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The Impact of Aesthetic Orthodontic Treatment Needs on the Oral Health-Related Quality of Life of Dental Students

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Materials and Methods: A cross-sectional design was used. A random sample of 100 2nd years to 5th year dental students aged 17-23 years from the University of Medical Sciences and Technology in Sudan was obtained, and each subject was assessed for orthodontic treatment need using the Aesthetic Component of the Index of Orthodontic Treatment Needs by taking photographs of the dentition. Each subject was also given an Oral health-related quality to life questionnaire to complete: The Oral Health Impact Profile (OHIP).

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The Impact of Aesthetic Orthodontic Treatment Needs on the Oral Health-Related Quality of Life of Dental Students

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Results: In general, the oral health-related quality of life was good in this sample. Males generally showed a significantly higher OHIP scores in the handicap domain than females. (P-value: 0.003). Despite the fact that no significant gender differences were observed in the remaining quality of life domains, when the Aesthetic Component of the Index of Orthodontic Treatment Needs (IOTN-AC) was separately evaluated, it was found that males with borderline need for treatment had significantly higher impacts on oral health than females in the same group with regards to functional limitation and psychological discomfort, as well as overall OHIP scores (P= 0.014, 0.05, 0.000 respectively).

Conclusion: Malocclusion does not appear to affect the oral health-related quality of life to a measurable degree.

Keywords: malocclusion, quality of life, oral health-related quality of life, oral health impact profile, orthodontic treatment need.

I. INTRODUCTION

The demand for orthodontic treatment has been increasing, which places a load on many global healthcare resources.¹ the development of occlusal indices was done so as to determine the severity of the malocclusion and prioritize treatment. However, occlusal indices define orthodontic treatment need from a clinician's point of view without paying attention to the patient's social needs and desire to improve appearance.

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Recently, researchers and clinicians have placed more focus on patients' own perceptions of oral health status and oral health care systems to understand their needs, fulfillment with treatment, and ultimately the perceived overall quality of health systems.^{2, 3, 4}

Kelly Ryan Taylor et al found that recent studies with standardized instruments have displayed a link between malocclusion and the oral health related quality of life.⁵

The Aesthetic Component of the Index of Orthodontic Treatment Needs (IOTN-AC) classifies malocclusions based on particular occlusal features which are considered important for aesthetics, in order to identify those in most need for treatment. The aesthetic component (AC), records the aesthetic need for orthodontic treatment using a ten grade standardized ranking scale of coloured photographs showing various levels of dental attractiveness. For IOTN-AC, those with a score of 1-4 are labeled as having no/little treatment needed, 5-7 as borderline treatment needed, and 8-10 as treatment required.⁶

Many instruments have been designed to measure dental outcomes in terms of the impact on quality of life related to oral health. Amongst these, the Oral health impact profile (OHIP) and its shortened version OHIP-14 are broadly used. It was designed to be applied to various oral conditions. The items in both versions of the Oral health impact profile (OHIP) are grouped into 7 domains: functional limitation, physical pain, psychological discomfort, physical disability, psychological disability, social disability, and handicap.^{7,8} numerous previous studies reported a significant association between malocclusion and Oral Health Related Quality of Life (OHRQoL)^{1, 2, 9-11}

This study aims to answer the following questions: Do various orthodontic treatment needs have an impact on the oral health-related quality of life? Does gender significantly affect the oral health-related quality of life? And is there a difference of OHIP scores between genders in relation to the IOTN?

II. MATERIALS AND METHODS

This is a Cross-sectional study carried out in the Academy Charity Teaching Hospital (ACTH), University of Medical Sciences and Technology, Faculty of

Dentistry, Khartoum from November 2012 to February 2013.

Permission and approval was obtained from the University of Medical Sciences and Technology (UMST). An informed consent was obtained from each participant in the study. Before taking part in this study, all participants were given a brief explanation about the aim of the study and the methods that will be carried out.

This research included 2nd, 3rd, 4th, and 5th year dental students in the University of Medical Sciences and Technology. 1st years were not included because they were not present in the Academy Charity Teaching Hospital (ACTH) at the time. The following groups of subjects were excluded from the study:

- Students who have had previous orthodontic treatment.
- Students who had active orthodontic treatment.

The sampling technique used was Stratified random sampling.

The desirable sample size was n=100

III. DATA COLLECTION TECHNIQUE

Each batch of UMST students was informed about the aim of the study and all the steps which were required to collect the data in the lecture room. The individuals who have met the inclusion criteria were chosen randomly from registration sheet. Once consent had been obtained, each student was first assessed for orthodontic treatment needs using the aesthetic component of the Index of Orthodontic Treatment Need (IOTN).

The students were examined in the dental clinic. After doing a clinical examination, the subject was asked to bite on their back teeth and a photograph was taken of the dentition. Then, the subject was asked to compare the photo of their teeth with the standard, and grade the dental attractiveness of the anterior teeth.

There were 10 grades, grade 1 being the most attractive and 10 being the least. After the subject graded their photo, the need of treatment was attained.

Grade 1-4: No/little treatment need.

Grade 5-7: Borderline treatment need.

Grade 8-10: Definite treatment need.

Secondly, the Oral Health-Related Quality of life was determined by giving each subject a questionnaire to complete with the examiner sitting by the students for explanation of any difficult questions. The questionnaire was the Oral Health Impact Profile (OHIP) which is composed of 49 questions related to oral health. Respondents were asked to indicate on a five-point Likert scale how frequently they experienced each problem within a reference period of 12 months. Response categories for the five-point scale are: "Very often", "Fairly often", "Occasionally", "Hardly ever" and "Never". For three questions that ask about denture-related problems (numbers 9, 18 and 30), a response option was provided for non-wearers of dentures to indicate that these questions do not apply to them. The OHIP scores were then attained.

IV. DATA PROCESSING AND ANALYSIS

The data was processed and analyzed using computer software programs SPSS (Statistical Package for Social Sciences) version 17

The data analyzed and correlated with those of the Index of orthodontic treatment needs (IOTN) and final results were obtained and presented in tables and figures. The tests which were used during analysis were Chi-squared test, and ANOVA test.

V. RESULTS

Figure 1 shows the gender distribution in the study; the majority of the students were females (78%), while (22%) were males.

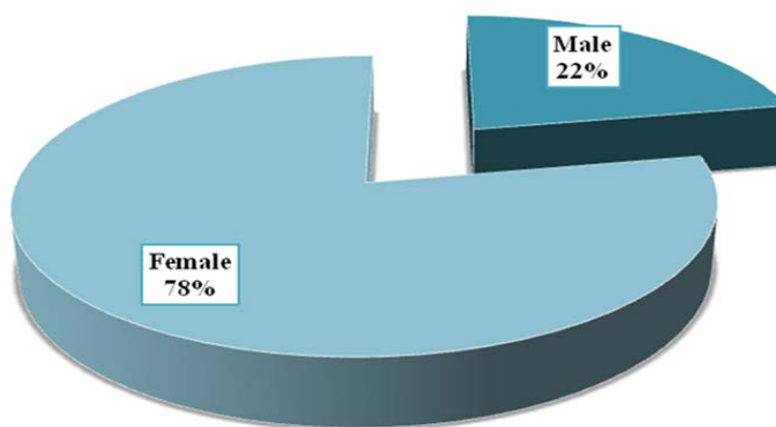


Figure 1: Distribution of the study sample according to (Gender)

Figure 2 portrays the distribution of the study sample according to Index of Orthodontic Treatment Needs (Aesthetic Component). 96% had No/ Slight treatment need with a score ranging from 1-4, while 4%

had borderline treatment need with a score ranging from 5-7. None of the population scored 8-10, meaning there was no definitive aesthetic need for treatment among this study sample.

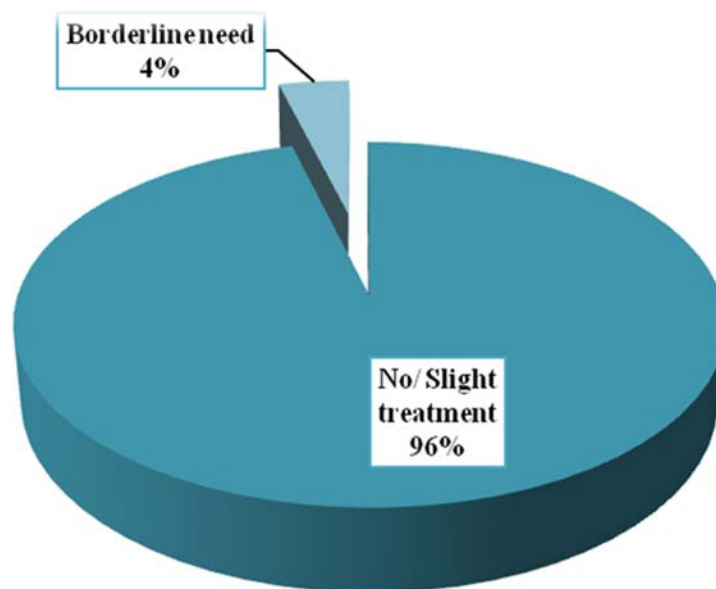


Figure 2 : Distribution of the study sample according to (Index of Orthodontic Treatment Needs (Aesthetic Component) - IOTN (AC))

Figure 3 shows Distribution of the study sample according to Index of Orthodontic Treatment Needs (Aesthetic Component) in relation to gender. It was

found that 90.9% of males and 97.4% of females had No/Slight treatment need, while 9.1% of males and 2.6% of females had borderline need for treatment.

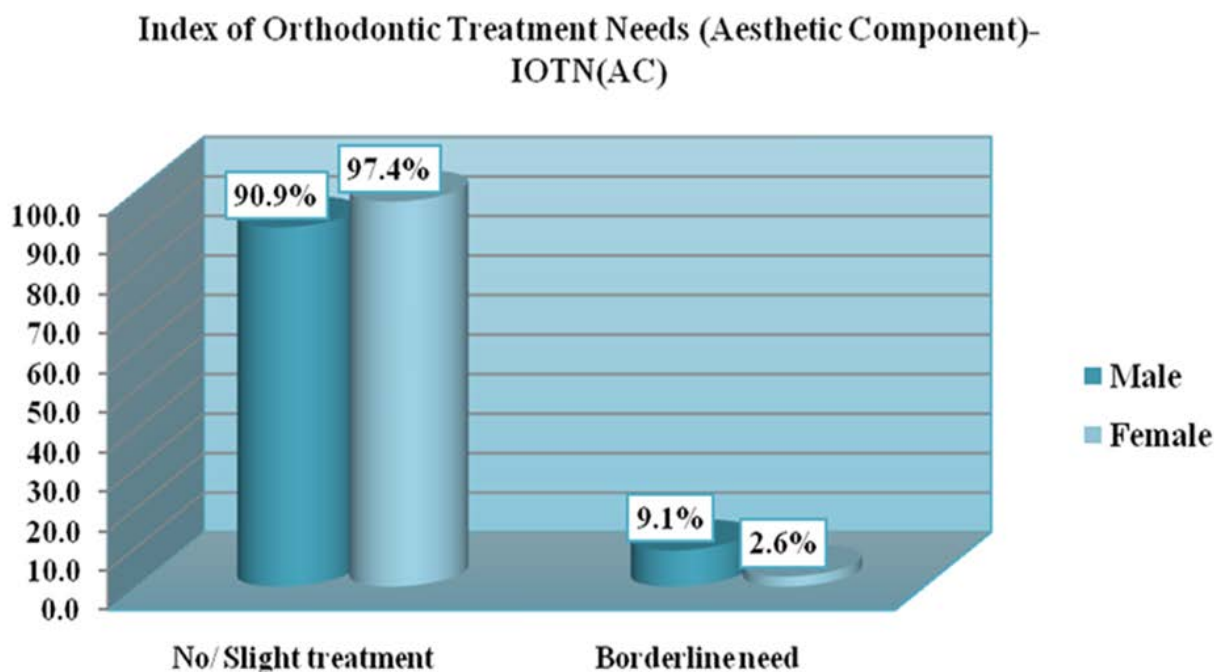


Figure 3 : Distribution of the study sample according to (Index of Orthodontic Treatment Needs (Aesthetic Component) - IOTN (AC)) in relation to gender

In this study sample, the OHIP scores ranged from 0-22.02 in the domains while the overall OHIP scores ranged from 0-95.1 in both genders.

Table (1) shows The Oral health Impact Profile scores (mean \pm S.D) in relation with gender; males generally showed a significantly higher OHIP scores in the handicap domain than females. (P-value: 0.003).

They also showed higher scores in functional limitation, psychological discomfort, psychological disability, and physical disability than females, however, these were not statistically significant. Females, on the other hand, had more impacts to oral health in terms of physical pain and social disability. These scores, however, were also not statistically significant.

Table 1 : The Oral health Impact Profile scores (mean \pm S.D) in relation with gender

		Functional limitation	Physical pain	Psychological discomfort	Physical disability	Psychological disability	Social disability	Handicap	Overall Oral health Impact Profile scores
Gender	Male	8.3 ± 4.2	8.6 ± 5.9	10.0 ± 8.1	5.5 ± 4.8	5.5 ± 9.6	2.2 ± 4.2	6.1 ± 6.5	46.2 ± 26.9
	Female	6.1 ± 3.7	9.8 ± 6.1	7.6 ± 6.8	3.4 ± 3.4	3.1 ± 5.4	2.3 ± 2.5	1.7 ± 3.3	33.5 ± 24.6
	P-Value	0.098	0.544	0.336	0.110	0.281	0.958	0.003	0.144

Table (2) shows The Oral health Impact Profile scores (mean \pm S.D) in relation with Index of Orthodontic Treatment Needs (Aesthetic Component) Those with borderline treatment need had statistically

significant higher impact on oral health in relation to functional limitation (OHIP score: 11.9 \pm 9) than those with no/ slight treatment need (OHIP score: 6.4 \pm 3.6) P-value: 0.05 Those with borderline need for treatment

also showed higher impacts on oral health in relation to psychological disability and physical disability, yet these were not statistically significant.

The Oral health Impact Profile scores (mean \pm S.D) in relation with Index of Orthodontic Treatment Needs (Aesthetic Component) and gender are shown on Table (3) The males with a borderline need for treatment showed significantly higher scores in functional limitation (P-value: 0.014), psychological discomfort (P-value: 0.05), and overall OHIP scores (P-value: 0.000) than females who also had a borderline need for treatment.



Table 2 : The Oral health Impact Profile scores (mean ± S.D) in relation with Index of Orthodontic Treatment Needs (Aesthetic Component)

		Functional limitation	Physical pain	Psychological discomfort	Physical disability	Psychological disability	Social disability	Handicap	Overall Oral health Impact Profile scores
Index of Orthodontic Treatment Needs (Aesthetic Component)- IOTN(AC)	No/ Slight treatment	6.4 ± 3.6	9.6 ± 6.1	8.0 ± 7.1	3.8 ± 3.9	3.7 ± 6.6	2.4 ± 4.5	2.7 ± 4.6	36.0 ± 25.6
	Borderline need	11.9 ± 9.0	9.5 ± 1.6	12.6 ± 7.1	5.9 ± 2.2	3.1 ± 4.4	0.0 ± 0.0	1.1 ± 1.5	44.0 ± 25.7
	P-Value	0.05	0.982	0.368	0.441	0.905	0.464	0.614	0.667

Table 3 : The Oral health Impact Profile scores (mean \pm S.D) in relation with Index of Orthodontic Treatment Needs (Aesthetic Component) and gender

Index of Orthodontic Treatment Needs (Aesthetic Component)- IOTN(AC)	Functional limitation	Physical pain	Psychological discomfort	Physical disability	Psychological disability	Social disability	Handicap	Overall Oral health Impact Profile scores
No/ Slight treatment	Male	7.3 \pm 2.8	8.4 \pm 6.2	9.2 \pm 8.1	5.3 \pm 5.0	5.5 \pm 10.1	2.4 \pm 4.3	6.5 \pm 6.7
	Female	6.1 \pm 3.8	9.9 \pm 6.2	7.6 \pm 6.9	3.4 \pm 3.5	3.2 \pm 5.4	2.3 \pm 4.6	1.7 \pm 3.3
	P-Value	0.782	0.637	0.808	0.480	0.317	0.998	0.096
Borderline need	Male	18.2 \pm 0.0	10.6 \pm 0.0	17.6 \pm 0.0	7.5 \pm 0.0	6.2 \pm 0.0	0.0 \pm 0.0	2.1 \pm 0.0
	Female	5.5 \pm 0.0	8.4 \pm 0.0	7.6 \pm 0.0	4.4 \pm 0.0	0.0 \pm 0.0	0.0 \pm 0.0	0.0 \pm 0.0
	P-Value	0.014	0.491	0.050	0.248			0.000

VI. DISCUSSION

The results of this study showed that the orthodontic treatment needs didn't significantly affect the oral health-related quality of life, which were consistent with the results of Kelly Ryan Taylor et al⁵, who carried out a study on 293 children aged 11 to 14 recruited from orthodontic and pediatric dental clinics at the University of Washington and a community health clinic in Seattle, and Vig et al¹² who carried out a longitudinal study involving children/adolescents attending the OSU dental clinics in the United States.

In assessment of the association between Oral Health-Related Quality of Life (OHQoL) and gender, there was found to be a significant difference between gender for the handicap domain of the OHIP only, where males showed higher scores than females ($P = 0.003$). However, there was no statistically significant difference between genders in the remaining domains of the OHIP, as well as the overall OHIP scores. This corroborated the results of L.A Foster Page et al¹¹ and Daniela Feu et al¹³, while they differed from the results of De Oliveria and Sheiham⁹ who found that females had higher impacts on oral health than males.

In the present study, despite the fact that no gender differences were observed in the remaining quality of life domains, when the Aesthetic Component of the Index of Orthodontic Treatment Needs (IOTN-AC) was separately evaluated, it was found that males with borderline need for treatment had significantly higher impacts on oral health than females in the same group with regards to functional limitation and psychological discomfort, as well as overall OHIP scores ($P = 0.014, 0.05, 0.000$ respectively).

Interestingly, this raises the question, why do males seem to have more negative impacts on certain areas of their oral health than females in this study, and why has this never been reported in another study? And is this truly related to malocclusion only or do other factors play a role?

When we take a look at the domains where males significantly scored higher: Handicap, functional limitation, and psychological discomfort, we find that they included general questions related to oral health. Now, assuming that the questions were answered on a general basis, and not just focusing on malocclusion, which is what should have happened, we can see that there was obviously a great difference in the Handicap domain where males scored (6.1 ± 6.5) and females (1.7 ± 3.3) despite the fact that malocclusion may lead to stale breath, bad appearance, dental problems, and self-consciousness in both genders. One hypothetical response to this is, assuming that it is more common to find males using tobacco products than females, that this may be the cause. Other possible causes are listed later on.

Because the male subjects in this study were students at the faculty, after raising this question, the

researcher returned and asked them about their smoking status. It was found that 14 out of the 22 male participants in this study, that is, 63.6% were current smokers. This is a large percentage, and it seems likely to have an effect on the results of this study. However this must be statistically proven before making any conclusions and further research should be done to assess the association between smoking and oral health-related quality of life. This is one of many factors which may have contributed to the impacts on oral health in this study. Other studies controlled confounding factors such as that carried out by L.A Foster Page¹¹ where the caries index was accounted for using the DMFT score.

However, due to the cross-sectional design of this study, one should not assume that malocclusion doesn't truly have an effect on the oral health-related quality of life.

The studies conducted by Ali and Amin² and De Oliveria and Sheiham⁹ only used the Dental Health Component of the IOTN to assess the effect of malocclusion on the oral health-related quality of life. Because treatment need is not only assessed objectively, and because most orthodontic patients seek their services out of concern for aesthetics rather than health or function, these studies don't truly show the extent of how orthodontic treatment needs affects the oral health-related quality of life. Furthermore, De Oliveria and Sheiham rather focused more on comparing those who had completed orthodontic treatment, with those who were currently under treatment, and those who never had treatment.

This cross-sectional study was the first in Sudan to use these valid instruments: The Oral Health Impact Profile (OHIP), and the Index of Orthodontic Treatment Needs (AC) to investigate the effects of malocclusion on the oral health-related quality of life of dental students. The subjects were randomly selected, giving no room for selection bias. The OHIP was used out of all the other oral health-related quality of life measures because it has been used in many studies^{1, 2, 7-9, 13} to assess the relationship between malocclusion and oral health-related quality of life, and it is concerned with not only impairment, but also three functional status dimensions (social, psychological and physical) which represent four of the seven quality of life dimensions¹⁴

Nevertheless, some limitations should be discussed. The sample size was small due to time and cost factors, and as a result may not have shown a clear association because of the diversity of malocclusions in the population. Therefore, a larger sample may be required to endorse this research.

The subjects were only recruited from UMST, faculty of Dentistry. These were dental students themselves and may have had better access to dental care and more knowledge in the field of dentistry. Thus the results might not be generalizable to the population

of young Sudanese adults requiring orthodontic treatment.

Despite the interviewer's attempt to clarify that the responses of the subjects were confidential, it can't be ruled out that the responses were biased by a desire to give a positive feedback in relation to aesthetics as well as oral health-related quality of life.

VII. CONCLUSION

Orthodontic treatment needs alone doesn't impact the oral health related quality of life. However, this doesn't necessarily mean that it doesn't play a role in affecting the quality of life related to oral health. Many factors though individually minute, when coupled together can negatively impact an individual's quality of life.

Males generally showed a significantly higher OHIP scores in the handicap domain than females. They also showed higher scores in functional limitation, psychological discomfort, psychological disability, and physical disability than females. Females, on the other hand, had more impacts to oral health in terms of physical pain and social disability.

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