Association Between Periodontal Health And the Number of Children Among Sudanese Mothers in Khartoum City

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Abstract

Background: *Periodontitis is an inflammatory disease initiated by gram negative bacteria. The degree of destruction in the periodontal tissue, ligament and bones depend upon the resistance capacity of the host. The aim is to investigate the effect of the number of children on the periodontal health of the mother.*

Materials and Methods: *A comparative and cross-sectional study was conducted in The Academy Dental Teaching Hospital & Khartoum Teaching Dental hospital and the study population included 80 healthy Sudanese mothers aged (30-35) years who had 3 or more children (40 were regarded as cases study group) & a matching group of young mothers of the same age range who had 2 or less children (40 were regarded as control study group). The two groups were examined using CPITN to determine their periodontal status after signing consent. Chi-Square Tests were used to evaluate the periodontal health of mothers with varying number of children.*

Results: *It has been shown that mothers having increased number of children are more prone to get periodontal disease as compared to mothers with lesser number of children. It was evident that there is a strong association between the prevalence of the disease and its severity with increasing number of children. (P-value=0.000, 0.007 respectively)*

Conclusions: *Having more children increases the risk of the mother to develop periodontal disease. The more children she has, the more likely she is to get a more severe form of periodontitis.*

Keywords: *young mothers, periodontitis, number of children*

I. Introduction

Periodontitis is characterized by inflammation in the supporting dental tissues resulting in their complete deterioration and is caused by specific gram-negative bacteria. Previously it was thought that periodontal inflammation is the reason of poor oral health, plaque deposition and occlusal trauma [1]. Various non-modifiable and modifiable factors were demonstrated as the cause of periodontitis. The modifiable factors include socioeconomic status, stress, oral hygiene, smoking, obesity etc. while the genetic factors i.e. age, ethnicity, presence of diseases etc. are referred to as non-modifiable factors[2],[3]. The non-modifiable factors also include hormonal alteration which occurs mainly during pregnancy [4] a change in the hormonal function does not alter the course of infection but it is indirectly involved in the elevation of the tissue response against the infection. Such infections severely affect the quality of life and causes functional and psychological impairment in mothers [5].

The normal periodontium comprises the gingiva, periodontal ligament, cementum and the alveolar bone. It acts as a supporting unit for the teeth [6]. The disease is responsible for the deterioration of the tissue leading to tooth loss [7]. The effect and severity of the periodontal disease varies with the amount of bacterial plaque and the susceptibility of the tissue towards the disease [8]. The disease could be chronic or aggressive depending upon the severity of the effect caused by the disease. Chronic periodontitis is more common in elders and its severity enhances with the increase in age while aggressive periodontitis which could be affected by certain genetic factors, is more common in children and causes the rapid loss of the tissue [9]. Various environmental and genetic factors alter the immune mechanism of the host cell and enable the microbial deposition in the periodontal tissue proceeding towards periodontitis [10]. Periodontal infection causes resorption of bone and detaches the teeth from the ligaments, these results in the formation of a pocket which later on reserves the pathogenic bacteria [11]. The environmental and intrinsic risk factors explained previously have been confirmed through research studies and therefore, these risk factors should be eliminated to penalize the disease process [12]. The pathogens mainly involved in periodontitis, includes gram-negative and gram-positive bacteria, anaerobes and facultative bacteria [13]. Chronic periodontitis is caused by Porphyromonas gingivalis, Tannerella forsythia and Treponema Denticola [7],[14],[15]. The extent of pathogenesis caused by the above described bacterial species is highly dependent on the host response to the pathogenic organisms and on the presence of etiological

risk factors [16]. Extended studies should be done to determine the progression of the disease process by these bacterial species [17]. An infection caused by the P. Endodontalis is found in the form of lesions in the periodontal pockets and dorsum of the tongue [18].The extent of generation of an immune response in the host cell is the key to the modification of chronic periodontitis [19]. It is suggested that the inflammatory response generated by the periodontal disease is not localized and induces wide spread systemic inflammation [20]. Similarly, Miller proposed a theory of "focal infection" and suggested that oral infections act as a contributing agent in the development of various systemic diseases such as, septicemia, pneumonia and tonsillitis [21]. It is also noticed that pregnancy is also prone to modify the oral environment in females due to some unknown underlying mechanism and could be avoided through maintaining the oral hygiene [16].

Periodontal assessment is done through detailed oral examination which includes the inspection of the texture, shape and color of the gingival tissues. Assessment of the extent of periodontal damage is done through probing depth and gingival recession measurements. These measurements are not likely to be accurate because of the loss of gingival margins in chronic periodontitis but could provide a good estimation of the depth of the periodontal pockets [16]. The severity of periodontal damage could be assessed by the abnormal tooth mobility which is a reason of alveolar bone loss [22].

Periodontal disease is affected by many systemic problems including stress. Stress is an organic response of the hypothalamic-pituitary-adrenal (HPA) axis to different chemical, physical and emotional stimuli. The concept of acute disease has changed over the past years, although relations to psychosocial and emotional issues remain [23]. Research based evidence put forward the fact that psychological stress is related to the development of attachment losses and alveolar bone resorption induced by the production of IL-6 which could be an underlying factor for the development of periodontal infection [24]. It is further apprehended that host immunity is severely depressed during psychological stress which aids the rapid progression of P.gingivalis infection in individuals [9],[25].

Due to the less research evidence on the topic, it is important to study the relationship of periodontal disease with the number of children possessed by the woman. Therefore, this study was conducted on Sudanese mothers to evaluate the disease prevalence with respect to the number of children. Due to the strong socio-cultural influences that usually dictate how things go in our Sudanese community, Sudanese mothers tend to dedicate their time and efforts mainly towards taking care of their children, neglecting their general health & oral health as well, which may affect their future well-being, a matter which indicates the scientific rationale of this study.

The main objective of this study is to find out the association between prevalence of periodontal disease in young mothers examined and the number of their children (Banjoist, 2011, p. 279)[9] and specifically to assess the severity of the mother's periodontal disease among the study group and control group and to determine the association between severity of the mother's periodontal disease and the number of her children.

II.   Materials And Methods

It is a descriptive, cross-sectional, comparative study that was carried out in two dental hospitals. The Academy Teaching Dental Hospital, which is located in Imtidad area of Khartoum city and Khartoum Teaching Dental Hospital, which is found in the centre of Khartoum city .

The study was done from the December 2011 till February 2012. All married mothers with ages ranging from 30 – 35 years who have three or more children during the study period were categorized as cases, and a matching control group of mothers of the same age range who have 2 or less children. The mother selected to be part of the study group should at least have a child who is of two years or younger in age during the assessment. Certain exclusion criteria was followed in which all mothers who suffer from systemic disease e.g. diabetes mellitus or hypertension, aggressive periodontitis and those with poor oral hygiene, habits that deteriorate the oral health eg smoking, snuff dipping or drinking were excluded[2].

The dependent variable in the study is the status of periodontal infection in mothers, whereas, the independent variable in the study is the number of children. Convenience Sampling was the technique used, in which the sample size was found to be 80, 40 cases (married Sudanese mothers aged (30 – 35) years who have 3 or more children), and 40 matching control group (married Sudanese mothers of the same age group who have 2 or less children).

Approval letter was obtained from the ethical committee of the, University of Medical Sciences & Technology. Before the commencement of the study, the purpose and procedure of the study were conveyed to the participants and consent was taken. Those who were reluctant were excluded. The mothers were interviewed using a well structured, close ended questionnaire including demographic data [age of the mother, her level of education, total number of children she has, age of her youngest child, her daily oral hygiene maintenance methods, daily habits and finally confirmation of absence of exclusion criteria].

Clinical examination for each mother was done under standard and strict infection control measures using CPITN (Community Periodontal Index of Treatment needs). Examination was done on dental chairs under dental light using a periodontal probe (University of Michigan with William markings) [18].

Six sextants were developed for the assessment of periodontal infection in mothers. A specific index for each tooth is examined by scoring on sextant basis. The sextant with higher score is then evaluated after the complete examination of all teeth.

Six sextants (depicted based on FDI notation)

17 – 14	13 – 23	24 – 27
47 – 44	43 – 33	34 – 37

The third molars are only included in case they are working as second molars. The treatment based on sextant scores involves the evaluation of each sextant; and treatment is only given when two or more teeth are affected and are not extracted. In case of a single tooth, it is added to the adjacent sextant. Specific tooth showing worsened periodontal infection are selected to develop the treatment strategy. According to the FDI notation, the index teeth are elaborated as follows.

17, 16, 11, 26, 27

47, 46, 31, 36, 37

The periodontal examination included presence of supra or sub gingival calculus, plaque index (PI), gingival index (GI) and probing depth (PD) as well as gingival recession (GR) by using a periodontal probe. The highest score measured at the index teeth in the above criteria was considered to be the tooth score in each specific category.PAL (Probing Attachment Loss) indicates severity of periodontal disease. It was calculated for each tooth by addition of PD value + GR value (if present), then a diagnosis of the periodontal status of the patient is reached. If PAL is 0-2 then it is a mild form of periodontitis, 3-4 it is a moderate form and 5 and more is considered a severe type of periodontal disease. Examination findings were recorded on the examination sheet. Data was tabulated and analyzed using SPSS 16.0. Pearson Chi-Square test was used, in which a level of 0.05 P-value was considered to be significant.

After examination, all mothers who were included in the study group were given a proper oral hygiene instructions and scheduled at the Dental Hospitals, for periodontal treatment and regular follow-up.

III.   RESULTS
The main findings in this study are shown in the following figures and tables:

Figure (1) illustrates the distribution of the study subjects on the basis of age. In the control study group, the majority was 30 years old i.e. 45% of the total participants while for the case study group, most of them were 35 years old i.e. 32.5% of the total participants.

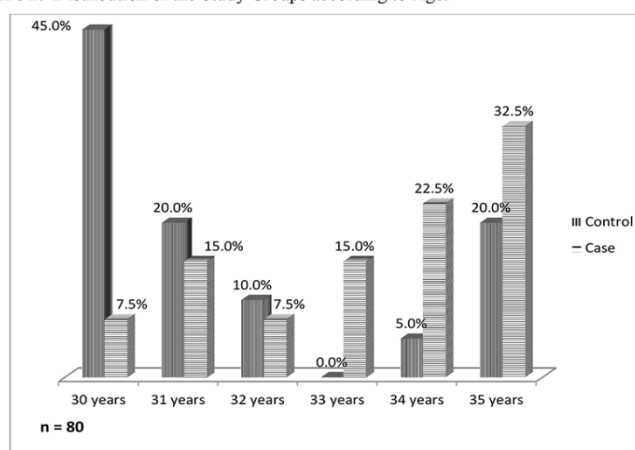**Figure 1:** Distribution of the Study Groups according to Age.

Table (1) shows that (95%) were college graduates and (5%) were secondary school certificate holders. While most of the case study groups were college graduates (72.5%) and (5%) were primary school educated.

Table 1: Frequency Distribution of the Study Groups according to Level of Education:

Type of patients	Educational Level	Frequency	Percent
Case ≥ 3 children	Primary School	2	5.0%
	Secondary School	9	22.5%
	Graduate	29	72.5%
	Total	40	100%
Control ≤ 2 children	Primary School	0	0.00%
	Secondary School	2	5.0%
	Graduate	38	95.0%

Table (2) shows frequency distributions according to the number of children each individual has. 80% of control group mothers have 2 children, while 20% have 1 child. In cases group, 37.5% have 4 children as the highest percentage, while the lowest is 5% having 6 children.

Table 1: Frequency Distribution of the Study Groups According to the Number of their Children

Type of patients	Number of Children	Frequency	Percent
Case ≥ 3 children	3 children	13	32.5%
	4 children	15	37.5%
	5 children	10	25.0%
	6 children	2	5.0%
	Total	40	100%
Control ≤ 2 children	1 child	8	20.0%
	2 children	32	80.0%
	Total	40	100%

Table (3) illustrates the association between the prevalence of periodontal disease in young mothers who are part of the study groups and the number of children they have, which was found to be significant with a P-value = 0.000

Table 2: Association between the Prevalence of Periodontal Disease in Mothers & the Number of their Children:

Diagnosis	Type of patient		Total
	Cases (≥ 3 children)	Control (l≤ 2 children)	
Generalized mild chronic periodontitis	1	0	1
	100.0%	.0%	100.0%
	2.5%	.0%	1.3%
Generalized moderate chronic periodontitis	13	2	15
	86.7%	13.3%	100.0%
	32.5%	5.0%	18.8%
Generalized severe chronic periodontitis	13	4	17
	76.5%	23.5%	100.0%
	32.5%	10.0%	21.3%
Localized mild chronic periodontitis	1	12	13
	7.7%	92.3%	100.0%
	2.5%	30.0%	16.3%
Localized moderate chronic periodontitis	5	2	7
	71.4%	28.6%	100.0%
	12.5%	5.0%	8.8%
Localized severe chronic periodontitis	1	0	1
	100.0%	.0%	100.0%
	2.5%	.0%	1.3%
Generalized marginal chronic gingivitis	6	14	20
	30.0%	70.0%	100.0%
	15.0%	35.0%	25.0%
Generalized papillary chronic gingivitis	0	2	2
	.0%	100.0%	100.0%
	.0%	5.0%	2.5%
Localized papillary chronic gingivitis	0	4	4
	.0%	100.0%	100.0%
	.0%	10.0%	5.0%
Total	40	40	80
	50.0%	50.0%	100.0%
	100.0%	100.0%	100.0%

P-value = 0.000

Figure (2) illustrates the severity of periodontal disease in the study groups in which the cases have high percent of severe periodontal disease [35%] against only 10% of the control group.

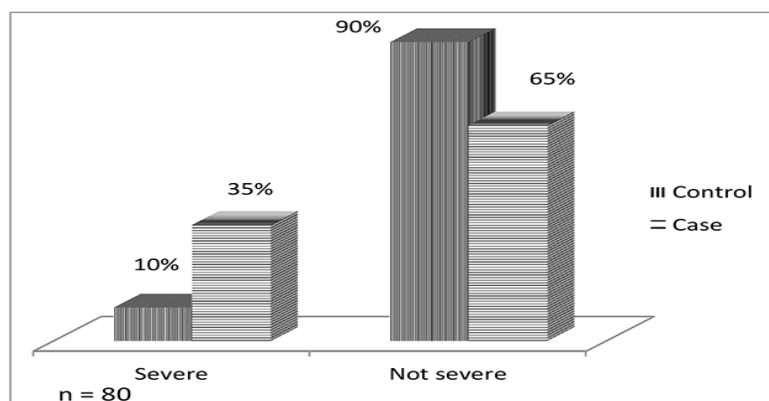**Figure 2:** Distribution of study groups according to severity of periodontal disease.

Table (4) shows the association between severity of periodontal disease in mothers and the number of children they have. It was found to be significant with a P-value of 0.007. Out of the 40 case study patients, 14 patients (35%) were diagnosed of having chronic periodontal disease, while 26 patients (65%) were diagnosed with no chronic infection. While in control patients, 4 patients (10%) were diagnosed of having severe periodontal disease, whereas 36 patients (90%) did not have chronic infection.

Table 3: Association between severity of periodontal disease in young mothers and the number of their children

Type of patient	Severity		Total
	Severe	Not severe	
Control	4	36	40
(l≤ 2 children)	10.0%	90.0%	100.0%
	22.2%	58.1%	50.0%
Case	14	26	40
≥ 3 children	35.0%	65.0%	100.0%
	77.8%	41.9%	50.0%
Total	18	62	80
	22.5%	77.5%	100.0%
	100.0%	100.0%	100.0%

P-Value = 0.007

IV. Discussion

The findings of this study have created an alarming situation for the public health departments because periodontal infection particularly strikes the mothers. A number of limitations affected this study. The sample size was specific and limited; whereas, the study duration was shorter without any follow-up. These factors limit the credibility of the findings of this study. It is justified by considering the fact that the study population is limited to Sudanese mothers who are not prone to address their oral condition and left it untreated unless it deemed to be obligatory. Further, the study findings are not generalized and are applied only on the dental hospitals present in the Khartoum city.

The findings of this study showed a high prevalence of periodontal disease among the patients of cases study group (mothers who have 3 or more children) with exactly 34 out of a total of 40 patients i.e. 85% of individuals of cases study group have some form of periodontitis. Comparing these results with a much less prevalence amongst control study group with only 20 out of 40 patients i.e. 50% of individuals included in the control study group has a periodontal disease. With a P-value of 0.000, there is an evident association between the prevalence of periodontal disease among mothers aged (30-35) years and the number of children they have.

The study findings also elaborated that approximately one-third of the patients (35%) were diagnosed with having some form of a severe chronic periodontal disease, while the other two thirds of the same cases group had some sort of mild or moderate chronic periodontitis disease, which is also a high percentage of prevalence of severe periodontal disease among mothers of child-bearing age who already have 3 or more children. About 22.5% of all the individuals of the study groups were diagnosed of having a severe form of periodontal disease.

An interesting observation in the results of this study revealed a clear association, not only of the actual presence of periodontal disease in young mothers and the number of children they have, but extending to include a strong association with a P-value of 0.007, between severity of the mother's periodontal status disease, and the number of children she gave birth to. This principal finding may add to the scanty data available regarding this issue in the Sudanese community.

The direct proportional relationship between severity of a mother's periodontal disease and the number of her kids could be due to the increase in stress and energy spent by the mother to take care of her many children. It is clearly mentioned previously in many research studies that increased stress conditions may attribute to increase the risk of periodontal disease prevalence [9],[23]-[25]. Changes in the microvasculature of the teeth during motherhood could be more prominent and occurring at a more chronic level and over a longer period of time, that's why it can appear with an increase in number of children which could be accompanied by a decrease in maintenance of oral hygiene, aggravating the destructive procedure and subsequently leading to periodontal disease [9].

V. Conclusion

There is an evident association between a mother's periodontal status, and the number of her children. There is a significant association between the deterioration in a mother's periodontal health and the number of her children. It was observed that mothers with more children are at more risk of development and progression of the periodontal disease.

Cohort follow-up studies should be carried out to elaborate the factors contributing to faster progression of the periodontal condition and the outcome of performing regular and adequate dental care.

Acknowledgment

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