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Frequency of Angles Malocclusion, Psychological Effects in Patient Using Oasis Questionnaire and Treatment Needs in Patients Visiting Dental Teaching Hospital

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ABSTRACT

A person's psychological health and confidence are greatly influenced by their facial appearance. It encourages acceptance, integration, and social recognition. **Objective:** The objective of current study was to establish the frequency of Angle's malocclusion, assess its psychological impact using the OASIS questionnaire, and evaluate orthodontic treatment need using the Index of Orthodontic Treatment Need (IOTN) in patients visiting dental teaching hospital. **Methods:** Both gender patients between 14-20 years, fully erupted first molar from one arch to another were included while participants with a history of jaw injuries, experiencing orthodontic treatment, or had prior orthodontics treatment were not included in the current study. The Oral Aesthetic Subjective Impact Scale (OASIS), self-evaluation validated tool was used to determine perceived therapeutic requirements. Index of Orthodontic Treatment Need (IOTN) index was also reported. **Results:** Among the 350 people examined, 70% (245) were females and 30% (105) were males. The mean age was 17 years with S.D ± 1.26. 54 (15.4%) of the patients had normal dental occlusions, 175 (50%) had class I malocclusion, 99 (28.3%) had class II, and 22 (6.3%) had class III malocclusion. 202 (57.7%) of patients reported good psychological well-being about their dental looks, whereas 90 (25.7%) and 58 (16.6%) had satisfactory and poor psychological well-being respectively, based on sample size. **Conclusions:** This study showed a significant rate of malocclusion, with Class I being the most frequent. Psychological effects were obvious, as many patients expressed unhappiness with their oral look.

INTRODUCTION

A person's psychological health and confidence are greatly influenced by their facial appearance. It encourages acceptance, integration, and social recognition [1]. One important component of self-concept, encompassing universal, ability, emotional, intellectual, and physical characteristics, has been shown to be the self-perception of the dentofacial area. According to research, those who have fewer dental flaws are more socially adept, academically successful, and psychologically well [2]. "The mal relationship between arches in any plane or a condition characterized by anomalies in tooth position, number, form, and developmental position of teeth beyond normal limits" is the definition of malocclusion [3]. In addition to local variables including bad dental habits, tooth form, and

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location during development, it can be brought on by environmental or genetic causes [4].Treatments for malocclusion are commonly carried out during adolescence, when permanent teeth erupt [5].Facial attractiveness, especially aesthetic appearance, is crucial for social interaction.It affects work prospects, performance, personality attributes, and pairing success. Smile appeal and facial beauty appear to be closely related [6].People frequently concentrate on the eyes and mouth of the speaker during social encounters.People's opinions about how their teeth look, which are shaped by their surroundings and society, greatly affect whether they decide to have treatment.Enhancing the look of teeth is a crucial part of dental treatment to guarantee satisfaction [7].Malocclusion can further cause tooth cavities, temporomandibular joint disorders, and periodontal concerns [8].Amaral *et al.*, (2020) evaluated malocclusion and the need for orthodontic treatment in Indian youth aged 16-24 [9].Cross-sectional research involving 660 participants, including 300 females and 360 males, was conducted in rural regions.The Dental Aesthetic Index (DAI) was utilized in clinical studies to assess the population's overall need for orthodontic treatment.According to Hameed *et al.*, (2023), 79.8% of patients attending several OPD of Punjab dental colleges [10].

The objective of the current study was to establish the frequency of Angle's malocclusion, assess its psychological impact using the OASIS questionnaire, and evaluate orthodontic treatment need using the IOTN in patients visiting dental teaching hospital.

METHODS

From November 2023 to August 2024, a questionnaire-based descriptive cross-sectional study carried out on patients visiting Khyber Medical University-Institute of Dental Sciences Kohat's orthodontic department after approval for the research was received from the Institutional Review Board of Khyber Medical University-Institute of Dental Sciences Kohat (KIDS-IRBB/ECC/23-2/10). Sample size was estimated by using Epi-info software. Total calculated sample size was 350 (10% drop out was added). The sample size was calculated by the formula below: Population size: 1761 (average patient visited department in last 5 years), Confidence Limits: 95%, Expected Frequency: 50%, Sample required: 315 (Adding 10% = 350). The study included both gender patients aged 14-20 years with fully erupted first permanent molar from one arch to another while participants with a history of jaw injuries, experiencing orthodontic treatment, or had prior orthodontics treatment were not included in the current research study. A consecutive sampling method was adopted, with all eligible patients who visited the orthodontic department throughout the research period being included until the needed sample size was attained. This method reduces selection bias while providing a representative sample of the population. Written consent was taken from each participant who fulfilled the inclusion criteria. Participants' personal information, such as name, age, and gender, was noted. The dental surgeon used a mirror, WHO probe, and dental twizzer to do a complete oral examination. Angle's classification, overbite, overjet, crossbite and open bite were recorded using a self-made Performa. The Oral Aesthetic Subjective Impact Scale (OASIS) is a self-evaluation validated tool used to determine perceived therapeutic requirements [11]. It consists of five items that evaluate concerns about dental appearance, self-perception, and the negative effects of dental abnormalities on life and social relationships. Each question is rated on a Likert scale of 1 to 5. Patients were asked five questions and rated according to their responses. The total score was the totality of all five parts and varied between 5 and 25. A score of 5-10 was deemed good, 11-15 satisfactory, and 16-25 poor psychological well-being. The Index of Orthodontic Treatment Need (IOTN) ranks malocclusion based on the relevance of occlusal characteristics for oral health and aesthetics. The score comprises both an aesthetic and Dental Health Component (DHC), based on Swedish medical board recommendations. For several malocclusions, the Dental Health Component (DHC) of the IOTN index was specified. There are 3 levels of treatment need: "level 1 (no need), level 2 (little or no need for treatment), level 3 (borderline need), level 4 (definite need), and level 5 (severe need)" [12]. Prior to full-scale data collection, a pilot study of 20 participants was done to assess the reliability and validity of the data collecting tools in the local community. Cronbach's alpha was used to test the internal consistency of the OASIS questionnaire, a validated self-evaluation tool, and the result was 0.82, suggesting excellent reliability. Furthermore, test-retest reliability was examined by delivering the questionnaire again, two weeks apart, which revealed a significant Intraclass Correlation Coefficient (ICC) of 0.89. For the IOTN index's inter-examiner reliability was established by training two independent examiners to evaluate 20 random cases. The kappa statistic was used to assess agreement amongst examiners, and a result of 0.78 indicated significant agreement. These stages made sure that both instruments were properly tailored for the local community. Chi-square test (χ^2 test) of independence was used to assess whether there is a significant association between categorical variables. A Pearson correlation analysis was used to investigate the association between IOTN grades and OASIS scores. A simple linear regression model was also used, using the OASIS score as the dependent variable and IOTN grade as the independent variable. A Statistical Package for Social Sciences software (SPSS) version 29.0 was used to enter and proceed with the data using an IBM compatible computer.

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RESULTS

Among the 350 people examined, 70% (245) were females and 30% (105) were males. The mean age was 17 years with S.D +1.26. Furthermore, 59 (16.9%), 55 (15.7%), 40 (11.4%), 77 (22%), 54 (15.4), 29 (8.3%) and 36 (10.3) were 14, 15, 16, 17, 18, 19 and 20 years old respectively (Table 1).

Table 1: Age Distribution of Participants

Age	Gender		Total Frequency (%)
	Male Frequency (%)	Female Frequency (%)	
14	10 (9.5%)	49 (20%)	59 (16.9%)
15	16 (15.2%)	39 (16%)	55 (15.7%)
16	15 (14.3%)	25 (10.2%)	40 (11.4%)
17	33 (31.4%)	44 (18%)	77 (22%)
18	18 (17.2%)	36 (14.6%)	54 (15.4%)
19	07 (6.7%)	22 (9%)	29 (8.3%)
20	06 (5.7%)	30 (12.2%)	36 (10.3%)
Total	105 (100%)	245 (100%)	350 (100%)

Table 2 demonstrated that 54 (15.4%) of the patients had normal dental occlusions, 175 (50%) had class I malocclusion, 99 (28.3%) had class II, and 22 (6.3%) had class III malocclusion. Overjet increased in 56 (16%) cases & reduced in 39 (11.1%). Overbite was increased in 91 (26%) cases and decreased in 29 (8.3%). In 91 (26%) cases, there was an open bite. The prevalence of Normal Occlusion was 15.4% (95% CI: 11.6% – 19.2%), while Class I malocclusion was 50.0% (95% CI: 44.8% – 55.2%). Class II and Class III malocclusions had prevalence rates of 28.3% (95% CI: 23.6% – 33.0%) and 6.3% (95% CI: 3.7% – 8.8%), respectively.

Table 2: Distribution of Different Occlusal Characteristics

Variables	Class	Frequency (%)	95% Confidence Interval (CI)	p-Value
Angle Class	Normal Occlusion	54 (15.4%)	11.6% – 19.2%	0.010*
	Class I	175 (50%)	44.8% – 55.2%	
	Class II	99 (28.3%)	23.6% – 33.0%	
	Class III	22 (6.3%)	3.7% – 8.8%	
Overjet	Normal	255 (72.9%)	68.2% – 77.5%	0.030*
	Excessive	56 (16%)	12.2% – 19.8%	
	Reduced	39 (11.1%)	7.8% – 14.4%	
Open Bite	Present	91 (26%)	21.4% – 30.6%	0.050
	Absent	259 (74%)	69.4% – 78.6%	
Overbite	Normal	230 (65.7%)	60.7% – 70.7%	0.020*
	Excessive	91 (26%)	21.4% – 30.6%	
	Reduced	29 (8.3%)	5.4% – 11.2%	

*Statistically Significant

Table 3: Oral Aesthetic Subjective Impact Scale (OASIS) Distribution by Gender

Gender	OASIS Categories			Total Frequency (%)
	Good Frequency (%)	Satisfactory Frequency (%)	Poor Frequency (%)	
Male	59 (56.2%)	29 (27.6%)	29 (27.6%)	105 (100%)
Female	143 (58.4%)	61 (24.9%)	61 (24.9%)	245 (100%)
Total	202 (57.7%)	90 (25.7%)	90 (25.7%)	350 (100%)

DHC grade I and II (little or no need for treatment) was noted in 200, grade III (borderline need), in 88 and grade IV (definite need) and grade V in 62 (severe need)" subjects respectively (Table 4). P value was found as 0.050 which suggests that the difference in IOTN scores between males and females is marginally significant but not strongly conclusive.

Table 4: Index of Orthodontic Treatment Need Score for Dental Health Components

DHC Score	Gender		Total Frequency (%)	p-Value
	Male Frequency (%)	Female Frequency (%)		
Grade I and II	55 (27.5%)	145 (72.5%)	200 (57.1%)	0.050
Grade III	35 (39.8%)	53 (60.2%)	88 (25.1%)	
Grade IV and V	15 (24.2%)	47 (75.8%)	62 (17.8%)	

A Pearson correlation analysis was used to investigate the association between malocclusion severity (IOTN grades) and psychological distress (OASIS scores). The study found a moderate negative connection ($r = -0.42$, $p < 0.001$), indicating that as malocclusion severity increases, psychological well-being worsens. A simple linear regression model was used, using the OASIS score as the dependent variable and IOTN grade as the independent variable. The model was statistically significant ($p < 0.001$) and explained 18% of the variance ($R^2 = 0.18$) in psychological distress. The regression coefficient ($\beta = -0.38$) shows that for every one-unit increase in IOTN grade, the OASIS score decreases by 0.38 points, indicating that severe malocclusion is associated with greater psychological distress (Table 5).

Table 5: Correlation and Regression Analysis Results

Analysis	Variables	Coefficient	p-Value
Pearson Correlation	IOTN Grade vs OASIS Score	-0.42 (r)	< 0.001
Linear Regression	IOTN Grade OASIS Score	-0.38 (β)	< 0.001
Model Fit	R2 Value	0.18	-

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DISCUSSION

In this current study, 296 (84.6%) of 350 individuals exhibited some kind of malocclusion, which is similar to the conclusions of Hameed *et al.*, in (2023), 79.8% who detected malocclusion in 79.8% of their sample size [10]. Comparably, Mangat, in (2020) performed an investigation in Republic of Hungary of 483 participant's between16-18 years and discovered a 71% prevalence of malocclusion in his sample size [13].Similarly, Prameswari (2021) did research on deafened children and reported a frequency of 69.5%, which is consistent with these findings [14].Alyami *et al.*, in (2023) did research on 502 Najran students and discovered an occurrence of 78%, which is consistent with this study [15].The frequency of class I malocclusion was 175 (50%), like to previous research carried out in Iran (49.1%), (51.5%) in Afghanistan and Pakistan (47.1%)[16-18]. Class III malocclusion 22 (6.3%) in the current study was found to be similar to that established in Saudi Arabia (6.52%) [15], Pakistan (8%) and (11%), and Turkey (10%) Overjet was found to be normal in 255 (72.9%), increased in 56 (16%), and reduced in 39 (11.1%) [15, 18-20].These findings were identical to those reported by Londono (2023) and Nath *et al.*, in (2024) [21, 22]. Overbite was seen in 91 (26%) of the patients, comparable to studies by Abraham *et al.*, in (2024) (29.1%) and Chunduru *et al.*, in (2024) (29%), but much lower than that identified in Mylonopoulou *et al.*, in (2021) 16.7% [23-25]. Self-evaluated dental appearance is gaining popularity due to its potential influence on dental treatment and patient-centred care delivery.In this study, 202 (57.7%) of subjects reported a positive psychological response to their dental appearance, which is consistent with findings by Meng *et al.*, between a different sample of adults in Florida and Khan *et al* [26, 27]. The statistical analyses performed in this study give important insights into the association between malocclusion severity, psychological effect, and orthodontic treatment requirement.The Pearson correlation analysis showed a substantial negative association ($r = -0.42$, $p < 0.001$) between IOTN grades and OASIS scores, indicating that as malocclusion severity grows, so does psychological distress.These findings are consistent with studies conducted by Meng *et al.*, in (2007) and Hamamci *et al.*, (2009), who discovered that patients with severe malocclusions expressed increased unhappiness with their dental appearance [26, 28].The Chi-square test revealed significant relationships between malocclusion severity and psychological discomfort ($p = 0.010$), supporting the premise that orthodontic treatment is not only clinically necessary but also critical for mental health. This is congruent with studies done by Alyami *et al.*, in (2023) [15] and Tariq *et al.*, (2024) [18], where patients with higher orthodontic treatment requirements (IOTN grade IV and V) indicated more unhappiness with their facial aesthetics [15, 18].The IOTN includes a DHC component, which, like all standardizing indices, can vary over time to indicate developmental modifications and is henceforth rather reliable.The National Health Services in the United Kingdom frequently employs the IOTN to identify persons whose occlusions characteristics are deemed eligible for resource investing.The present study aimed to determine if the subjects under observation required orthodontic care for malocclusion.DHC grade I and II (little or no need for treatment) was noted in 200, grade III (borderline need), in 88 and grade IV (definite need and V in 62 (severe need) subjects respectively in the current study which was similar to Amaral *et al.*, (2020) who evaluated a total of 215 students aged between 15 and 19 years and asked to respond to a questionnaire concerning their perception of need for orthodontic treatment and their satisfaction with their own esthetics and mastication [9]. Furthermore, the simple linear regression model ($R^2 = 0.18$, $\beta = -0.38$, $p < 0.001$) supports the predicted link between malocclusion severity and psychological impact. While previous research has mostly focused on prevalence, these findings highlight the relevance of incorporating psychological stress when choosing treatment priorities. Future research should look at the long-term psychological effects of orthodontic therapy to help confirm these findings.

CONCLUSIONS

This study showed a significant rate of malocclusion, with Class I being the most frequent. Psychological effects were obvious, as many patients expressed unhappiness with their oral look.The IOTN examination revealed a considerable need for orthodontic treatment.Early intervention and improved awareness are critical for promoting dental health and psychological well-being.

Authors Contribution

Conceptualization: AK, SA
Methodology: AK, AM
Formal analysis: SS, KNA
Writing, review and editing: SR, FG, SS, HA, SA

All authors have read and agreed to the published version of the manuscript

Conflicts of Interest

All the authors declare no conflict of interest.

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