE SOUTHERN REGION OF SAUDI ARABIA

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Perception and Awareness of Prosthodontic Rehabilitation among Jazan Population in the Southern Region of Saudi Arabia

Dr. R. Naveen Reddy ^α, Dr. Elfatih Ibrahim Elamin ^σ, Dr. Swetha Vempalli ^ρ & Dr. Fuad Al Sanabani ^ω

Abstract- The Prosthodontic health status and Prosthodontic rehabilitation needs of Jazan local population in the southern region of Saudi Arabia were not well documented. This study evaluates the level of perception and awareness of a group of Jazan population towards Prosthodontic rehabilitation and the factors that prevent them from the treatment. Knowledge and perceived needs of subjects regarding Prosthodontics play an important role in their acceptance to prosthetic rehabilitation. A self-designed questionnaire containing eleven questions was designed and reasons for choosing or refusing treatments were measured using Likert scale. A survey of 467 randomly selected subjects was conducted among the patients and relatives reported to the College of Dentistry, Jazan University, Jazan. Collected data were statistically analysed using SPSS V.19 for descriptive statistics along with Chi-squared test at a significance level of $p < 0.05$.

Results: Age was ranging from 20 to 91 years with a mean age of 56.48 +11.92 years with 53.10% males and 46.90% females. Out of the 467 participants, 95.93% had heard about Prosthodontic rehabilitation as a dental treatment modality, with marginal significant difference between males and females ($P=0.0551$). Out of these, 95.93% people with missing teeth only 57.82% people were willing to undergo treatment if needed.

Individual perception of potential reasons for treatment selection was the most important determinants of patients' decisions based on knowledge, awareness and motivation. By conducting this study the individual perception and potential reasons behind treatment selection and its relation to patient's knowledge, awareness and motivation can be assessed. The findings can be used in improving patient's motivation and leading them to a favourable decision making.

Keywords: knowledge; perception; prosthodontic treatment; awareness; survey; patient acceptance of health care; prosthetic replacements.

I. INTRODUCTION

In its broadest sense, Prosthodontics is concerned with the replacement of partial or complete loss of teeth and oral function due to tooth or tissue damage (Carlsson GE and Omar R, 2006). Prosthetic treatment involves the replacement of few missing teeth in a healthy but incomplete dentition, the functional replacement of nearly all teeth in a badly damaged dentition, or restoring function by means of removable

or FPDs, implants, complete dentures, or over dentures (Mukatash et al., 2010 and Zarb GA et al., 1978). With the rapid improvement in oral health and the reduction of edentulism in many countries, increasing numbers of people are retaining more teeth later in life (Carlsson GE and Omar R, 2006). Knowledge of subjects regarding prosthodontic treatment may play a role in their acceptance of the prostheses (Shigli et al., 2007). The aim of this paper was to evaluate the level of knowledge, perception, awareness, attitude, and behaviour of a group of Jazan population in the southern region of Saudi Arabia aged 21-91 years towards the options available for replacing missing teeth and the factors preventing them from taking treatment.

II. MATERIALS AND METHODS

The present study was a questionnaire survey conducted at College of Dentistry, Jazan University, Jazan. The study samples of 467 subjects were randomly selected from patients in the Department of Prosthodontics. The sample population consists of 248 males and 219 females within an age range of 21 to 91 years. A self-designed questionnaire containing eleven questions was designed on perception and awareness for different Prosthodontic treatment modalities and reasons for choosing or refusing treatments were measured (Table1). Ethical committee clearance was obtained. Initially a pilot study was carried out with twenty patients recruited in the same manner as in the main study to check the feasibility of the study and the questions were modified accordingly. Following the successful pilot study in which the questionnaire was validated, potential subjects were approached to carry out the main study. The questionnaire was made available both in English and Arabic languages. The dentists, dental technicians, and assistants were excluded from the study. Socio-demographic details including age, gender etc. was noted. A total of 500 questionnaire forms were distributed and 467 were returned back (response rate was 93.4%). Collected responses were tabulated.

Statistical Analysis: Data was statistically analysed using the SPSS V.20 program. Frequencies were generated and mean calculated with standard deviation using descriptive statistical analysis. Chi-squared test was used to identify significance. The

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probability was assessed using P value by considering $p < 0.05$ as significant.

Age:

Sex:

1. Are you aware that missing teeth have to be replaced? YES / NO
2. The various types of replacement that they are aware of
 - a. Complete Denture
 - b. Removable Partial Denture
 - c. Fixed Partial Denture
 - d. Implants
3. Do you have any missing teeth? YES / NO
4. If Yes FRONT / BACK
5. How long have the teeth been missing? -----
6. Did you get them replaced? YES / NO
7. Type of replacement:
 - a. Complete Denture
 - b. Removable Partial Denture
 - c. Fixed Partial Denture
 - d. Implant supported
8. If not replaced then why?
 - a. Financial Constraints
 - b. Inadequate Knowledge
 - c. Not motivated
9. Where would you like to go for replacement of missing teeth?
 - a. Dental Clinic
 - b. General Hospital
 - c. Dental College
 - d. Others
10. Are you aware that there is a dental college where replacement of missing teeth will be done in Jazan? YES / NO
11. How did you know about the college?
 - a. Friends
 - b. Relatives
 - c. Referred by a dentist
 - d. Media

III. RESULTS

The study sample consisted of 53.10% males (N=248) and 46.90% females (N=219) with a mean age of 56.48+11.92 years. Each question was analysed for the frequency and the relation between the gender difference was tabulated (Table 2).

Question 1: Awareness about missing teeth replacement: The results show that 95.93 % (N=448) of the study population including both males and females has the awareness that they have to replace the missing tooth. There was marginal statistically significant difference between the genders (P=0.05).

Question 2: Knowledge about various treatment options: Out of the 467 individuals 87.79% (N=410), 42.83% (N=200), 36.40% (N=170) and 10.71% (N=50) had the knowledge of complete denture, Removable Partial Denture, Fixed Partial denture and Implants respectively.

There were no significant differences noted statistically $P > 0.05$.

Question 3: Have any missing teeth: 100% (N=467) individuals that participated in this study had missing teeth. The males showed a higher frequency of missing teeth than females. This result was statistically proven with chi square test, $P=0.7111$ (Table 2).

Question 4: Position of tooth loss: There was marginal statistically significant difference between the genders (P=0.05). Loss of posterior teeth (N=144) 32.73% is more when compared to the anterior teeth (N=95) 21.59% and combination of anterior and posterior teeth is the highest (N=201) 45.68%

Question 5: The duration of missing teeth among the participant of the survey was 34.98 + 62.38 months for males and 28.11 + 35.04 months for females. There was no statistical difference between the genders $P=0.1629$.

Question 6: Attitude towards prosthetic rehabilitation: Considering the attitude towards the replacement of the missing teeth with prosthesis 57.82% (N=270) individuals were positive and were planning to replace the missing teeth. But there were no significant differences between the genders even though comparatively more men were willing for replacement.

Question 7: Type of Replacement perceived: Comparison of the individual's knowledge toward different prosthetic replacement options and their perceived option for replacing the missing tooth were as follows. Most of the people were willing to replace the missing teeth with complete denture i.e., 62.44 % (N=123/272), compared to 50.25% (N= 99/272) for removable partial denture and 25.38% (N= 50/272) for fixed partial denture. There were no patients who preferred to replace their missing teeth with implants.

Question 8: Reasons for not replacing the missing teeth: The main reason for not undergoing the prosthodontic replacement was inadequate knowledge (57.36%, N= 113), followed by lack of motivation, regarding the prosthetic replacements (24.37%, N=48) and the least were due to financial constraints (18.27%, N=36) and these observations were not statistically significant.

Question 9: The setup where individual would like to get the prosthetic replacement done: Out of the 467 participants 60.60% (N=283) preferred to get the prosthesis done from dental college and 26.12% (N=112) from Dental clinic and 11.35% (N=53) opted for general hospitals. These observations show statistical significance $p = 0.0001^*$

Question 10: Awareness about the availability of Prosthetic replacement treatment in College of Dentistry Jazan University: The results shows that 91.43% (N=427) participants were aware about the treatment facility in the college.

Question 11: how did you know about the dental college: Out of the 467 participants 61.46% (N=287) came to know about the college from relatives and friends 24.20% (N=113). Few patients were referred by Dentists 10.92% (N=51) whereas media 3.43% (N=16) formed the least in patients knowing about the college. These observations were not statistically significant. $P = 0.3352$.

IV. DISCUSSION

Oral health means much more than just healthy teeth. Good oral health is a major resource for social, economic and personal development of individuals (Khan SA et al., 2012). Teeth are required for mastication, phonetics, aesthetics, structural balance and for the comfort of an individual. With the loss of teeth, the above functions are impaired resulting in physical, physiological and psychological trauma to the individual (S S, Sharma S, 2010). Preventive dental care

is almost non-existent in rural India (Parlani S et al., 2011). Initiatives should be aimed not only on the prevention but also on the curative aspects of oral health. Mobile dental clinics, dental camps, and prosthodontic outreach programs are possible solutions to change attitudes, spread awareness, and extend treatment. Lack of awareness of different prosthodontic treatment options among people living in and around Jazan prevents them from availing of treatment even though there are many Government setups that offer treatment free of cost (Menezes M and Aras M, 2009). From the present study, it can be observed that the subjects were aware of the needs of dentures in contrast to previous studies (S S, Sharma S, 2010). This may be due to the increase in technology and media. When asked about the attitude towards the replacement, even though the participants had the knowledge about the need for replacement, majority did not opt for treatment mainly due to inadequate knowledge. Most of the patients opted to get treated from the dental college than private clinics; this may be to reduce the financial burden following a prosthetic replacement. The study suggests that in general the dentist must spend more time on the chair side during examination and motivate the patient regarding the need of a denture so as to get a proper response in relation to need of a denture which was similar to previous observations in literature (S S, Sharma S, 2010). Even though there is a scarcity of data regarding patient's needs and preferences in field of fixed prosthodontics, this study shows an increase in demand for fixed partial denture by the individual with knowledge of the same. From the present study, it can be observed that most of the subjects were not aware of dental implants. This implies that persons whether male or female need motivation and education to help them realize the needs of implants.

V. CONCLUSION

In conclusion complete dentures are associated with lower expected outcomes, while inadequate knowledge and lack of motivation are the major factors associated with the preferences for implant treatment for the study population.

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Table : Distribution of samples by age groups and sex

Characteristics	No of samples	% of samples
Age groups		
>25	1	0.21
25-34	6	1.28
35-44	74	15.85
>45	386	82.66
Mean age	56.48	
SD age	11.92	
Sex		
Male	248.00	53.10
Female	219.00	46.90
Total	467	100.00

Table : Item wise responses of respondents

Items	No of samples	% of samples
Q1 Are you aware that missing teeth have to be replaced		
Yes	448	95.93
No	19	4.07
Total	467	100.00
Q2 The various types of replacement that they are aware of		
Complete Denture	410	87.79
Removable Partial Denture	200	42.83
Fixed Partial Denture	170	36.40
Implants	50	10.71
Q3 Do you have any missing teeth		
Yes	440	94.22
No	27	5.78
Total	467	100.00
Q-4 If Yes		
Front	95	21.59
Back	144	32.73
Both	201	45.68
Q5 How long have the teeth been missing		
Means	31.76	
Std.Dev.	51.48	
Q6 Did you get them replaced		
Yes	270	57.82
No	197	42.18
Total	467	100.00
Q-7 Type of replacement		
Complete Denture	123	62.44
Removable Partial Denture	99	50.25

Fixed Partial Denture	50	25.38
Implant supported	0	0.00
Q-8 If not replaced then why		
Financial Constraints	36	18.27
Inadequate Knowledge	113	57.36
Not motivated	48	24.37
Q-9 Where would you like to go for replacement of missing teeth		
Dental Clinic	122	26.12
Dental College	283	60.60
General Hospital	53	11.35
Others	9	1.93
Total	467	100.00
Q10 dental college where replacement in Jazan		
Yes	427	91.43
No	40	8.57
Total	467	100.00
Q-11 How did you know about the college		
Friends	113	24.20
Relatives	287	61.46
Dentist	51	10.92
Media	16	3.43
Total	467	100.00

Table : Distribution of samples by age groups and sex

Age groups	Male	%	Female	%	Total	%
>25	1	0.40	0	0.00	1	0.21
25-34	2	0.81	4	1.83	6	1.28
35-44	34	13.71	40	18.26	74	15.85
>45	211	85.08	175	79.91	386	82.66
Total	248	100.00	219	100.00	467	100.00
Mean age	57.40		55.43		56.48	
SD age	11.28		12.54		11.92	

Table : Comparison of male and females with Q 1

Q 1	Male	%	Female	%	Total	%
Yes	242	97.58	206	94.06	448	95.93
No	6	2.42	13	5.94	19	4.07
Total	248	100.00	219	100.00	467	100.00

Chi-square=3.6852 P = 0.0551

Table : Comparison of male and females with Q2 i.e. types of replacement that they are aware

Q 2	Male	%	Female	%	Total	%
Complete Denture	222	89.52	188	85.84	410	87.79
Removable Partial Denture	105	42.34	95	43.38	200	42.83
Fixed Partial Denture	93	37.50	77	35.16	170	36.40
Implants	29	11.69	21	9.59	50	10.71

Chi-square=0.5383 P = 0.9102

Table : Comparison of male and females with Q3 i.e. missing teeth

Q3 i.e. missing teeth	Male	%	Female	%	Total	%
Yes	234	94.35	206	94.06	440	94.22
No	14	5.65	13	5.94	27	5.78
Total	248	100.00	219	100.00	467	100.00

Chi-square=0.1327 P = 0.7111

Table : Comparison of male and females with Q4 if yes for missing teeth

Q-4 sides	Male	%	Female	%	Total	%
Front	48	20.51	47	22.82	95	21.59
Back	67	28.63	77	37.38	144	32.73
Both	119	50.85	82	39.81	201	45.68
Chi-square=5.7557 P = 0.0565						

Table : Comparison of male and females with Q5 i.e. Duration of edentulism

Sex	Means	Std.Dev.
Male	34.98	62.38
Female	28.11	35.04
Total	31.76	51.48
t-value	1.3978	
P-value	0.1629	

Table : Comparison of male and females with Q6 i.e. did you get them replaced

Q6	Male	%	Female	%	Total	%
Yes	136	54.84	134	61.19	270	57.82
No	112	45.16	85	38.81	197	42.18
Total	248	100.00	219	100.00	467	100.00
Chi-square=1.9221 P = 0.1662						

Table : Comparison of male and females with Q7 if yes for Q6

Q-7	Male	%	Female	%	Total	%
Complete Denture	68	60.71	55	64.71	123	62.44
Removable Partial Denture	51	45.54	48	56.47	99	50.25
Fixed Partial Denture	18	16.07	32	37.65	50	25.38
Implant supported	0	0.00	0	0.00	0	0.00
Chi-square=5.3702 P = 0.0681						

Table : Comparison of male and females with Q8 if No for Q6

Q-8	Male	%	Female	%	Total	%
Financial Constraints	23	20.54	13	15.29	36	18.27
Inadequate Knowledge	61	54.46	52	61.18	113	57.36
Not motivated	28	25.00	20	23.53	48	24.37
Chi-square=1.1429 P = 0.5633						

Table : Comparison of male and females with Q9

Q-9	Male	%	Female	%	Total	%
Dental Clinic	64	25.81	58	26.48	122	26.12
Dental College	154	62.10	129	58.90	283	60.60
General Hospital	27	10.89	26	11.87	53	11.35
Others	3	1.21	6	2.74	9	1.93
Total	248	100.00	219	100.00	467	100.00
Chi-square=40.3122 P = 0.0001*						

*p<0.05

Table : Comparison of male and females with Q10 i.e. dental college where of missing teeth will be done in Jazan

Q10	Male	%	Female	%	Total	%
Yes	229	92.34	198	90.41	427	91.43
No	19	7.66	21	9.59	40	8.57
Total	248	100.00	219	100.00	467	100.00
Chi-square=0.5527 P = 0.4581						

Table : Comparison of male and females with Q11 i.e. how did you know about the college

Q-11	Male	%	Female	%	Total	%
Friends	65	26.21	48	21.92	113	24.20
Relatives	143	57.66	144	65.75	287	61.46
Dentist	31	12.50	20	9.13	51	10.92
Media	9	3.63	7	3.20	16	3.43
Total	248	100.00	219	100.00	467	100.00
Chi-square=3.3961 P = 0.3352						

OR

Table : Comparison of male and females in each item

Items	Male	%	Female	%	Total	%
Q 1						
Yes	242	97.58	206	94.06	448	95.93
No	6	2.42	13	5.94	19	4.07
Total	248	100.00	219	100.00	467	100.00
Chi-square=3.6852 P = 0.0551						
Q 2						
Complete Denture	222	89.52	188	85.84	410	87.79
Removable Partial Denture	105	42.34	95	43.38	200	42.83
Fixed Partial Denture	93	37.50	77	35.16	170	36.40
Implants	29	11.69	21	9.59	50	10.71
Chi-square=0.5383 P = 0.9102						
Q3 i.e. missing teeth						
Yes	234	94.35	206	94.06	440	94.22
No	14	5.65	13	5.94	27	5.78
Total	248	100.00	219	100.00	467	100.00
Chi-square= 0.1327 P = 0.7111						
Q-4 sides						
Front	48	20.51	47	22.82	95	21.59
Back	67	28.63	77	37.38	144	32.73
Both	119	50.85	82	39.81	201	45.68
Chi-square= 5.7557 P = 0.0565						
Q5						
Means	35		28			31.76
Std.Dev.	62		35			51.48
t=1.3978, p=0.1629						
Q6						
Yes	136	54.84	134	61.19	270	57.82
No	112	45.16	85	38.81	197	42.18
Total	248	100.00	219	100.00	467	100.00
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Otitis Media with Effusion, Development of Animal Model: Literature Review

By Bibek Gyanwali

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Abstract- Objective: Provide a brief review about the development of animal model of otitis media with effusion.

Methods: We studied different methods of inducing otitis media with effusion in animal model published in different journals and try to point out their strong and weak points.

Result: Although different animal models had been established as model, none of them were able to explain in detail about the disease physiology in animal and further more research is needed to develop a valid animal model of otitis media with effusion.

Conclusion: Otitis media is one of the most common disease in children so further detail study is needed in this disease. Till the date several animal models were established. Before the research detail study on experimental animal and experimental method is necessary for the reliable result.

Keywords: *otitis media, animal model, method, research.*

GJMR-J Classification: *NLMC Code: WV 232*



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I. INTRODUCTION

Otitis Media with Effusion (OME) is one of the most common childhood disease defined by the inflammation of the middle ear including middle ear ossicles and Eustachian tube and in some condition mastoid air cells. OME is characterized by the collection of non-purulent nearly sterile fluid in the middle ear cavity. By the age of 3 at least four-fifth of children have experienced at least one or more episodes of OME [1]. The pathogenesis of otitis media has been related to malfunctioning of Eustachian tube, which fails to ventilate and drain the middle ear (ciliary dysfunction, mucosal edema, middle ear/nasopharynx pressure gradient, adenoid hypertrophy, chronic rhinitis, sinusitis and tonsillitis, neoplasm and malignant tumors of nose, paranasal sinuses and nasopharynx, cleft palate and palatal paralysis) allergy, unresolved acute otitis media, viral infection and increased secretory activity of middle ear [2].

OME is one of the hot topic in research these days because it effects hearing and balancing causing poor language and development and eventually leading to poor school performance in children [3]. The etiology of OME is multifactorial, it is believed that dysfunction of Eustachian tube (ET) is one of the most important factor in the formation of middle ear effusion [4]. ET has three main functions; pressure regulation, protection and clearance [5]. Any compromise to this function may

leads to OME. In recent study in in-vitro and in -vivo it has been found that smoking and air pollution may induce OME. It is very difficult to create a model because of lack of device to control appropriate dosage and time exposure to the smoke and air pollution may be long [6].

OME is creating financial burden in many countries, In United States alone 5 billion USD was estimated annually in OME [7]. This expenditure may will be even high in few years. Studies on human are very difficult because it is very risky to trail newly developed drugs and treatment methods. Further more research on human model require proved hypothesis on animal model, unfortunately such satisfactory animal model of OME has not been developed yet.

Several methods and several experimental animals had been used and still being used to develop a valid animal model of OME. In this review we study different methods used by different researchers and study their strong and weak points. In our study we found following methods.

1. Eustachian tube blockade
2. Use of chemical substances
3. Injury to paratubular muscles
4. Others; creating nasal obstruction and creating cleft palate

II. EUSTACHIAN TUBE BLOCKADE

To create OME one can block Eustachian tube by ligation of cauterization, this can be done by two surgical approaches; Trans-cervical approach and Trans-palatal approach. In trans-cervical approach ventral incision or anterior cervical incision could be used to expose Eustachian tube, then bony or cartilaginous ET can be obstructed with the use of a small piece of gelfoam or a bite of muscle or dental material or can be obstructed with electrocautery [8-12]. The strong point of this approach is the clear visualization of ET so result obtained is expected to be more reliable and consistent. The week point is this method is comparatively difficult, a good knowledge of anatomy of neck necessary and it is time consuming .Some time may require 30 minutes [13]. In trans - palatal approach mouth is kept open with the use of mouth retractor and electric cautery needle was inserted at the soft palate and hard palate junction and ET pharyngeal orifice was cauterized [14]. This method is easy and relatively fast. The week point is the side effect

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after the surgery due to severe thermal damage around the Eustachian tube pharyngeal orifice can induce severe bleeding and poor oral intake [13]. There is greater chance of animal death after the procedure. In this method ET was not visualized so it is not certain the cauterization was done on the right area. The ET pharyngeal orifice was just estimated, So middle ear effusion may be due to the injury and edema of surrounding tissue not due to ET obstruction so the result may not be always consistent.

Another method to induce OME via trans-palatal approach was transpalatal incision, incision was made on the soft palate of desired side near the perygoid hamulus and visualized the ET pharyngeal orifice which could be obstructed by the use of poly vinyl acetate material [14]. The strong point of this procedure is the better visualization of ET pharyngeal orifice which could be easily closed or obstructed so the result expected may be consistent and reliable. Huang Q et.al. mentioned the use of trichloroacetic acid to create obstruction of Eustachian tube instead of electric cautery [16].

III. USE OF CHEMICAL SUBSTANCES

This method is quite easy and less time consuming and result obtained may be consistent and reliable. Different types of chemical substances were used to induce OME. Till the date we found the use of β -lactamase-producing nontypable Haemophilus influenzae, peptidoglycan-polysaccharide, lipopolysaccharide, E-coli, endotoxin, Streptococcus pneumoniae, non viable heat killed Hemophilus influenza, histamine solution [8, 12,17-23]. The inoculation method may be either directly injection of chemical substances in the middle ear via tympanic membrane or inoculation intranasally. The only drawback of this method is the calculation of the suitable dosage of chemical substance. Inoculation of insufficient amount may not induce OME and inoculation of excessive amount may produce undesirable side effects. In a study conducted by Aynali G. et.al. used 0.1 ml. Of histamine solution to induce OME and half of the rats showed middle ear effusion within 24 hours [22].

Some researchers used both ET obstruction and inoculation of chemical substances [8,12]. In our opinion the result could be consistent in such experiment as two parameters causing Eustachian tube dysfunction was used in the research to induce OME.

IV. INJURY TO PARATUBULAR MUSCLES

In most of the research tensor veli palatini (TVPM) was used to induce middle ear effusion and compromise Eustachian tube function. Injury to TVPM was created by 3 different methods; (1) Paralyzing TVPM by injecting botulinum toxin injection, (2) Surgical alteration of TVPM (complete excision of muscle,

transection of superficial muscle bundle, and transposition of muscle tendon medial to hamular process, (3) Excision of third branch of Trigeminal nerve [23,24,25]. When TVPM was injured ET function was compromised and was not able to dilate the lumen and increase the luminal cross-sectional area of ET actively and the force required to open ET pharyngeal orifice was not enough so ET pharyngeal orifice remained closed and middle ear negative pressure was created.

In a study conducted by Canteki El. et.al. studied the effect of LVPM on ET. They excised LVPM bilaterally and after the period of five months no middle ear effusion was observed [27]. But it is still debate whether TVPM or lavator veli palatini muscle (LVPM). is most important contribute in the ET function. The only drawback is LVPM was excluded from the study. Further study must be done on these two muscles TVPM and LVPM to explain their exact function.

V. CREATING CLEFT PALATE

This method is quite similar to the trans-palatal approach but it is quite simple less time consuming, with little side effect and reversible. To create cleft palate midline incision was made from the uvula to the posterior border of hard palate [28]. The only drawback of this method is difficult in swallowing and poor oral intake, but the swallowing function returns to normal condition after palatal recovery.

VI. NASAL OBSTRUCTION

Nasal cavity can be obstructed by use of dental impression material in the nasal cavity and nostrils can be obstructed by use of synthetic resin [29, 30]. In a study conducted by Buchman CA. et.al. created nasal obstruction by using dental material and found no evidence of middle ear fluid in both unilateral and bilateral obstruction group [29]. In another study conducted by Scarano E. et.al obstructed nostrils bilaterally using synthetic resin 28 days after birth and after a period of time found that numbers of TVPM muscles fibers progressively decreased in the obstructed rats [30]. OME can be induced by nasal obstruction is still not clear so further research should be conducted to find out whether or not there exists any relationship between nasal obstruction and OME.

Several animal models are availed for OME. But none of these animal models were able to describe the anatomical and physiological effect of the disease, so it has been difficult which experimental method and model is the best. Each experimental methods has its strong and weak points, so selecting appropriate animal model and experimental method is the most important for the better outcome. Although OME is self limiting condition but it has been medical problem and financial burden in many countries so further research is needed to develop a reliable animal model of OME.

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Correlation between Chronological Age, Dental Age and Skeletal Maturity in a sample of Sudanese Children

By Bushra M. Hasan & Amal H. Abuaffan

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Abstract- Objective: This study aimed to correlate chronological and dental ages with skeletal maturity.

Methods: A retrospective, descriptive study of the clinical files for 112 Sudanese patients, 7-16 years old. Skeletal maturity was assessed by using the cervical vertebral maturation stages. Dental age was determined by using the Demirjian method. Pearson's coefficient was applied to measure the association between chronological and dental ages and Spearman rank correlation coefficient for the CS and dental calcification stages.

Results: All correlations between cervical vertebral maturity and dental maturity stages were statistically significant ($P < 0.05$) in both genders. The mean chronologic age was 12.0533 ± 0.976 13.34 ± 1.66 years for female, male respectively.

Conclusion: The first premolars in female and second premolar in male showed the highest relationship with CVM, which can apply as markers for skeletal maturity of a child whose looking for treatment.

Keywords: *chronological age, dental age, cervical vertebrae maturity, demirjian's method, baccetti method.*

GJMR-J Classification: NLMC Code: WU 460



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I. INTRODUCTION

Growth is critical feature of a children life which differentiates them from adults and it is identified as an indicator of wellbeing. The growth factor is a decisive variable in orthodontic treatment.¹ It believe one of the main uncertain dissimilarity in nature and plays an important role in etiology of malocclusion in addition to evaluation of diagnosis, treatment planning, retention and stability of orthodontically treated cases.²

Every person have special internal clock in maturity, the facial bones growth time and the periods of accelerated or intense physiologic growth must be individualized for superior exploit bone remodeling in accurate skeletal discrepancies.³ In orthodontics and dentofacial orthopedics, the initiation of treatment is becoming increasingly evident, as the selection of the specific treatment procedures.⁴

Skeletal age estimation is vital in planning of orthodontic treatment, due to variations on timing, duration and velocity of growth.¹

Estimation of growth potential requires the assessment of the developmental age of the individual patient. A number of developmental indicators can be utilized to assess maturity; increase in body height, skeletal maturation of the hand and wrist, cervical vertebral maturation, dental development and eruption, and menarche or voice changes.^{3, 5-7}

Chronological age is measured from the birth day, which used to recognize the developmental stage of individuals, although, it is the most easily determined parameter of all the developmental ages, it is a weak growth predictor. Physiological age considers more reliable to evaluate the maturation state because each child has his or her own characteristic time clock.⁸ The onset of chronological age varies with gender, generation, population and environment, and diverges greatly among individuals.⁹

Dental age is an important matter in orthodontic diagnosis and treatment planning. It is estimate by teeth development either by calcification of crowns and roots or eruption of the crowns on the radiographs.¹⁰ Tooth formation is widely used as a growth indicator for assessment and comparison between individuals and populations in dentistry, pediatrics and anthropology, moreover forensic sciences.¹¹

Skeletal maturation refers to the level of development of ossification in bone. Size and maturation can vary autonomously of each other. Skeletal maturation is well identified and frequently used for measurement of biological maturity, which resolute by radiographic assessment of one or more areas in the body.¹²

Hand-wrist radiographs have been used to assess the skeletal maturity stages, it is recently been inquiry. Recently the cervical vertebra maturation (CVM) method was introduced for growth assessment; allocate skeletal age evaluation and diminish the need for additional radiographic exposure.¹²⁻¹⁴

Chronological age, dental and skeletal development were regarded as regular maturational indexes of developmental maturation.^{1, 15} The divergence between dental, skeletal and chronological age is of enormous attention in compared with ordinary growth.^{12, 16-18}

Worldwide several studies in previous literature correlate the dental age, skeletal maturity with

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chronological age among different populations, to our knowledge no such study are available in Sudan, therefore the present study had been designed to provide reliable age estimation for the Sudanese population and the outcome results will be of great helps for diagnosis and treatment planning for orthodontic and pediatric patients as well as to forensic dentistry.

II. MATERIALS AND METHODS

The material consisted of the clinical files and panoramic and lateral cephalometric radiographs of 112 Sudanese children (65 males and 46 females), aged from 7 to 16 years, who attending orthodontic treatment at the clinic of Orthodontic Department, Faculty of

Dentistry, University of Khartoum, between 2009 and 2015. At the beginning of the study, the chronological ages of the patients were recognized from the child's birth to the day the panoramic radiograph was taken. The chronological age was recorded in years and months.

To identify the dental age and skeletal maturity stages, all OPGs and lateral cephalometric radiographs were evaluated in dark room on a view box to ensure the maximum contrast. The dental age was assessed on panoramic radiograph by using Demirjian method.¹⁰ This method based on the developmental stages of the left mandibular permanent teeth, were rated on an 8-stages scale from A to H. (figure1)

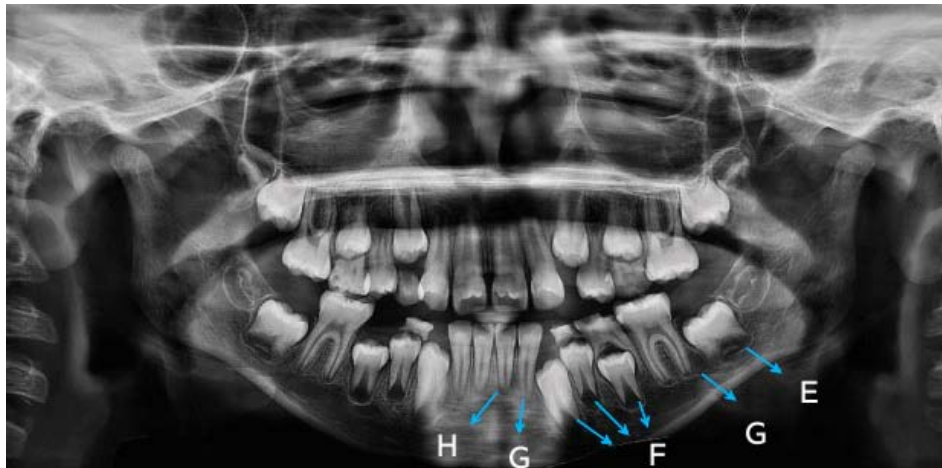


Figure 1 : Different developmental stages for one of the current clinical cases

The maturity score is converted directly into a dental age using the table suggested.

The skeletal maturity was being assessed on lateral cephalometric radiograph by using Baccetti method.⁴ According to this method, the lower border of

the bodies of the second (C2), third (C3), and fourth (C4) cervical vertebrae traced from the lateral cephalometric radiographs were visually analyzed and rated on a 6-level scale from cervical stage CS 1 to CS6. The patient is classified into one of six stages. (Figure 2)

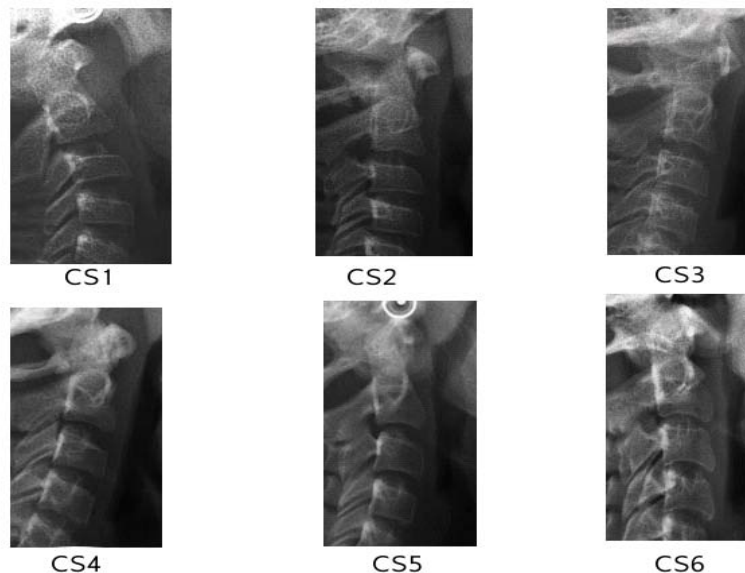


Figure 2 : Different cervical vertebra maturation stages (CVMS) from the current clinical cases.

Data were entered into computer master-sheet SPSS for window version 21.0 to facilitate data analysis. Pearson's coefficient was applied to measure the association between chronological and dental ages and Spearman rank correlation coefficient for the CS and dental calcification stages. Kappa test was calculated to evaluate intra- and inter-observer reading, one month after the initial assessment, 20 panoramic radiographs and lateral skull cephalograms was be reassessed in random selection, once by the same investigator and other by second investigator. Good agreement was seen between the two measurement, for dental age 1.000 and 0.89, whereas, for CVM stages, 0.864 and

0.859 respectively (intra- and inter-examiner agreement respectively).

III. RESULTS

The total numbers of the studied radiograph were 112 (47 males and 65 females). It was clear that the mean chronologic age of female was significantly lower than that of male on first four stages. In stage CS3, the mean chronologic age was 12.0533 ± 0.976 years for females and 13.34 ± 1.66 years for males. (Table 1)

Table 1 : Sample distribution according to cervical vertebrae stages in males and females.

Cervical vertebra stages CS	Male		Female		Total
	No	Mean , SD	No	Mean, SD	
CS1	13	9.84±1.55	4	9.42±2.02	17
CS2	8	11.83±2.13	5	9.7±0.9	13
CS3	16	13.34±0.97	15	12.05±1.66	31
CS4	8	14.73±0.76	19	13.29±1.01	27
CS5	0	0	16	15.03±0.65	16
CS6	2	15.45±0.55	6	15.35±1.9	8
Total		47		65	112

Table 2 shows the results of Spearman rank order correlation coefficients between chronological and dental ages in each cervical vertebral maturation stage. These correlation coefficients were between 0.922 and

0.177 for gender. The significance level for all coefficients was high except in CS4 in male and CS 5 in female was $P > 0.5$.

Table 2 : Correlations between chronological dental ages and skeletal maturity among study sample.

CS	Male		Female	
	R	P	r	P
CS1	0.864	0.000	0.922	0.000
CS2	0.915	0.001	0.759	0.010
CS3	0.764	0.001	0.552	0.030
CS4	0.177	0.675	0.731	0.000
CS5	0	0	0.239	0.373
CS6	0	0	0.912	0.050

P value was significant at ≤ 0.05

Table 3 : Correlations between chronological ages and skeletal maturity among study sample.

Gender	R	P
Male	0.744	0.000
Female	0.878	0.000

P value was significant at ≤ 0.05

Table 3 shows the results of Pearson correlation coefficients between chronological and cervical vertebral maturation stages. An overall high statically significant in genders was noted ($P > 0.5$).

Table 4 shows the Pearson correlation coefficient, the results revealed relationships between the chronological and dental ages; an overall high statically significant in genders was noted.

Table 4 : Pearson correlation between chronological and dental ages

Gender	R	P
Male	0.925	0.000
Female	0.845	0.000

P value was significant at ≤ 0.05

R square equal were 0.86, 0.71 that means the dental age change by 86%, 71% due to the Chronological age for male and female respectively. P value was significant at < 0.05 this reflected the model is significant and the relation between dental age and Chronological age is suitable. The P-value of t.test less than 0.05 so we have to reject the null hypothesis and accepted the alternative hypothesis which point that the

Chronological age is highly significance to the dental age, below equation show the relation between them. $Y = -0.288 + 1.06X$ (Male), $Y = 0.073 + 1.02X$ (Female) Where, Y is Dental age, and X is Chronological age.

The equation pointed if the Chronological age change by one unit the Dental age will change by 1.06, 1.02 for male and female respectively.

Table 5 : Spearman correlation coefficients between cervical vertebral and dental maturity stages among genders

Tooth	Male		Female	
	R	P	r	P
Central incisor	0.453	0.001	0.276	0.026
Lateral incisor	0.408	0.001	0.451	0.001
Canine	0.759	0.001	0.586	0.001
1 st premolar	0.774	0.001	0.672	0.001
2 nd premolar	0.752	0.001	0.772	0.001
1 st molar	0.496	0.001	0.425	0.001
2 nd molar	0.758	0.000	0.756	0.001
Total	0.704	0.001	0.769	0.001

P value was significant at ≤ 0.05

Spearman rank-order correlation coefficients between the cervical vertebral maturation stages and developmental stages for the 7 teeth are given in Table 5. All correlations were statistically significant. The level

of the correlation was different for individual teeth where the correlation coefficients ranged from 0.276 to 0.772 for females and from 0.453 to 0.774 for males. (Table 5)

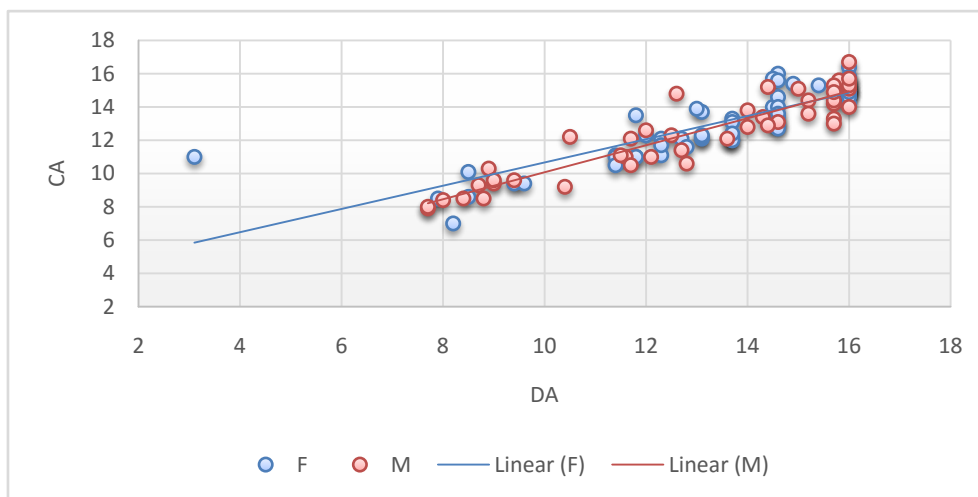


Figure 3 : linear relationship among chronological and dental age.

There was wide variation in tooth calcification stages for all teeth in boys and girls. The percentage distribution of dental development stages was calculated for the canines, first and second premolars, as well as the second molars. In CS1, the most frequently observed dental development stages were G for the canine and first premolar and E for the second molar (50%) in females and F for the canine and D in males (46.1%). Tooth calcification stages in other teeth had a percentage distribution less than 50%. (Figure 4)

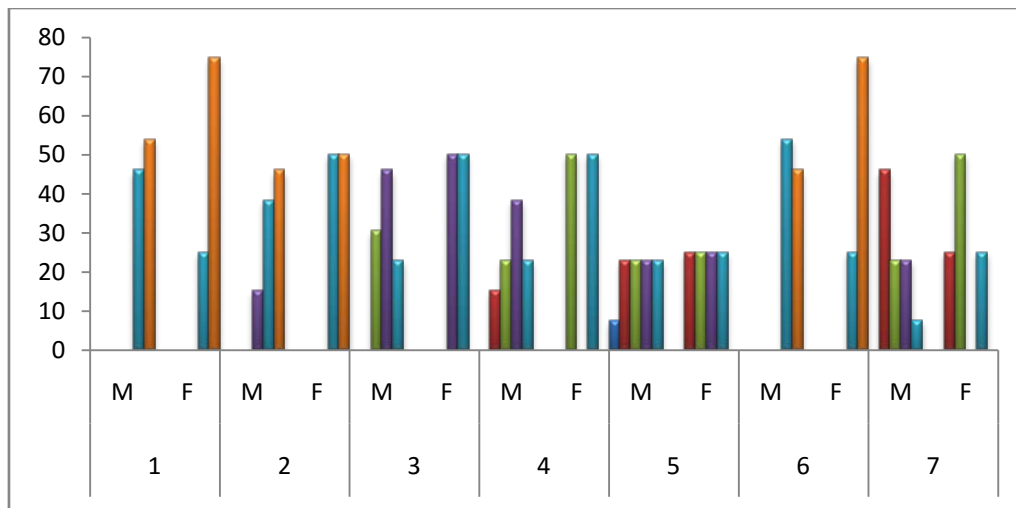


Figure 4 : Percentage Distribution of Calcification Stages of Teeth at CVMS1: 1: central incisor, 2: lateral incisor, 3: Canine, 4: first premolar; 5: second premolar; 6: first molar, second molar. C, D, E, F, G, H: Stages of dental development.

In CS2 a wide distribution of tooth calcification stages can be clearly seen stage F in the first and second premolar (80%) in female and stage F in the second premolar (60%) in male. (Figure 5)

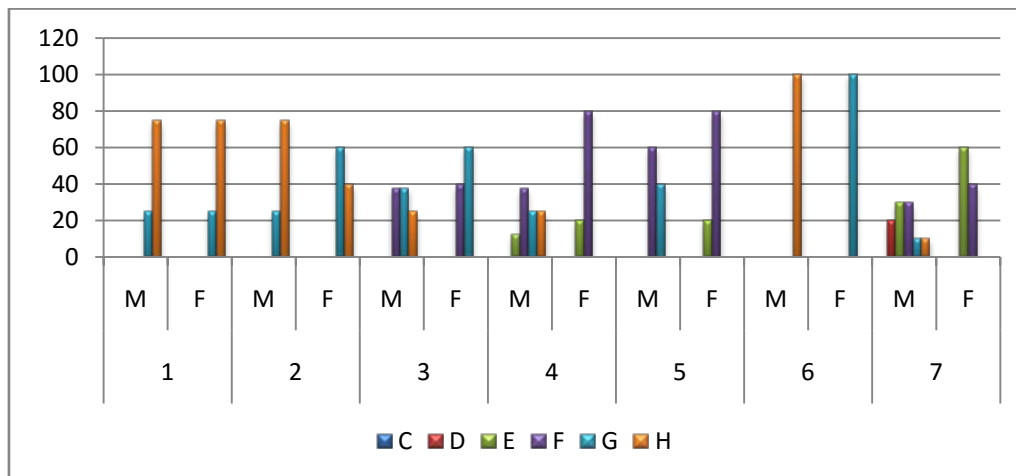


Figure 5 : Percentage Distribution of Calcification Stages of Teeth at CVMS2

In CS3 stage G in the second molar and male (80%) were showed the highest percentage distribution. (Figure6)

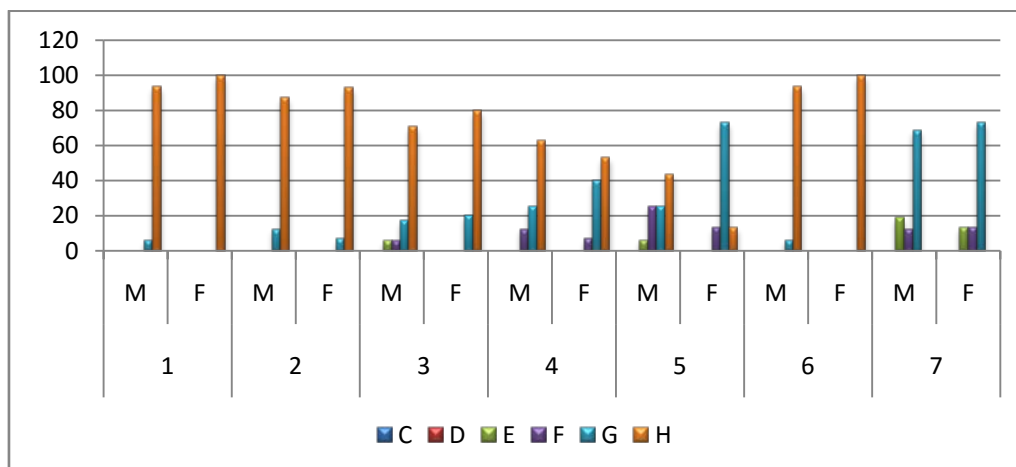


Figure 6 : Percentage Distribution of Calcification Stages of Teeth at CVMS3

In CS4 stage G of the second molar (78.9%) in female and the calcification of the canine was complete in male. (Figure 7).

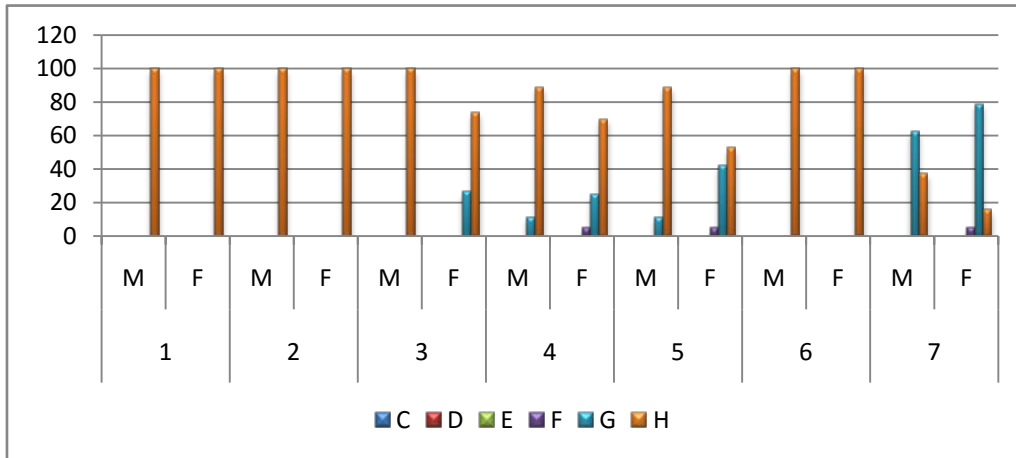


Figure 7 : Percentage Distribution of Calcification Stages of Teeth at CVMS4

Most of the studied teeth were well formed by CS5 and CS6 except the second molars still presented mainly in G stage of development for female, 62.5% and 83.3% in CS5 – CS6 respectively. (Figure 8-9)

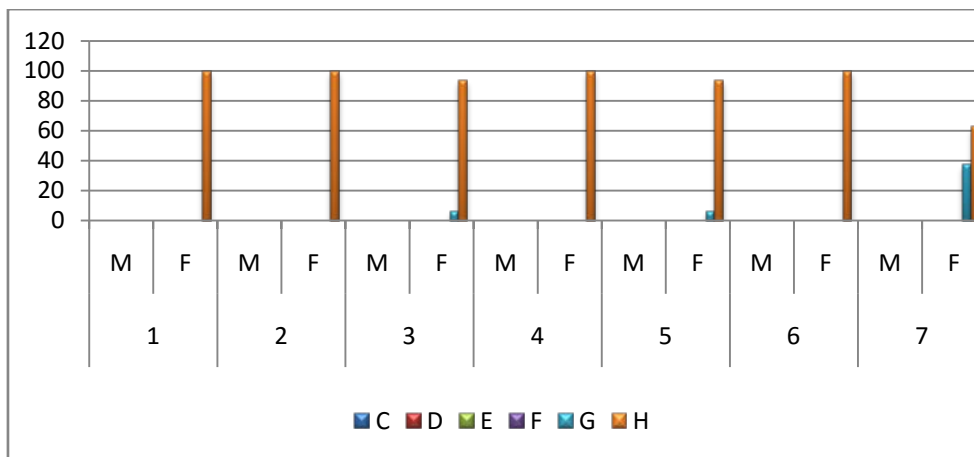


Figure 8 : Percentage Distribution of Calcification Stages of Teeth at CVMS5

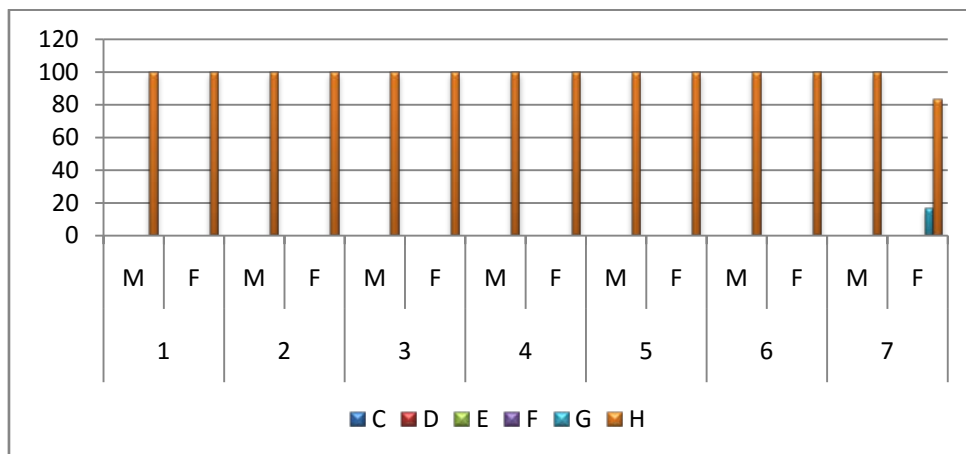


Figure 9 : Percentage Distribution of Calcification Stages of Teeth at CVMS 6

IV. DISCUSSION

Skeletal and dental maturity assessment is a common clinical practice in many health professions especially for growth modification.

In the present study, no males were documented in stage 5 of cervical maturity stages and only two in stage 6; subsequently the mean of the chronological age in females was significantly younger than males in the first four stages, which indicated that female maturation ahead of males, which in agreement with previous studies among other population.

In current study the mean chronologic age in stage CS3 was 12.0533 ± 0.976 years for females and 13.34 ± 1.66 years for males, similar results had been recorded among both gender in Turkish and Pakistani populations^{19, 20} and South Africa males,²¹ Indian females.²² In contrast to the results obtained by Irfan et al,²³ Chen et al²⁴ and Al-Hadlaq et al²⁵ in Kashmiri, Chinese and Saudi populations.

High significant correlations were showed between chronological, dental ages and skeletal maturity, the highest correlation between chronological age and dental age was observed in CS 2 and CS 1 in male and female respectively. It was confirm that the cervical vertebrae stages were progressed with increase the chronological age as well as dental age.

Engestrom et al,²⁶ Sukhia et al²⁰ and Ingrid et al,²⁷ agreed with the present results, although Engestrom et al in Sewden samples depend on the third molar development and Ingrid et al in Central Poland samples showed the highest correlation in CS1 for both gender.

High statistic significant correlation ($p= 0.000$) was observed in the current study between chronological and skeletal maturity. Which mean the chronological age can be used for measuring the skeletal maturity; although not all age group were included in this study there for we cannot depend on this result unless further study prove this fact. Baidas et al²⁸ in Saudi Arabia and Al khal et al²⁵ in Southern China,²⁹ concluded the same results.

In the current study, the dental maturity assessment stages of Demirjian et al were used due to calcification stages of teeth as an alternative of eruption were chosen because tooth development was proposed as a more reliable criterion for determining dental maturation. A high correlation coefficient was observed between chronological and dental ages ($r = 0.925$, $p = 0.0001$ for male and $r = 0.845$, $p = 0.0001$ for female) in this study, which in accordance with previous results observed by Parabhakar et al,³⁰ Ingrid et al and Hedege et al³¹ whereas a statistically significant differences between dental and chronological age were described in Belgian children due to overestimation of the chronological age with dental age,³² and Kuwaiti children due to a tendency for delayed dental

maturation.³³ The ethnic background, racial and environment influences as well as the methods, the results among populations were diverged.

A high significant correlation was observed between the dental developmental stages and cervical vertebral maturation stages of subjects with the Spearman rank order correlation coefficients.

In the present study, the permanent central and lateral incisors as well as the first molars were excluded from analysis owing to the medium correlations with CVM, whereas the canines, first and second premolars, and second molar showed good correlation, which agreed with numerous previous studies in literature, accordingly, the percentage distribution of dental development stages was calculated for the canines, first and second premolars, as well as the second molars.

In this study tooth development stages relative to stages of skeletal maturation was considered separately for male and female subjects. The sequence of each tooth according to dental development stages from the highest to the lowest correlation, the mandibular first premolar had the highest correlation coefficient with CVM stage among male subjects ($r = 0.77$, $p = 0.001$), followed by canine ($r = 0.759$, $p = 0.001$), second molar ($r = 0.758$, $p = 0.001$) and second premolar ($r = 0.752$, $p = 0.001$). Whereas for female, the mandibular second premolar had the highest correlation with CVM stage ($r = 0.772$, $p = 0.001$) followed by second molar ($r = 0.756$, $p = 0.001$), first premolar ($r = 0.672$, $p = 0.001$) and canine ($r = 0.586$, $p = 0.001$). This finding was confirmed that the first premolar and second premolar recorded with highest correlation in male and female respectively. Similarly study among Chinese, the second molar and canine for female and male respectively,²⁴ while in Saudi male revealed higher correlation values in the first premolar and the second molar with the skeletal maturation.²⁵ Moreover Kraillassiri et al obtained the same finding among female, while the highest correlation in the second premolar among male.³⁴

In this study stage F in the mandibular first premolar was 38.4% in CS1 and 37.5% in CS2, and in stage H was 62.6% in CS3, 88.9% in CS4 and 100% in CS6 in male. Whereas in female the percentages for stage F in mandibular second premolar were 25% in CS1, 80.0% in CS2 and for stage G 73.4% in CS3. For stage H, the percentages were 52.6% in CS4, 93.7% in CS5 and 100% in CS6.

In study carried out by Uysal et al, among Turkish population showed that the development of canine and first premolar was completed in most cases at the pubertal growth spurt.¹⁹ However in Chinese and Indian populations, stage F in second molar was observed in female at beginning of the pubertal growth spurt.^{22, 24}

This differences may be partially related to discrepancies in the, age, racial background and

number of the studied subjects as well as methods of selection of the teeth.

V. CONCLUSION

- A statistically significant relation was observed between chronological and dental ages and dental developmental stages with skeletal maturity stages.
- The stage H of the first premolar in male and stage G of the mandibular second premolar in female suggest the beginning of the pubertal growth spurt in Sudanese subjects. This confirms that the first premolar and second premolar (male and female respectively) may be used as markers for skeletal maturity of a child who's seeking orthodontic treatment.

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Management of the Labyrinthine Fistula in Chronic Otitis Media with Cholesteatoma

By Z.Chafiki, M.Ait el kerdoudi, S.Rouadi, R.L. Abada, M.Roubal & M.Mahtar

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Abstract- Labyrinthine fistula, defined by a destruction of the bony labyrinth is one of the most feared complications during the evolution of a chronic otitis media with cholesteatoma. Relatively common, it represents 4-12% cases of chronic otitis media with cholesteatoma and essentially occurs in the lateral semi-circular canal (70-80% of cases).

The abnormal opening of the bony labyrinth in the middle ear runs the risk of recurrent labyrinthitis with dizziness, sensorineural hearing loss, purulent labyrinthitis and meningitis. Its treatment is surgical, however, an alteration of cochleovestibular function during surgery may occur.

We propose in this development to review signs that suggest this complication and to establish a practical management of labyrinthine fistula in chronic otitis media with cholesteatoma.

Keywords: *cholesteatoma; fistula; labyrinthine; perilym-phatic; surgery.*

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Management of the Labyrinthine Fistula in Chronic Otitis Media with Cholesteatoma

Z.Chafiki ^α, M.Ait el kerdoudi ^σ, S.Rouadi ^ρ, R.L. Abada ^ω, M.Roubal [¥] & M.Mahtar [§]

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I. INTRODUCTION

The labyrinthine fistula, defined by a destruction of the bony labyrinth, is a common condition in the evolution of chronic otitis cholesteatoma (4-12% of cases) [1]. In terms of nosology, we conventionally distinguish bony labyrinth lysis (LOL) from perilymphatic fistula (PF).

II. ANATOMICAL PRESENTATIONS OF LABYRINTHINE FISTULAS

a) Sites

Fistulas are located:

- Essentially on the lateral semi-circular canal (70-80% of cases), mostly in the middle of its loop or slightly behind,
- More rarely on the promontory, the superior or the posterior semi-circular canal, and the stapes footplate. The combination of several fistulas may occur. [2-3]

b) Lesions

Labyrinthine fistulas are classified by the size and depth of invasion [4]:

The size is defined by the diameter of bone erosion (<2mm and > 2 mm). Narrow fistula of less than 2 mm on the largest diameter, where the matrix of the

cholesteatoma is less likely to pass, present a low risk of invasion of the membranous labyrinth.

The prognosis of labyrinthine fistula is correlated with **depth**. Dornhoffer et al. classified labyrinthine fistulas according to depth in three types (5): Type I - erosion of the bony labyrinth with an intact endosteum; Types II - Exposure of membranous labyrinth and thus opening of the perilymphatic area; Type III: -Invasion of the membranous labyrinth

In large fistulas, palpation of the stapes footplate by a protected absorbable sponge fragment, using a blunt instrument, can sometimes bring interesting feedback:

- Perilymph leaking in case of a permeable canal.
- Bulge of the membranous canal in case of perilymph blocking.

III. WHEN TO SUSPECT A LABYRINTHINE FISTULA?

Some circumstances may evoke this complication, especially if a chronic otitis is evolving for many years. However, it can also be observed in children.

Recall in case of:

- History of dizziness, frequently found at the anamnesis and described as "Little dizziness" or brief episodes of imbalance,
- Sign of the fistula, by finger pressure on the tragus, systematic measure to seek in all chronic otitis examination,
- Facial paralysis,
- Facial canal Lysis, during surgery.

However, absence of dizziness and fistula sign does not totally eliminate labyrinthine fistula. [6-1]

That's why imaging is usually decisive in the preoperative. CT scan with millimeter cuts allows in general positive and topographic diagnosis of the fistula. However, it isn't sensitive enough to affirm or eliminate extension to endosteum, which will define surgical procedure and functional prognosis. In theory, MRI is the best way to diagnose a labyrinthine fistula by highlighting:

- ❖ A reduction of the space between cholesteatoma and the membranous labyrinth.
- ❖ A labyrinthine inflammation

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- ❖ or a partitioning of the perilymphatic fluid in CISS sequence. Only this sign has been studied in the literature and shows excellent sensitivity.[7]

Consequences: [8]

1st notion:

Labyrinthine fistula has to be feared in any chronic otitis media surgery. The operative strategy must take this into account and consider that there is a possible fistula until proven otherwise.

2nd notion:

When inflammatory tissue is discovered in a "risk area", such as in the lateral semi-circular canal, avoid any dissection that would expose the membranous labyrinth. First, search for a fistula by gentle pressure on the stapes.

3rd notion:

Once the fistula is found, or even merely suspected, the site must be protected by an absorbable sponge or paper piece, until its treatment.

4th notion:

To treat labyrinthine fistula in best conditions, bloodless surgical field is imperative for a lesser use of suction which is a very important bone conduction impairment factor.

5th notion:

Accordingly, labyrinthine fistula must be proceed at the end of surgery, when there is no milling and therefore no heavy suction. Also, cholesteatoma dissection should be conclude by areas likely to be the site of alabyrinthine fistula, mainly lateral semi-circular canal and promontory.

Management of Labyrinthine Fistula: [9-10]

Management of labyrinthine fistula still raises discussions because:

- Leaving the cholesteatoma matrix theoretically expose to a further erosion bone and recurrent cholesteatoma.
- Removing the matrix may cause bone conduction impairment or even deafness in cases of membranous labyrinth trauma.

Fistula of the lateral semi-circular canal:

Towards cholesteatoma, two perspectives are opposed.

The matrix dissection. It can be performed under reserve of:

- Using a very fine suction, through an absorbable sponge ball if necessary and non-traumatic instruments, like button-hook
- stopping at every grip.
- Lining the area with a large fascia fragment at the end of the matrix dissection, eventually with the use of a biological glue.

- *Leaving an epidermal layer* over all or part of the fistula, which is a wise solution :
- In case of One-off ear or better ear.
- If the cholesteatoma matrix adheres to the membranous labyrinth or Granulomatous area, or if the ear is infected.

Towards the bony fistula, one can:

- Simply cover the area with a temporal fascia fragment and possibly with the use of biological glue, if the lumen of the canal is not exposed.
- Closing with bone powder if the canal is open, before covering with the fascia.

In case of labyrinthine leaking, especially during palpation of the stapes, simply covering the site with a fragment of fascia may not be enough to stop the fluid flow, which is a bone conduction impairment factor. Filling the lumen of the canal with the bony powder (optionally with the biological glue) can effectively plug the fistula.

In case of labyrinthine fistula on a deaf ear the procedure must initially seal the canal lumen with bone powder before covering it with temporal fascia to avoid a possible spread of infection to the subarachnoid spaces.

Fistula of the promontory:

Cochlear function prognosis are worse in promontory fistulas than lateral semi-circular canal ones. Therefore, Caution is to leave a thin matrix layer and line it by temporal fascia fragment.

Canal Wall up or Canal Wall Down Tympanoplasty? :[9-10-11-12]

The presence of a labyrinthine fistula is not a deciding factor for the type of procedure.

Technique choice depend on some general factors but especially on characteristics of cholesteatoma. In addition, it appears that the choice of the technique does not influence bone curve quality in postoperative. Apart from some particular circumstances (multi-operated ear, multiple fistulas, one-off ear) or when letting up the matrix (large fistula of the posterior canal, promontory and cochlear fistula), It's suitable to recommend a canal wall up to facilitate à further monitoring.

Hearing Results of Labyrinthine Fistula Surgery: [11]

Average postoperative deafness risk is 10% and most of the time unpredictable. However, if the cochlear function is usually spared, the risk seems correlated for some authors to the size of the fistula and its site, which lead to a greater caution in case of a large fistula or a dicey site.

IV. CONCLUSION

Labyrinthine fistula is a common complication of chronic otitis media with cholesteatoma.

Diagnosis is based on clinical features and imaging (MRI, CT +/-). However, Surgery remains the only way to diagnose for sure a labyrinthine fistula.

Surgeon must remain cautious whenever operating a large cholesteatoma, because CT scan can be falsely reassuring.

The choice of surgical technique (canal wall up or canal wall down tympanoplasty) is more likely defined by the characteristics of cholesteatoma than by the presence or the nature of the fistula.

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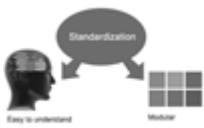
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