
**“ASSESSING THE NEED FOR ORTHODONTIC
TREATMENT USING IOTN AND IMPACT OF
MALOCCLUSION ON SELF ESTEEM OF
ADOLESCENTS IN SCHOOL OF BELAGAVI
CITY: A CROSS SECTIONAL STUDY”**

By
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Dissertation

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KAHER, Belagavi, Karnataka
In partial fulfilment of the requirements for the degree of*

**MASTERS OF DENTAL SURGERY
IN
ORTHODONTICS AND DENTOFACIAL ORTHOPAEDICS
(BRANCH – V)**

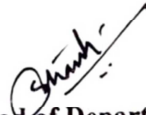
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ABSTRACT

Introduction: Malocclusion can be defined as irregularity of the teeth or malalignment of the dental arches that extends beyond what is deemed as normal. One of the main reasons why individuals undergo orthodontic treatment is to achieve a pleasing smile which will increase facial aesthetics. During the period of adolescence, there are various changes occurring within children both physically and emotionally. Self-Esteem is the total assessment of oneself. Self-concept is a term used to refer to how someone thinks about themselves, how they perceive, evaluate and judge themselves. It can be noticed that individuals who have misaligned teeth, frequently feel self-conscious about their smiles. Malocclusion affects children's and adolescents' psychological growth, which in turn affects their sense of themselves and their ability to fit in with society. Hence it becomes important to note the affect of malocclusion on adolescent's self-worth and how they perceive themselves.

The purpose of this research was to determine how malocclusion can impact the self-esteem of adolescents of Belagavi city, Karnataka and assessing the severity of their malocclusion requiring the need for orthodontic treatment.

Materials and methods: A total of 310 adolescents aged 14-18 years were included to be a part of this study meeting the inclusion and exclusion criteria. The adolescents were asked to fill two questionnaires corresponding to Global Negative Self Esteem scale and Self-Perceived Aesthetics Questionnaire. Along with that the examiner assessed the Malocclusion of the youngsters with the IOTN, in school premises under natural lighting.

Results: The Dental Health Component of IOTN determined that the majority of the children had a borderline need for therapy. A noteworthy amount of population had

negative self-evaluations corresponding to lower self-esteem. The Self-Perceived Aesthetics Questionnaire revealed that children who felt more need of orthodontic treatment also believed that their malocclusion made them less successful, less popular, and more likely to be teased by their peers. The comparative evaluations between malocclusion, self-esteem and self-perceived aesthetics showed that children who had greater normative need for treatment had lower self-esteem as well as lower perceived treatment need and aesthetics.

Conclusion: There was a remarkable correlation between malocclusion and self-esteem of adolescents. The self-believed treatment need and aesthetics were also altered. Therefore, the negative psychological effects of having unattractive teeth should not be disregarded.

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INTRODUCTION

Malocclusion is a problem affecting individuals globally and to various degrees. According to Dental Practice board, the term ‘Malocclusion’ is defined as “an abnormal occlusion in which teeth are not in normal position in relation to adjacent teeth in the same jaw and/or in the opposite arch when the mouth is closed.”

It is described by Orthodontists as an appreciable deviation from ideal occlusion.

The **American Psychological Association** defines Self Esteem as “the degree to which the qualities and characteristics contained in one’s self-concept are perceived to be positive. It reflects a person’s physical self-image, view of their accomplishments and capabilities, and values and perceived success in living up to them, as well as the ways in which others view and respond to that person.” ⁽¹⁾. Adolescence is recognised as a time of unstable psychological and developmental processes. Both the bodily growth and marked changes in social roles occur during this time, while the exact timing of these developmental processes greatly varies depending on the individual and the surrounding environment ⁽²⁾.

Greater degree of self-esteem has been seen to correspond with certain factors of life like success in job front, academic achievement, interpersonal harmony, and general merriment ⁽²⁷⁾. During the period of adolescence, there are various changes occurring within children both physically and emotionally. Studies have shown that levels of self-esteem decreased during adolescence ⁽²⁵⁾. According to a study done by Anderson et al, 26% teens said that social media sites make them feel bad about themselves and their lives ⁽⁴⁾. Aesthetics and acceptance of peers becomes an important aspect of their life.

It can be noticed that individuals who have misaligned teeth, frequently feel self-conscious about their smiles. They may hide their smiles or steer clear of social situations as a result of feeling self-conscious and anxious about the way their teeth look all the time.

This may aggravate the negative self-perception, making it more difficult for the person to engage with others with confidence or to feel good about themselves. Correcting these malocclusions with orthodontic treatment can greatly boost dental health and appearance, resulting in more self-esteem and a more dazzling, self-assured smile. Therefore, malocclusion affects children's and adolescents' psychological growth, which in turn affects their sense of themselves and their ability to fit in with society ⁽³⁾.

In order to assess the severity of the malocclusion and the need of treatment, several indices have been developed. These help the orthodontists to segregate and classify varying degrees of malocclusion. One such index that is used is the Index of Treatment Needs (IOTN), developed by Brook and Shaw (1989) and then modified and refined by Richmond (1990) ⁽²⁹⁾. This index utilizes individual's occlusal traits for identifying their dental health using Dental Health Component (DHC) and perceived aesthetics of an individual using the Aesthetic Component (AC). IOTN is a relatively easy index to learn and helps in mass epidemiological surveys because of ease of testing and reproducibility.

Thus, the current study was aimed at determining how malocclusion can impact the self-esteem of adolescents of Belagavi city, Karnataka and assessing the severity of their malocclusion requiring the need for orthodontic treatment.

AIM AND OBJECTIVES

AIM:

To assess the orthodontic treatment needs of the adolescents and to assess if there was a correlation between the severity of malocclusion and self-esteem in adolescents.

OBJECTIVES:

- To assess the orthodontic treatment needs using IOTN in adolescents.
- To assess self-esteem in adolescents
- To assess if there was a correlation between the severity of malocclusion and self-esteem in adolescents.

RESEARCH HYPOTHESIS:

Null Hypothesis- There is no correlation between the severity of malocclusion and self-esteem in adolescents.

REVIEW OF LITERATURE

Serene Adnan Badran (2010) ⁽³⁾- The goals of this study were to determine the relationship between self-perceived aesthetics, self-perceived orthodontic treatment need, and self-esteem; the impact of perceived social implications of malocclusion and dental appearance satisfaction on these relationships; the relationship among self-perceived aesthetics and need and self-esteem; and the relationship in between receiving orthodontic treatment and self-esteem. This was their finding:

- The study's findings demonstrated a substantial relationship between the teenagers' self-perceived oral aesthetics as determined by their AC scores and their self-perceived need for treatment. Examiner's DHC and AC of IOTN indicate a correlation between normative orthodontic treatment need and self-perceived need for treatment.

Min-Ho Jung (2010) ⁽⁶⁾- This study had the objective to assess the effects of orthodontic treatment and malocclusion on teenagers' self-esteem. Dental crowding was clinically examined in 4509 middle school children. Additionally, lip protrusion was measured using a ruler that was particularly made. The degree of self-esteem of each participant was ascertained employing the Rosenberg's self-esteem measure. These were their findings:

- The results of the study revealed that there was a connection between malocclusion and self-esteem that was influenced by sex. The self-esteem of the girls had been significantly affected by crowding of the anterior teeth, whereas the boys' self-esteem did not significantly differ. The girls' self-esteem was higher following fixed orthodontic treatment than it was in the group with untreated malocclusion. Students

with crowding or protrusion had lower sense of self-worth than girls with an ideal profile and appropriate dental alignment.

- The study concluded that this clinical investigation demonstrated how adolescent girls' self-esteem can be altered by malocclusion and fixed orthodontic treatment.

Evelyne De Baets et al (2011) ⁽⁷⁾- The study set out to determine whether orthodontic treatment need and children's overall health-related quality of life are related, and if so, how much self-esteem influences these relationships. Examining any links between the requirement for orthodontic treatment and OHRQoL was the primary goal. Examining whether SE modifies the degree of the association between treatment need and Oral Health Related Quality of Life (OHRQoL) was the second goal. 223 adolescents between the ages of 11 and 16 participated in this cross-sectional study (113 boys and 110 girls). These were their findings:

- Both the need for orthodontic treatment and OHRQoL, as well as self-esteem and OHRQoL, were significantly correlated.
- There is not any proof that self-esteem influences the connection between treatment need and OHRQoL.

Patricia R. dos Santos et al (2017) ⁽⁸⁾- The intent of this study was to gauge how orthodontic treatment needs related to quality of life, self-esteem, and self-perception relate to normative and perceived needs. The sample consisted of 248, 12-year-old adolescents. The Dental Health Component and the Aesthetic Component of the Index of Orthodontic therapy analysed the normative aspect of orthodontic therapy. The individuals' self-perception of oral aesthetics, self-esteem, and quality of life as it relates to oral health were also assessed. The response variable in the present case

scenario was the Aesthetic Component of the Index of Orthodontic Treatment Need.

These were their findings:

- The model found a statistically significant relationship between self-perception, self-esteem and the perceived need for therapy. The outcome variable and the normative need had a substantial association that was unaffected by the independent variables.
- Perceived need did not overstate the normative need for orthodontic treatment, nor did it take sex or the impact on quality of life into play.

Anshika Sharma et al (2017) ⁽⁹⁾- The aim of this research investigation was to examine whether there was a correlation between the impact on adolescents' self-esteem and the objective and subjective assessment of their orthodontic treatment needs. In this cross-sectional study, 1140 youngsters residing in Sri Ganganagar, Rajasthan, India, between the ages of 10 and 17 were involved. The standard and self-perceived needs for orthodontic treatment were ascertained, respectively, by the means of the objective index of orthodontic treatment need (IOTN), the subjective aesthetic component (AC), and the dental health component (DHC). Dental caries, tooth loss, and trauma were further assessed in the chosen students. The self-esteem level was estimated using the Rosenberg Self-Esteem Scale. These were their findings:

- The study's findings suggested that teenager's self-esteem is strongly correlated with both DHC and AC, albeit with a more significant correlation for DHC than for AC. These results suggest that the psychological effects of having an unappealing smile shouldn't be disregarded.

N A Mandall et al (2000) ⁽¹⁰⁾- The key goals of this investigation were to assess: (i) the manner in which the gender, social deprivation, and ethnicity affected orthodontic treatment needs and use; (ii) the manner in which these factors shaped oral aesthetic impact of malocclusion and self-perceived need for orthodontic treatment; (iii) the manner in which these factors affected perceived oral aesthetic impact of malocclusion and perceived need and desire for orthodontic treatment; and (iv) to what extent orthodontic treatment experience affected perceived oral aesthetic impact of malocclusion. Index of Orthodontic Treatment Need (IOTN) was used to calculate the Normative orthodontic treatment need. These were their findings:

- When compared to their peers who had less clinical requirement for orthodontic treatment, children who had a higher need for treatment felt worse about themselves.
- A greater (i.e., significantly negative) aesthetic impact (OASIS) score was observed in children who were more socially deprived or who had high IOTN aesthetic component (AC) scores.
- When compared it was seen that Asians had higher IOTN dental health component (DHC) scores than Caucasians. Females had higher IOTN dental health component (DHC) scores and more esthetic appearance than men.
- Children from economically disadvantaged backgrounds were less likely to have had orthodontic treatment.
- Children without orthodontic treatment demonstrated higher scores on the IOTN AC and OASIS.

Carlos Bellot-Arcís et al (2013) ⁽¹²⁾- The study set out to examine the psychological implications of malocclusion, verify the correlation between the severity of malocclusion and its psychosocial impact, and evaluate the impact of gender and socioeconomic rank in teenagers. An arbitrary sample of 627 Spanish teenagers aged 12 - 15 years was taken. Using a self-rated Psychosocial Impact of Dental Aesthetics Questionnaire (PIDAQ), psychosocial impact was assessed. The Index of Orthodontic Treatment Need (IOTN) was used to gauge the degree of malocclusion. Additionally socioeconomic class and gender were noted. These were the findings:

- Adolescents who experience malocclusion suffer more psychosocial effects, and these effects worsen as the malocclusion gets worse.
- Although social class may not have an impact on this association, girls appear to be more affected psychologically.

Philip E Benson et al (2014) ⁽¹³⁾- The goal of the study included examining the correlations throughout time between young people's oral appearance, personal traits, and surroundings and overall health and well-being. The study included 374 adolescents aged between 11-12 years. The participants answered questions about their self-esteem and Oral Health Related Quality of Life (OHQoL). Clinical and self-evaluated normative measures of need (IOTN) and dental caries were assessed as part of a clinical examination. SES, or socioeconomic status, was indicated using the Index of Multiple Deprivation. These were their findings:

- This study discovered that there was an inconsistent cross-sectional link at baseline but there was no longitudinal link between the influence of malocclusion on OHQoL and the aesthetic component of the IOTN score. Furthermore, the correlation between OHQoL and self-esteem was more constant.

Srichitra Vulugundam et al (2021) ⁽¹⁴⁾- The goal of this investigation was to assess the connection between British adolescents' self-esteem fluctuations and their history of orthodontic treatment. 2600 children ranging from 10 to 16 years of age were include in the study. The relationship between the past orthodontic treatment history and the six-year variations in the Lawrence Self-Esteem Questionnaire (LAWSEQ) score was examined. These were their findings:

- The six-year longitudinal study found no proof and did not support the hypothesis that changes in British adolescents' self-esteem are related to orthodontic treatment history.

Ceib Phillips et al (2009) ⁽¹⁵⁾- The purpose of this research was to investigate, in teenagers with mild to moderate malocclusion, the association between self-perception and facial beauty, self-perception of malocclusion, and a clinical assessment of malocclusion. Participation was consented by the 59 consecutive patients, ages 9 to 15, who were scheduled for initial records in a graduate orthodontic clinic. The Facial Image Scale, the Multidimensional Self-Concept Scale (MSCS), and the Index of Treatment Need–Aesthetic Component (IOTN-AC) were completed independently by each participant. The diagnostic dental casts of the patients were used to assess their Peer Assessment Rating (PAR) ratings. These were their findings:

- There is a stronger association between self-concept and the self-perceived level of attractiveness or "positive" feelings with regards to the dentofacial region than there is between the severity of the malocclusion as shown by the PAR score or the adolescent's condemnation of their malocclusion.

M. Zhang et al (2006) ⁽¹⁷⁾- The objective of this investigation was to examine the research on how malocclusion and its treatment affect people's mental, physical, and social well-being. For the purpose of determining the effect of malocclusion and its treatment on quality of life, English-language publications, including reviews and meta-analyses, cross-sectional studies, retrospective and prospective longitudinal studies, randomised controlled trials, and reviews, were screened. These were their findings:

- Malocclusion and its treatment are said to have a profound effect on how one views himself in terms of psychological health. Social acceptance, intellectual perception, and how others view oneself can all be impacted by malocclusion and how it is treated.

Ahmad M Hamdan (2004) ⁽¹⁹⁾- Comparing patient, parent, and clinician perceptions of orthodontic treatment needs to normative/standard orthodontic treatment needs as determined by the Index of Orthodontic Treatment Need (IOTN) was the goal of the current study. 103 patients participated in the study with the mean age of 15.3 years. A physician used the IOTN to rate the patients' standard orthodontic treatment requirement. A 10-cm visual analogue scale (VAS) was then used to determine the patients' felt need. After that, the participants evaluated their own perceived need and aesthetic component (AC) score, and the parents did likewise for their children. These were their findings:

- The study has demonstrated that opinions about the significance of orthodontic treatment are complex and influenced by factors other than aesthetic preferences and health-related assessments of the need for orthodontic therapy.

- These factors can include socio-economic status, perception of an individual regarding psychology and its benefits as well as approach and will towards orthodontic appliances.
- The patients do not have the same extent of perceived need as the dental physician or orthodontist.

Shoroog Agou et al (2011) ⁽³²⁾. The objective of this investigation was to evaluate Oral Health Related Quality of Life (OHRQOL) in orthodontics while taking into consideration, the personal psychological traits. One hundred eighteen teens, aged eleven to fourteen, seeking treatment at the University of Toronto orthodontic clinics (74 receiving treatment, 44 on the waiting list) took part in this study. Using the dental aesthetic index, occlusal alterations were evaluated. To take age-related effects into account, a waiting-list comparison group was employed.

The following were the findings of the study:

- The study's findings are consistent with the idea that personal well-being {PWB}, plays an influencing part in assessing OHRQOL outcomes in adolescents receiving orthodontic therapy.
- Regardless of whether they are receiving orthodontic treatment, children with improved PWB are more likely to have greater OHRQOL.
- In comparison to those who got treatment, children who did not undergo orthodontic treatment had decreased PWB and, in turn had a worse OHRQOL.
- This implies that orthodontic therapy may be advantageous for kids with low PWB.

C. M. de Oliveira et al (2003) ⁽³³⁾- The aim of this investigation was to determine whether Brazilian adolescents had reduced impact on their oral health-related quality of life after the completion of orthodontic treatment. In Bauru-SP, Brazil, both public and private secondary schools participated in the study and 1675 teenagers between the ages of 15 and 16 were chosen at random. The Index of Orthodontic Treatment Need (IOTN) was used to conduct a clinical examination of adolescents. The Oral Impacts on Daily Performance (OIDP) and the shorter Oral Health Impacts Profile (OHIP-14) were the two oral health-related quality of life measures used to evaluate the impacts on teenagers' oral health. In the data analysis, multiple logistic regression was employed.

The following were the results of the study:

- The dental health of adolescents who had undergone orthodontic treatment was less affected than that of the other two groups.
- Children who had completed orthodontic treatment were 1.43 times more likely than teenagers who had never had therapy, or 1.85 times less likely than adolescents undergoing treatment, to experience an influence from their oral health on their daily lives.
- Teens who had finished their orthodontic treatment described a higher quality of life related to their oral health than those who were still receiving treatment or had never received it.

Judith E. N. Albino et al (1994) ⁽³⁴⁾- This study assessed the psychosocial impacts of orthodontic treatment for aesthetic impairment using a randomised control group method. A total of 93 individuals, aged between 11 and 14 years, with mild to

moderate malocclusions, were randomised to either have orthodontic treatment right away or after acting as delayed controls. Before therapy, during treatment, and three times following treatment completion—the final time taking place a year after termination—a series of psychological and social assessments was conducted. These were the findings of the study:

- The findings reveal that orthodontic therapy significantly improves teenager's opinions of their own oral facial attractiveness.
- Treatment had no effect on subject's self-esteem or their parent and self-reported social competency or social objectives, but it did significantly improve parent, peer, and self-assessments of dental-facial attractiveness.

MATERIALS AND METHODS

The present study was conducted to assess the orthodontic treatment needs of the adolescents using IOTN and to assess if there is a correlation between the severity of malocclusion and self-esteem in adolescents.

STUDY DESIGN: This study was a cross-sectional study

SOURCE OF DATA: Data was collected from adolescents studying in government and private schools in Belagavi City aged 14-18 years.

METHOD OF DATA COLLECTION: Belagavi City was divided into four zones and adolescent's were screened for the following criteria:

INCLUSION CRITERIA:

- Students aged 14-18 years
- Students without past history of orthodontic treatment
- Students with complete permanent dentition (except for 3rd molars)

EXCLUSION CRITERIA:

- Students having previous history of orthodontic treatment
- Students having mixed dentition
- Students having craniofacial abnormality

SAMPLE SIZE ESTIMATION: Sample size taken at 95% Confidence Interval, 10% Allowable Error and 10% Attrition.

$$N = \frac{z_{1-\alpha}^2 \times pq}{(d)^2} \times 1.1$$

Where $d^2 = 10\%$ of p

$$N = \frac{1.96^2 \times 57.7 \times (100 - 57.7)}{(0.10 \times 57.7)^2} \times 1.1$$

N= 310

SAMPLING TECHNIQUE: Cluster Sampling Technique

MATERIALS:

- Patient information sheet
- Consent/Assent form

ARMAMENTARIUM:

- **SELF PERCEIVED AESTHETICS AND SELF-ESTEEM TEST**
 - QUESTIONNAIRE TO ASSESS SELF PERCEIVED AESTHETICS AND SELF ESTEEM
- **MALOCCLUSION TESTS/INDEX**
 - DENTAL HEALTH COMPONENT (DHC) AND AESTHETIC COMPONENT (AC) OF INDEX OF ORTHODONTIC TREATMENT NEEDS (IOTN)

PERMISSIONS: Before the start of the study, ethical approval was obtained from the Institutional Ethics Committee of KLE Academy of Higher Education and Research, KLE University's VK Institute of Dental Sciences, Belagavi. (ANNEXURE-I)

Permission to conduct the study was obtained from the schools and written informed assent/consent was obtained from the students. (ANNEXURES-IV, ANNEXURES-V, ANNEXURES-VI, ANNEXURE-VII)

TRAINING AND CALIBRATION OF THE INVESTIGATOR: Before conducting the study, the investigator was trained to record the Index of Treatment Needs under the supervision of the guide in the Department of Orthodontics, KLE VK Institute of Dental Sciences, Belagavi.

DATA COLLECTION PROCEDURE: The investigator went to schools, explained the study procedure to the school authorities, and obtained the permission. On a pre-determined date, the investigator went to the schools and performed the following procedure.

1. Investigator- Selected schools, did the screening, got questionnaires answered and recorded the malocclusion.
2. Statistician- Performed the data analysis

Index used: The Index of Orthodontic Treatment Needs-IOTN was used to assess the severity of malocclusion.

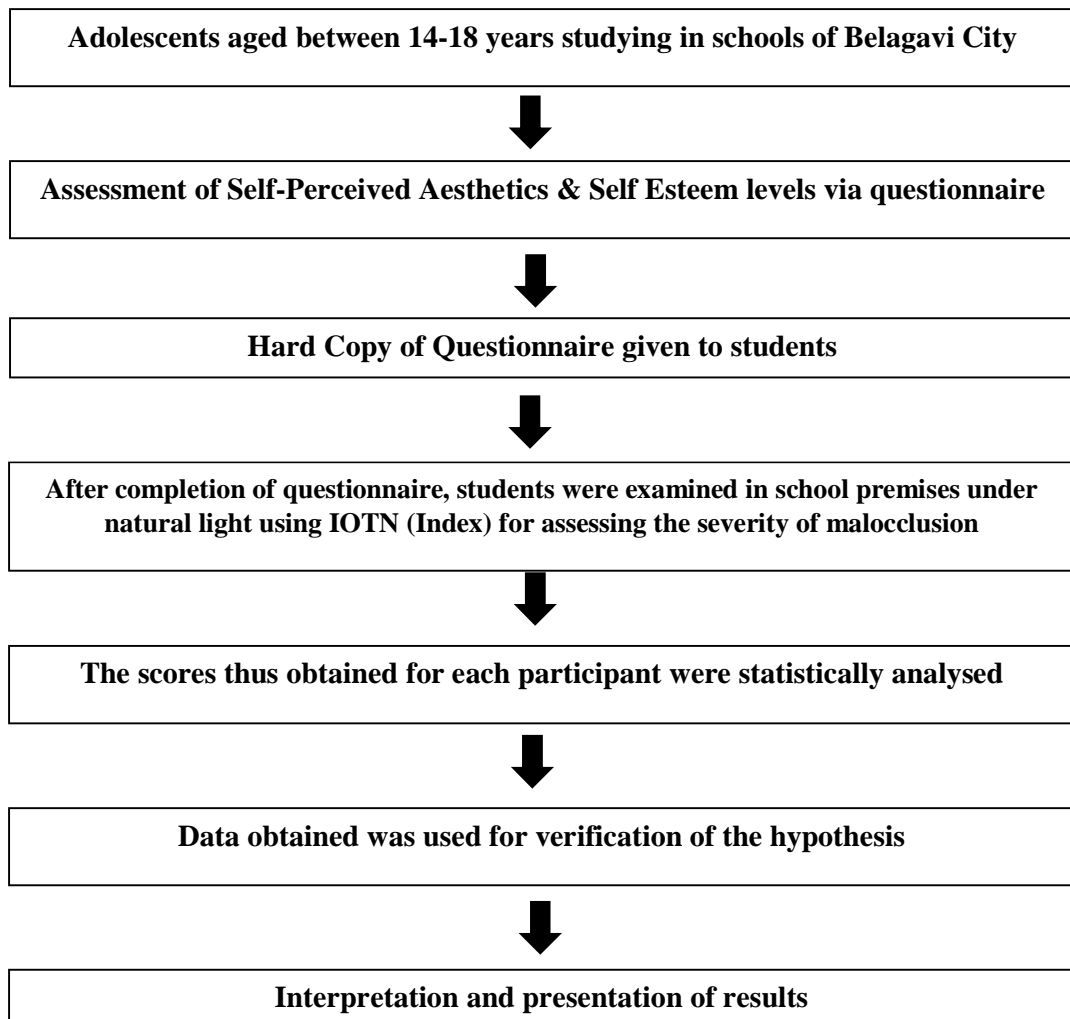
Questionnaires used: The Global Negative Self-Esteem scale and Self-Perceived Aesthetics questionnaire was used to assess self-esteem and self-perceived aesthetics of adolescents.

Index Description: The IOTN is used to assess the severity of malocclusion in population. It is divided into two components- The Dental Health Component (DHC) and The Aesthetic Component (AC). Grades are given in each component corresponding to the seriousness of malocclusion. Grades range from no need of

treatment, little/borderline need for treatment, moderate need for treatment, and severe need for treatment.

Oral Health Education: After the examination, the teachers and students were informed about Orthodontics as a treatment option. A referral card was distributed to participants. An oral health talk was given to students as well as the teachers regarding maintenance of good oral hygiene and importance of oral health.

METHODOLOGY:



DETAILS OF THE PROCEDURES TO BE CONDUCTED DURING THE RESEARCH:

- Government and Private Schools were selected for Sample Collection.
- Students Aged 14-18 years, studying from Class 9th to Class 12th were selected in the study.
- Students meeting the inclusion criteria were selected in the study.
- Each Head of the school were contacted to obtain approval to examine the students.
- Consent forms were obtained from the Parents/Guardians or the Students (18 years) and assent forms were obtained from Students aged 14- 17 years.
- Students who consented were given a questionnaire to assess their Self-Perceived Need, Satisfaction with Appearance, Social Impact of Malocclusion and Self-Esteem.
- After completing the questionnaire, each student was shown 10 photographs of the Aesthetic Component (AC) of the Index of Orthodontic Treatment Needs (IOTN) and asked to select the photograph which best represented the attractiveness of his/her dental appearance. This measured their self-perceived aesthetics.
- Then students who consented were clinically examined for Dental Health Component (DHC) of IOTN to assess their severity of malocclusion.
- Students were examined in the school premises under natural light by the examiner.
- The scores and data obtained for each student were statistically analyzed.
- The data thus obtained were used for verification of the hypothesis.
- Interpretation and presentation of the results were done.

STATISTICAL TEST:

- Chi-Square Test
- Linear Regression Analysis
- Spearman Correlation Coefficient
- Descriptive Statistics

STATISTICAL ANALYSIS

Method of statistical analysis –

- Data obtained was entered and sorted in Microsoft Excel (v.2013).
- Statistical analysis was performed using Statistical package for social sciences (SPSS) software (IBM Corp) (v.21.0).
- Descriptive and inferential statistics was performed for all the different parameters assessed in the study.
- Data normality test was performed to determine normal distribution of the data.
- Pearson's correlation coefficient test was performed to assess significant correlation between the different components of IOTN and different questions of the scales
- Linear regression analysis was to assess significant differences between many dependent variables of the scales and independent variables like gender, age etc.
- Chi-square test of association was performed to assess significant relationship between the demographic details, different components of IOTN and different questions of the scales
- All statistical tests were performed at 95% confidence intervals.
- A p value of less than 0.05 was considered as statistically significant in the study.

RESULTS

The study was conducted to assess the self-esteem levels in adolescents due to the presence of malocclusion, in schools of Belagavi City. The purpose of this research study was to assess if there is a correlation between the severity of malocclusion and self-esteem in adolescents. Total 310 adolescents were asked to participate in the study. Age group of 14-18 years was considered for the study. The adolescents were asked to fill out two questionnaires, i.e. Global Negative Self Esteem Scale and Self Perceived Aesthetic scale. IOTN of the students was assessed by the examiner within the school premises in natural light.

The following graphs and tables convey the results of the study. These graphs and tables correspond to the descriptive and inferential statistics along with correlations and regressions performed for this study. All statistical tests were performed at 95% confidence intervals. A p value of less than 0.05 was considered as statistically significant in the study.

TABLES and GRAPHS

Table 1 –Frequency distribution of the study participants according to Gender

Gender	Frequency (n)	Percent (%)
Male	150	48.4
Female	160	51.6
Total	310	100.0

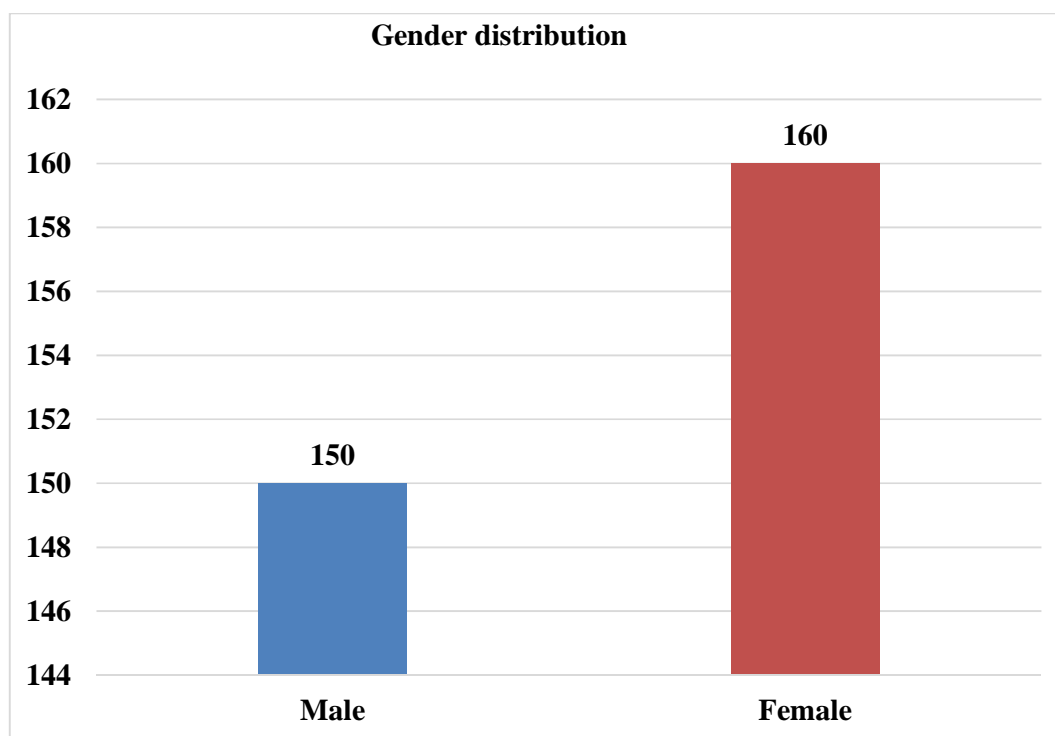
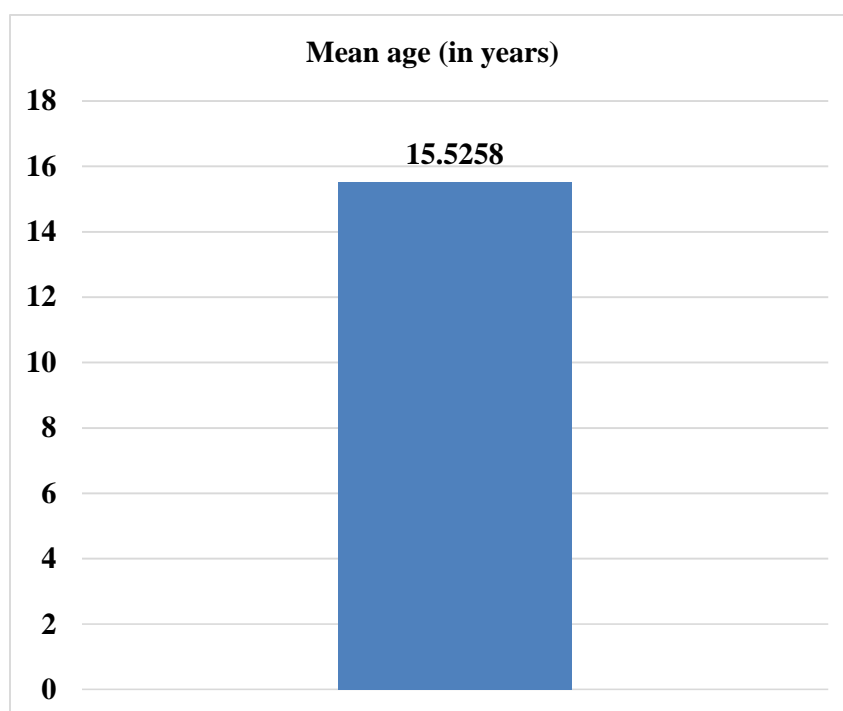


Table 2 – Descriptive statistics of Age of the study participants

	N	Minimum	Maximum	Mean	Std. Deviation
Age (in years)	310	14.00	18.00	15.5258	1.11084



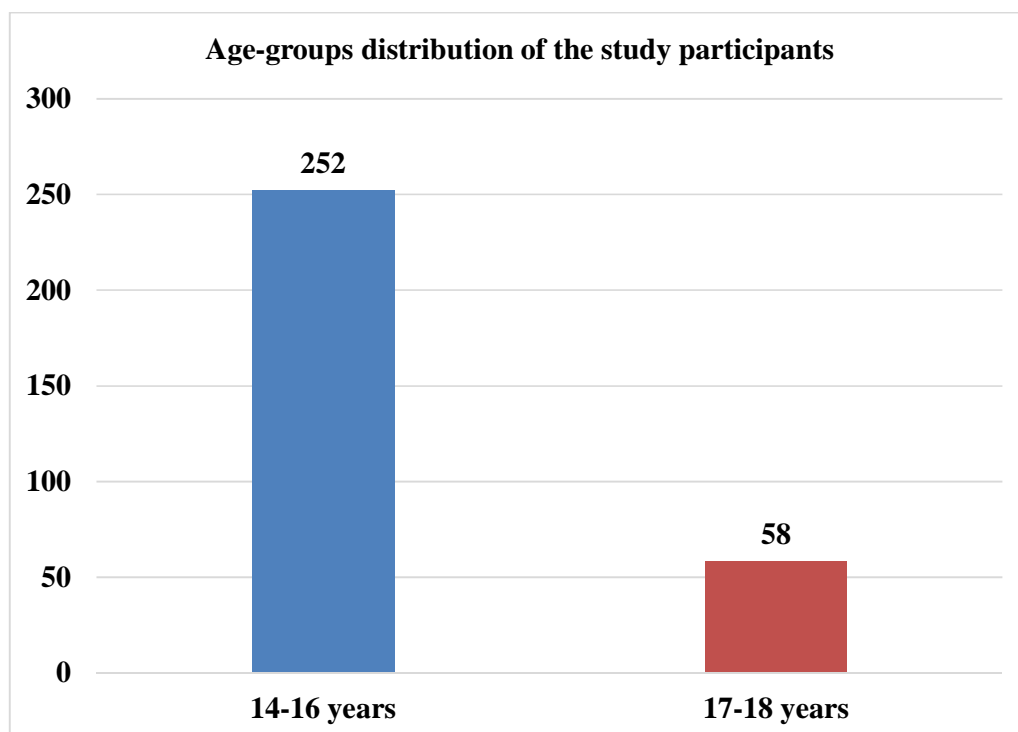


Table 3– Frequency distribution of the study participants according to different questions (Q1-Q6) of Global self-esteem scale

Q1. At times I feel I'm no good at all		Frequency (n)	Percent (%)
	1: does not apply at all	70	22.6
	2: does not apply well	67	21.6
	3: applies somewhat well	78	25.2
	4: applies fairly well	25	8.1
	5: applies well	33	10.6
	6: applies exactly	37	11.9
	Total	310	100.0

Q2. I feel I don't have much to be proud of		Frequency (n)	Percent (%)
	1: does not apply at all	70	22.6
	2: does not apply well	78	25.2
	3: applies somewhat well	73	23.5
	4: applies fairly well	23	7.4
	5: applies well	26	8.4
	6: applies exactly	40	12.9
	Total	310	100.0

Q3. I certainly feel useless at times		Frequency (n)	Percent (%)
	1: does not apply at all	105	33.9
	2: does not apply well	91	29.4
	3: applies somewhat well	46	14.8
	4: applies fairly well	28	9.0
	5: applies well	24	7.7
	6: applies exactly	16	5.2
	Total	310	100.0

Q4. All in all I'm inclined to feel that I'm a failure		Frequency (n)	Percent (%)
	1: does not apply at all	149	48.1
	2: does not apply well	62	20.0
	3: applies somewhat well	47	15.2
	4: applies fairly well	24	7.7
	5: applies well	13	4.2
	6: applies exactly	15	4.8
	Total	310	100.0

Q5. I would like to change many things about myself		Frequency (n)	Percent (%)
	1: does not apply at all	22	7.1
	2: does not apply well	31	10.0
	3: applies somewhat well	45	14.5
	4: applies fairly well	43	13.9
	5: applies well	58	18.7
	6: applies exactly	111	35.8
	Total	310	100.0

Q6. I have often wanted to become someone else		Frequency (n)	Percent (%)
	1: does not apply at all	81	26.1
	2: does not apply well	42	13.5
	3: applies somewhat well	28	9.0
	4: applies fairly well	33	10.6
	5: applies well	36	11.6
	6: applies exactly	90	29.0
	Total	310	100.0

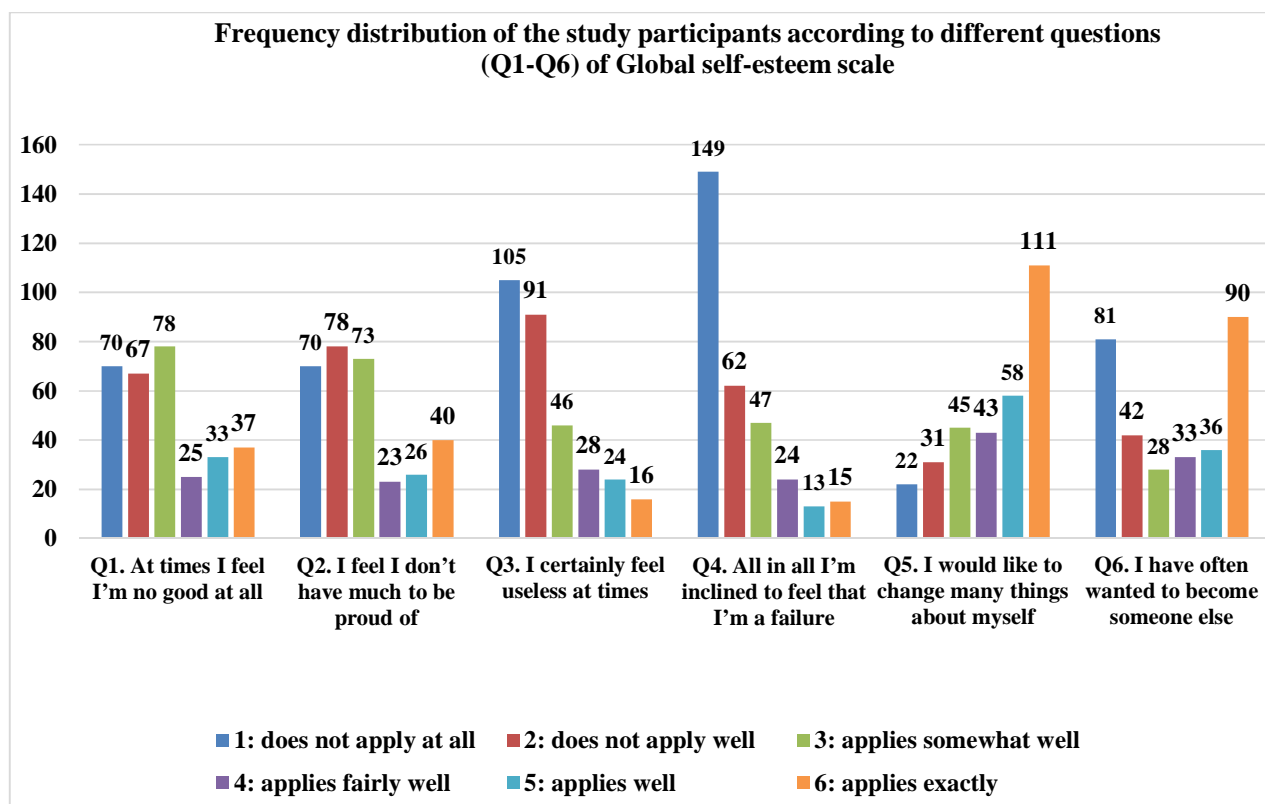


Table 4– Frequency distribution of the study participants according to different questions (Q1-Q7) of Self-perceived aesthetics questionnaire

Q1. Do you think you need orthodontic treatment?		Frequency (n)	Percent (%)
	1: not at all	108	34.8
	2: maybe	95	30.6
	3: most probably	34	11.0
	4: definitely	73	23.5
	Total	310	100.0

Q2. Are you satisfied with the way your teeth look?		Frequency (n)	Percent (%)
	1: not at all	74	23.9
	2: a little	123	39.7
	3: satisfied	75	24.2
	4: very satisfied	38	12.3
	Total	310	100.0

Q3. Do you think having straight teeth makes you more popular?		Frequency (n)	Percent (%)
	1: not at all	88	28.4
	2: a little	63	20.3
	3: probably	81	26.1
	4: definitely	78	25.2
	Total	310	100.0

Q4. Do you think having straight teeth makes you successful in life?		Frequency (n)	Percent (%)
	1: not at all	151	48.7
	2: a little	60	19.4
	3: probably	51	16.5
	4: definitely	48	15.5
	Total	310	100.0

Q5. Have you been told by other people that you need to have your teeth straightened?		Frequency (n)	Percent (%)
	1: never	127	41.0
	2: sometimes	100	32.3
	3: most of times	49	15.8
	4: always	34	11.0
	Total	310	100.0

Q6. Have you been teased about your teeth?		Frequency (n)	Percent (%)	Valid Percent
	1: never	166	53.5	53.5
	2: sometimes	93	30.0	30.0
	3: most of times	32	10.3	10.3
	4: always	19	6.1	6.1
	Total	310	100.0	100.0

Q7. Do you avoid smiling to hide your teeth?		Frequency (n)	Percent (%)
	1: never	166	53.5
	2: sometimes	93	30.0
	3: most of times	29	9.4
	4: always	22	7.1
	Total	310	100.0

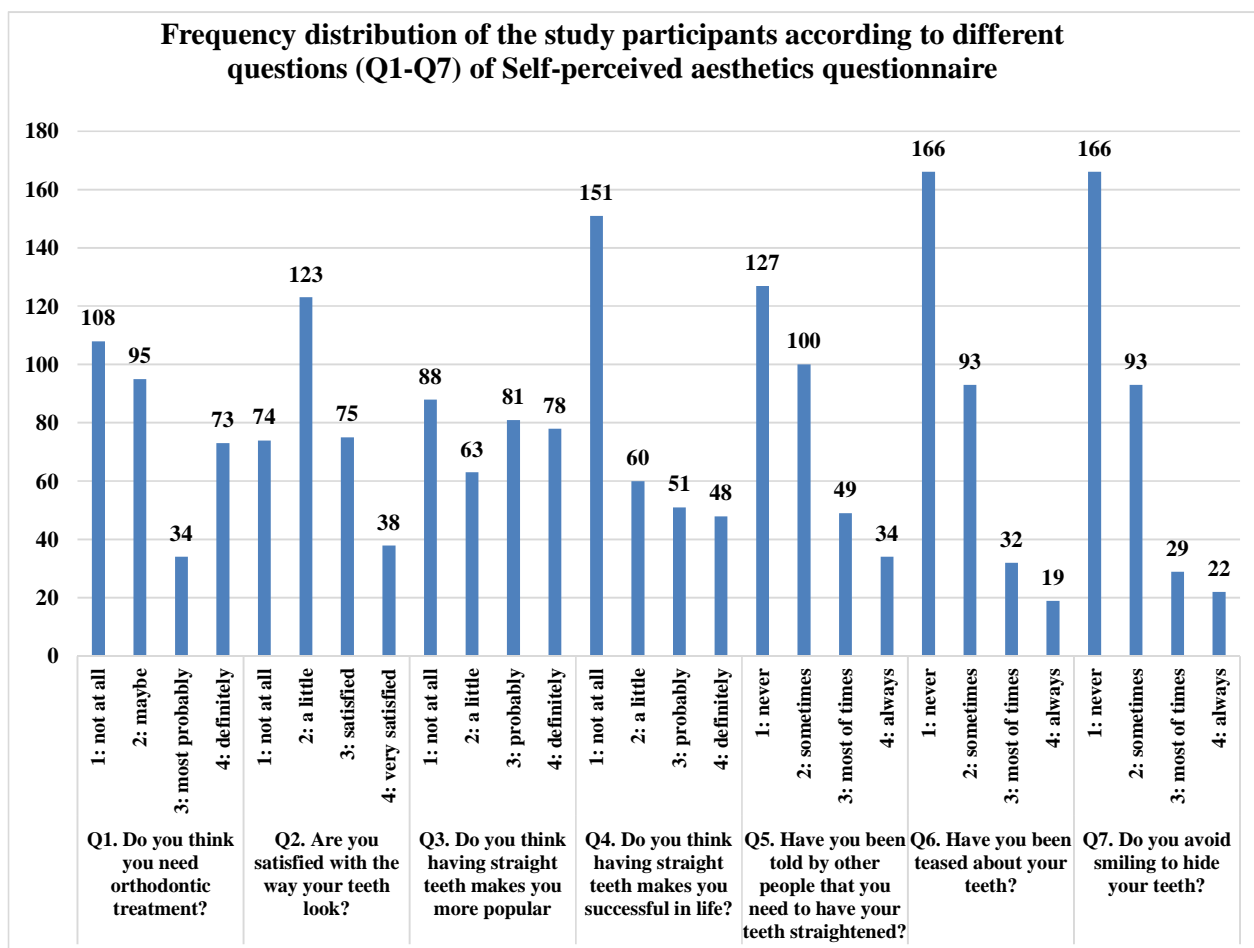


Table 5– Frequency distribution of the study participants according to DHC component of IOTN

DHC		Frequency (n)	Percent (%)
	No or little need for treatment	63	20.3
	A borderline need for treatment	163	52.6
	A definite need for treatment	84	27.1
	Total	310	100.0

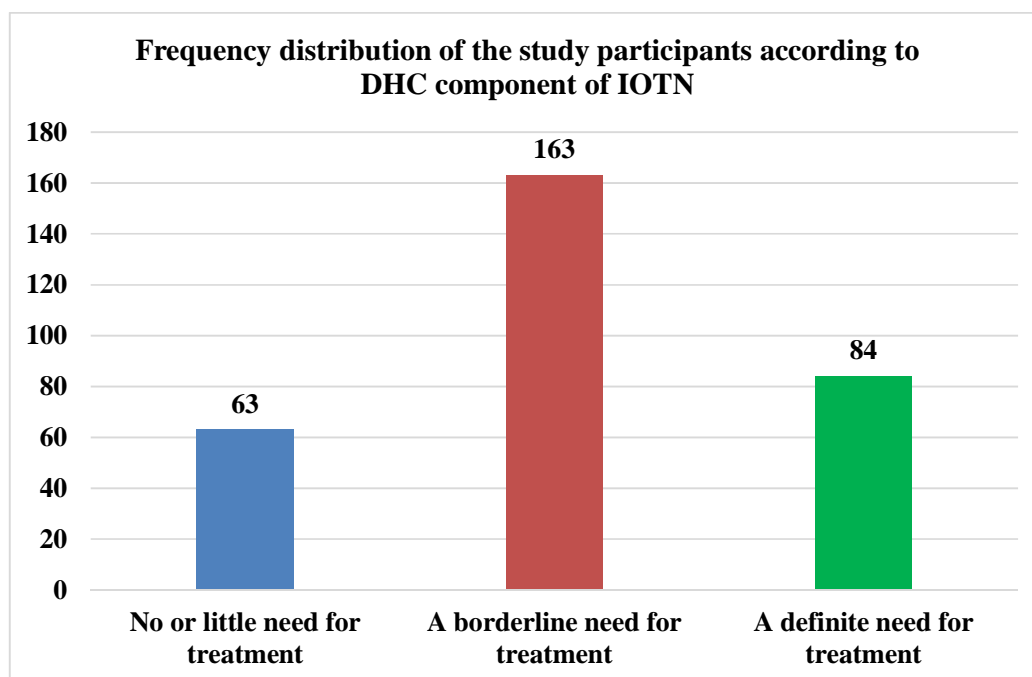


Table 6– Frequency distribution of the study participants according to AC component of IOTN

AC		Frequency (n)	Percent (%)
	No or little aesthetic need for orthodontic treatment	286	92.3
	Borderline aesthetic need for orthodontic treatment	14	4.5
	Definite aesthetic need for orthodontic treatment	10	3.2
	Total	310	100.0

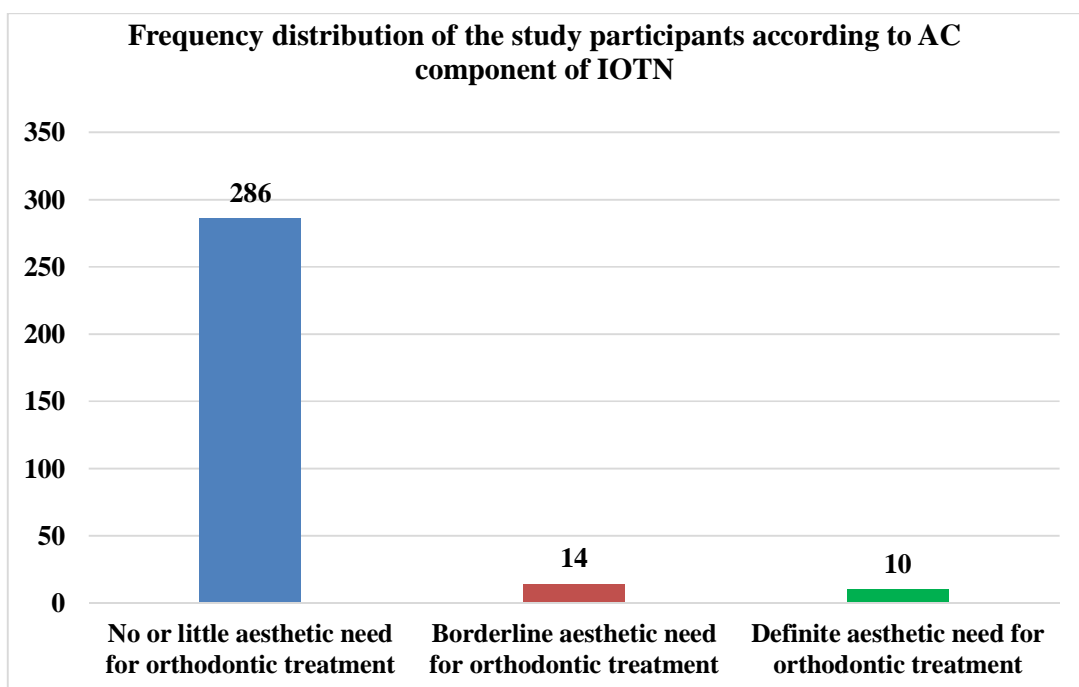
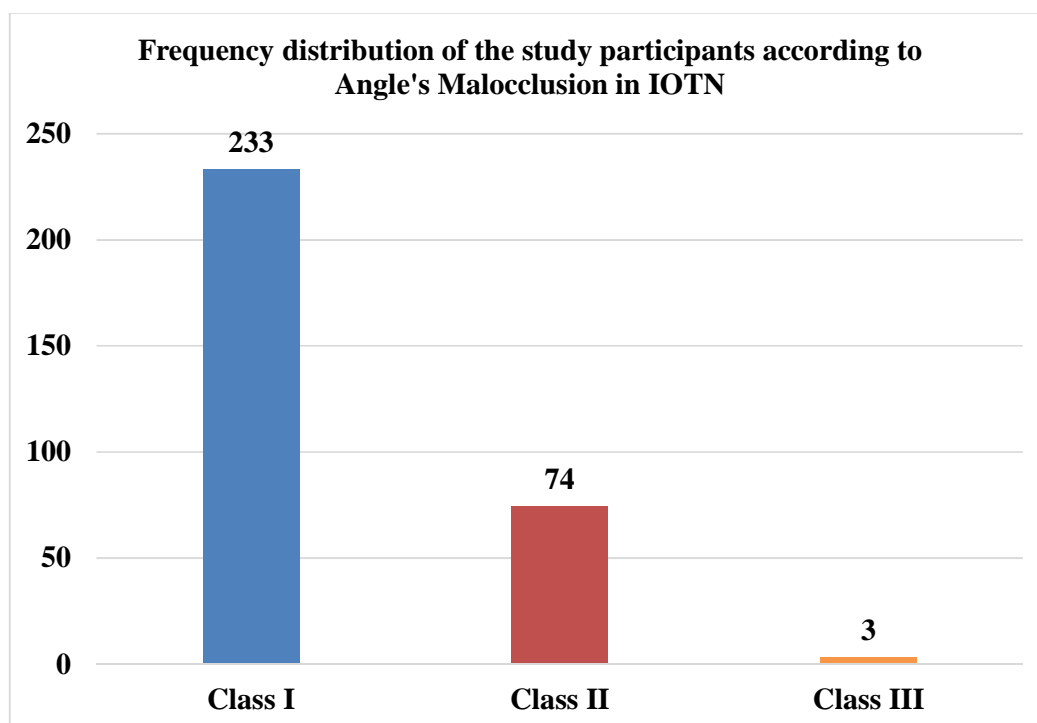


Table 7– Frequency distribution of the study participants according to Angle’s Malocclusion in IOTN

Angle’s Malocclusion		Frequency (n)	Percent (%)
	Class I	233	75.2
	Class II	74	23.9
	Class III	3	1.0
	Total	310	100.0



**Table 8 – Correlation between different questions of Global self-esteem scale
and different components of IOTN index**

Global Self-esteem scale		DHC	AC	Angle's Malocclusion
Q1. At times I feel I'm no good at all	Pearson Correlation	.101	.115**	.018**
	p value	.075	.043*	.748
	N	310	310	310
Q2. I feel I don't have much to be proud of	Pearson Correlation	.076**	-.065	.025
	p value	.183	.251	.657
	N	310	310	310
Q3. I certainly feel useless at times	Pearson Correlation	.048**	.078	.065
	p value	.402	.170	.254
	N	310	310	310
Q4. All in all I'm inclined to feel that I'm a failure	Pearson Correlation	.085**	.123**	.065**
	p value	.136	.031*	.251
	N	310	310	310
Q5. I would like to change many things about myself	Pearson Correlation	.221**	.050**	.006*
	p value	.000*	.379	.917
	N	310	310	310
Q6. I have often wanted to become someone else	Pearson Correlation	.270**	.116**	.132*
	p value	.000	.041*	.020*
	N	310	310	310

*p value <0.05 statistically significant, <0.01 highly significant

Interpretation – In our study Correlation between different questions of Global self-esteem scale and different components of IOTN index was performed using Pearson’s correlation coefficient. There was statistically significant correlation seen (p value <0.05) between majority of the items of scale and components of IOTN index.

Table 9 – Correlation between different questions of Self-perceived aesthetics questionnaire and different components of IOTN index

Self-perceived aesthetics questionnaire		AC	Angle's Malocclusion	DHC
Q1. Do you think you need orthodontic treatment?	Pearson Correlation	.323	.251	.301**
	p value	.000*	.000*	.000*
	N	310	310	310
Q2. Are you satisfied with the way your teeth look?	Pearson Correlation	-.331*	-.250**	-.342
	p value	.000*	.000*	.000*
	N	310	310	310
Q3. Do you think having straight teeth makes you more popular?	Pearson Correlation	.057**	.064	.204
	p value	.317	.258	.000*
	N	310	310	310
Q4. Do you think having straight teeth makes you successful in life?	Pearson Correlation	.062	.019	.093*
	p value	.277	.740	.102
	N	310	310	310
Q5. Have you been told by other people that you need to have your teeth straightened?	Pearson Correlation	.309**	.186**	.294**
	p value	.000*	.001*	.000*
	N	310	310	310
Q6. Have you been teased about your teeth?	Pearson Correlation	.348**	.228**	.342**
	p value	.000*	.000*	.000*
	N	310	310	310
Q7. Do you avoid smiling to hide your teeth?	Pearson Correlation	.223**	.201**	.251**
	p value	.000*	.000*	.000*
	N	310	310	310

*p value <0.05 statistically significant, <0.01 highly significant

Interpretation – In our study Correlation between questions of Self-perceived aesthetics questionnaire and different components of IOTN index was performed using Pearson's correlation coefficient. There was statistically significant correlation seen (p value <0.05) between majority of the items of scale and components of IOTN index.

Table 10 – Linear regression analysis of Global self-esteem scale in accordance with demographic details and different components of IOTN index

Model		Unstandardized Coefficients		Standardized Coefficients	t	p value
		B	Std. Error	Beta		
Global self-esteem scale	(Constant)	.598	.140		4.262	.000*
	Gender	.077	.041	.105	1.873	.062
	Age groups	.080	.053	.085	1.513	.131
	Angle's Malocclusion	-.005	.048	-.006	-.105	.917
	DHC	.090	.031	.170	2.892	.004*
	AC	.071	.057	.078	1.246	.214

*p value <0.05 statistically significant, <0.01 highly significant

Interpretation – In our study, Linear regression analysis of Global self-esteem scale in accordance with demographic details and different components of IOTN index was performed. Statistically significant differences (p value <0.05) between DHC and self-esteem scale seen.

Table 11 – Linear regression analysis of Self-perceived aesthetics questionnaire in accordance with demographic details and different components of IOTN index

Model		Unstandardized Coefficients		Standardized Coefficients	t	p value
		B	Std. Error	Beta		
Self-perceived aesthetics questionnaire	(Constant)	.538	.105		5.130	.000*
	Gender	.015	.031	.026	.483	.629
	Age groups	.108	.039	.149	2.739	.007*
	Angle's Malocclusion	.014	.036	.022	.381	.703
	DHC	.070	.023	.170	2.986	.003*
	AC	.150	.042	.214	3.527	.000*

*p value <0.05 statistically significant, <0.01 highly significant

Interpretation – In our study, Linear regression analysis of Self-perceived aesthetics questionnaire in accordance with demographic details and different components of IOTN index was performed. Statistically significant differences (p value <0.05) between DHC, Age groups and AC was seen.

Table 12 –Association between Global self-esteem scale and Gender of the study participants

		Gender		Total	P value
		Male	Female		
Global self esteem	Low self esteem	132	129	261	0.052
	Moderate to High self esteem	18	31	49	
Total		150	160	310	

*p value <0.05 statistically significant, <0.01 highly significant

Interpretation – In our study, Association between Global self-esteem scale and Gender of the study participants was performed using Chi-square test. This association was not statistically significant (p value >0.05).

Table 13 –Association between Global self-esteem scale and Age-groups of the study participants

		Age groups		Total	P value
		14-16 years	17-18 years		
Global self esteem	Low self esteem	215	46	261	0.175
	Moderate to High self esteem	37	12	49	
Total		252	58	310	

*p value <0.05 statistically significant, <0.01 highly significant

Interpretation – In our study, Association between Global self-esteem scale and Gender of the study participants was performed using Chi-square test. This association was not statistically significant (p value >0.05).

Table 14 –Association between Global self-esteem scale and Angle’s Malocclusion in IOTN index of the study participants

		Angle’s Malocclusion			Total	P value
		Class I	Class II	Class III		
Global self esteem	Low self esteem	197	63	1	261	0.052
	Moderate to High self esteem	36	11	2	49	
Total		233	74	3	310	

*p value <0.05 statistically significant, <0.01 highly significant

Interpretation – In our study, Association between Global self-esteem scale and Angle’s Malocclusion of the study participants was performed using Chi-square test. This association was not statistically significant (p value >0.05).

Table 15 –Association between Global self-esteem scale and DHC component of IOTN index of the study participants

		DHC			Total	P value
		No or little need for treatment	A borderline need for treatment	A definite need for treatment		
Global self esteem	Low self esteem	59	140	62	261	0.003*
	Moderate to High self esteem	4	23	22	49	
Total		63	163	84	310	

*p value <0.05 statistically significant, <0.01 highly significant

Interpretation – In our study, Association between Global self-esteem scale and DHC component of IOTN index of the study participants was performed using Chi-square test. This association was statistically significant (p value <0.05).

Table 16 –Association between Global self-esteem scale and AC component of IOTN index of the study participants

		AC			Total	P value
		No or little aesthetic need for orthodontic treatment	Borderline aesthetic need for orthodontic treatment	Definite aesthetic need for orthodontic treatment		
Global self esteem	Low self esteem	245	9	7	261	0.046*
	Moderate to High self esteem	41	5	3	49	
Total		286	14	10	310	

*p value <0.05 statistically significant, <0.01 highly significant

Interpretation – In our study, Association between Global self-esteem scale and AC component of IOTN index of the study participants was performed using Chi-square test. This association was statistically significant (p value <0.05).

Table 17 –Association between Self perceived aesthetics questionnaire and Gender of the study participants

		Gender		Total	P value
		Male	Female		
Self perceived aesthetics	Low self perceived aesthetics	138	145	283	0.411
	Moderate to High self perceived aesthetics	12	15	27	
Total		150	160	310	

*p value <0.05 statistically significant, <0.01 highly significant

Interpretation – In our study, Association between Self perceived aesthetics scale and Gender of the study participants was performed using Chi-square test. This association was not statistically significant (p value >0.05).

Table 18 –Association between Self perceived aesthetics questionnaire and Age-groups of the study participants

		Age groups		Total	P value
		14-16 years	17-18 years		
Self perceived aesthetics	Low self perceived aesthetics	234	49	283	0.042*
	Moderate to High self perceived aesthetics	18	9	27	
Total		252	58	310	

*p value <0.05 statistically significant, <0.01 highly significant

Interpretation – In our study, Association between Self perceived aesthetics scale and Age group of the study participants was performed using Chi-square test. This association was statistically significant (p value < 0.05).

Table 19 –Association between Self perceived aesthetics questionnaire and Angle’s Malocclusion in IOTN index of the study participants

		Angle’s Malocclusion			Total	P value
		Class I	Class II	Class III		
Self perceived aesthetics	Low self perceived aesthetics	215	68	0	283	0.027*
	Moderate to High self perceived aesthetics	18	6	3	27	
Total		233	74	3	310	

*p value <0.05 statistically significant, <0.01 highly significant

Interpretation – In our study, Association between Self perceived aesthetics scale and Malocclusion of the study participants was performed using Chi-square test. This association was statistically significant (p value < 0.05).

Table 20 –Association between Self perceived aesthetics questionnaire and DHC component of IOTN index of the study participants

		DHC			Total	P value
		No or little need for treatment	A borderline need for treatment	A definite need for treatment		
Self perceived aesthetics	Low self perceived aesthetics	61	156	66	283	0.000*
	Moderate to High self perceived aesthetics	2	7	18	27	
Total		63	163	84	310	

*p value <0.05 statistically significant, <0.01 highly significant

Interpretation – In our study, Association between Self perceived aesthetics scale and DHC component of IOTN index of the study participants was performed using Chi-square test. This association was statistically highly significant (p value < 0.01).

Table 21 –Association between Self perceived aesthetics questionnaire and AC component of IOTN index of the study participants

		AC			Total	P value
		No or little aesthetic need for orthodontic treatment	Borderline aesthetic need for orthodontic treatment	Definite aesthetic need for orthodontic treatment		
Self perceived aesthetics	Low self perceived aesthetics	265	14	4	283	0.002*
	Moderate to High self perceived aesthetics	21	0	6	27	
Total		286	14	10	310	

*p value <0.05 statistically significant, <0.01 highly significant

Interpretation – In our study, Association between Self perceived aesthetics scale and AC component of IOTN index of the study participants was performed using Chi-square test. This association was statistically significant (p value < 0.05).

Table 22– Spearman’s rho correlation coefficient between Global self-esteem, Perceived Social impact, Perceived treatment need, Students AC score, and DHC of IOTN

	Perceived Social impact	Perceived treatment need	Students AC score	DHC of IOTN
Global self esteem	.242**	.211**	.124*	.189**
Perceived Social impact		.382**	.257**	.237**
Perceived treatment need	.382**		.242**	.301**
Students AC score	.257**	.242**		.312**

Correlation significant at 0.05* and 0.01** level (2-tailed)

Interpretation – In our study Correlation between Global self-esteem, Perceived Social Impact, Perceived treatment need, Students AC score and DHC of IOTN was performed using Pearson’s correlation coefficient. There was statistically significant correlation seen (p value <0.05) between all of the components.

Table 23– Spearman’s rho correlation coefficient between Global self-esteem, Students AC score, Perceived treatment need and components of perceived social impact of malocclusion

	Told they need orthodontic treatment	Teased about teeth	Hide smile	Satisfaction with dental appearance	Subject having straight teeth are more popular	Subjects having straight teeth are more successful in life
Global self esteem	.211**	.360**	.241**	.208**	.136*	.123*
Students AC score	.242**	.266**	.152**	.200**	.060 (NS)	.081 (NS)
Perceived treatment need	.341**	.427**	.449**	.436**	.103 (NS)	.044 (NS)

Correlation significant at 0.05* and 0.01** level (2-tailed), NS = Non-significant

Interpretation – In our study Correlation between Global self-esteem, Students AC score, (Perceived treatment need and components of perceived social impact of malocclusion was performed using Pearson’s correlation coefficient. There was statistically significant correlation seen (p value <0.05) between majority of components.

DISCUSSION

The irregularity of the teeth or malalignment of the dental arches that extends beyond what is deemed as normal is known as malocclusion ⁽²⁰⁾. It is a developmental problem which can affect the relationship of teeth in the inter-arch, intra-arch or both.

According to the systematic review done in 2021 by *Balachandran et al* the prevalence of malocclusion observed in children from the age groups of 8-15 years was 35.4% and was noted that more prevalence of malocclusion was seen in urban population (32.78%) ⁽²⁶⁾. Irregularities of teeth can also be contributed to factors like teeth size, arch length, genetics and hereditary. When there is arch length-tooth material discrepancy it may lead to malocclusion. As the humans are evolving, shift from eating hard fibrous food to soft easily chewable food is seen. 3rd molars agenesis is seen frequently, along with decreased jaw size. Hence, prevalence and severity of malocclusion is steadily increasing within the population. Corrective treatment for the same should be a primary aim for overall health of an individual.

The goal of this investigation was to assess the Self-Esteem and Self-Perceived Aesthetics of adolescents and examining their malocclusion using IOTN and analyzing whether Self Esteem and Malocclusion had any correlation. A total of 310 adolescents aged 14-18 years were included to be a part of this study meeting the inclusion and exclusion criteria. The adolescents were asked to fill two questionnaires corresponding to **Global Negative Self Esteem scale** and **Self-Perceived Aesthetics Questionnaire**. Along with that the examiner assessed the Malocclusion of the youngsters with the **IOTN**, in school premises under natural lighting.

INDEX OF ORTHODONTIC TREATMENT NEEDS

In order to assess the severity of malocclusion in an individual, certain indices can be used. These indices can be used for the following reasons: to screen for malocclusions that are handicapping, to classify different diagnoses, and to characterise the severity or complexity of therapy. They can also be used to classify and prioritise the patients for therapy, or assess the need for treatment, and lastly, conduct epidemiological studies to look at malocclusion.

Various indices for malocclusion have been developed in orthodontics. Some examples of the indices used are- Malalignment Index by Vankirk and Pennell (1959), Handicapping labiolingual deviation index by Braker (1960), Occlusal feature index by Poulton and Aaronson (1961), Malocclusion severity estimate by Grainger (1960-61), Occlusal index by Summers (1996), Treatment priority index by Grainger (1967), Handicapping malocclusion assessment record by Salzmann (1968), Dental esthetic index (DAI), Cons (1986), IOTN (1989), Peer assessment rating index (1992), Index of complexity, outcome and need (2000).

The Index of Treatment Needs (IOTN) developed by Brook and Shaw in 1989, is one such index used. This index seeks to identify the people who would benefit the most from orthodontic treatment. It is done by ranking malocclusion according to the importance of different occlusal characteristics for a person's oral health and perceived aesthetic impairment.

The index comprises of two components- Dental Health Component (DHC) and the Aesthetic Component (AC). The Index was made using the Swedish Dental Board's index of treatment priority, hence DHC was modelled on that. The DHC grades the malocclusion from Grade 1 to 5. Grade 1-2 represent no or little need for

treatment, Grade 3 represents borderline need for treatment, Grade 4 represents great need for treatment and Grade 5 represents very great need for treatment.

The DHC uses MCODO as an acronym to represent Missing teeth, Crossbite, Overjet, Displacement of Contact and Overbite to guide the examiner to record the single worst trait of malocclusion present in the individual.

The AC consists of 10 frontal intraoral photographs showing different levels of malocclusion and attractiveness. As the grade keeps on increasing, the attractiveness keeps on decreasing and the malocclusion keeps on increasing. Grade 1-4 reflects no or slight need for treatment, Grade 5-7 reflects borderline need for treatment and Grade 8-10 reflect great need for treatment. The ease of use of this index, along with great reproducibility and facile understanding makes it a good choice to be used in mass population and epidemiological surveys.

Amongst the total population, as checked by the examiner using DHC of IOTN,

- 52.6% of the total populace had a borderline need of treatment which correlates to adolescents perceived need for treatment calculated from Self Perceived Aesthetic Questionnaire.

Whereas according to the Aesthetic Component of IOTN,

- 92.3% adolescents felt they had no or little aesthetic need for orthodontic treatment. This comes in contrast with their perceived dental aesthetics calculated from Self Perceived Aesthetic Questionnaire.

The reason for same can be contributed to the fact that children pay more attention to their overall appearance rather than just dental appearance, when looking in a mirror. Dental aesthetics in adolescents are affected by society and peers.

According to the study conducted by *Holmes*, assigning 'own' dentition to the AC scale has been shown to be a challenging issue in prior IOTN investigations, especially for younger patients ⁽⁴⁵⁾. Research investigations conducted by *Grzywacz* ⁽⁴¹⁾ and *Trivedi et al* ⁽⁴²⁾ concluded that the the AC of the IOTN only slightly represents the demand for orthodontic treatment and the subjective opinion of oral aesthetics, which are in accordance with our findings. It would be preferable to interpret grades 1-2 (no need for treatment) and 3-4 (slight need for treatment) separately since this would provide a more accurate sense of dental aesthetics and the need for treatment.

With 75.2% strength, Class I malocclusion was the most common encountered malocclusion in the study group.

GLOBAL NEGATIVE SELF-ESTEEM SCALE

One of the main reasons why individuals undergo orthodontic treatment is to achieve a pleasing smile which will increase facial aesthetics. All humans want to present themselves as smart and attractive. One's self of worth comes from internal and external validation. Hence orthodontic treatment can influence an individual's self-esteem.

A broad definition of **Self-Esteem** is the total assessment of oneself, whether favourable or unfavourable. It conveys the degree to which a person thinks they are capable and deserving of life. In essence, it is the sense of one's own expertise and

value. It is an individual's self-perception. It is his general assessment of himself, or how much he enjoys being around that specific individual ⁽²¹⁾. One's self-esteem increases with the aggregated view of these traits and qualities becoming more positive. While low self-esteem and feelings of worthlessness are common depressive symptoms, a reasonably high degree of self-esteem is thought to be an essential component of mental wellness.

Christopher Mruk created a self-esteem matrix with Competence at horizontal axis and Worthiness at the vertical axis. Competence means an individual's capability to be good at doing certain tasks; it can be sports, studies etc. Worthiness means how good one feels about themselves, something that comes from within. There are four types of self-esteem created. These are:

1. Low Self-esteem
2. High Self-esteem
3. Worthiness based Self-esteem
4. Competence based Self-esteem

According to a study done by Taibah et al, individuals who have a positive or higher sense of self will have a better quality of life and will be more equipped to deal with strenuous situations. Low or negative self-esteem is a disabling condition and occurs when a person believes they are inadequate, incapable, and inept ⁽²²⁾.

High self-esteem serves as a guide for development of full human potential in individuals of all age groups. If an individual's low self-esteem has an impact on their treatment needs and scope, then it becomes imperative to recognise and address the cause of low self-esteem. According to a study done by *Orth et al*, when trajectory of self-esteem was seen for an individual's lifetime, it was noted that there is an increase

from adolescence to middle adulthood, at the age of 50-60 years there comes the peak and then it again declines at an accelerating speed in old age⁽²⁸⁾.

Factors that affect Self-Esteem:-

- Family Environment
- Achievement
- Physical Appearance
- Self-Belief
- Task Proficiency
- Feedback friends and others

Adolescence has been defined as the period of transition, where an individual goes from childhood to adulthood. The age range varies, but typically can be taken from 13 years to 18 years of age. It is a period which coincides with puberty. Puberty is a biological occurrence where there is sexual maturity seen in children due to increase in hormonal activity. There is development of primary and secondary sexual characteristics along with **raging hormonal levels**⁽³⁰⁾. It is a period of stress and strain, involving complex changes in emotional maturation and mental expansions. These changes contribute to various physical and psychological alternations in adolescents like low self-esteem, need to be liked by peers, increased need for social validation, increased concern regarding looks etc.

Adolescent hormones have an impact on their behaviour in addition to their bodies and thoughts. Teens who are under peer pressure, have low self-esteem, and are dealing with hormonal imbalances may take risks and participate in risky behaviours that could negatively impact their future. They are also more likely to be depressed individuals. Adolescents often experience difficulties with self-worth,

believing that they fall short of their friends, parents, or teacher's expectations, therefore it becomes even more important to instil sense of confidence and self-worth in children.

An indication that a child is entering adolescence is when they start to worry more about their appearance, take longer to get ready for school or go out, become pickier about their appearance, spend more time taking care of themselves, and become more particular about how they look and dress.

Global Negative Self-Esteem scale was developed by Francoise Alsaker and Dan Olweus in 1986. This is a modification of Rosenberg Self Esteem Scale. In this scale, it was seen that it is a reliable indicator for **Negative self-evaluations**. The population for which this scale was developed was 11-16 years. It consists of 6 questions worded negatively to assess the **Negative self-evaluation**.

The items had 6 responses ranging from-

- 1- Does not apply at all
- 2- Does not apply well
- 3- Applies Somewhat
- 4- Applies Fairly well
- 5- Applies well
- 6- Applies exactly

A higher score corresponds to lower self-esteem and **higher negative self-evaluation** ⁽³¹⁾. According to the items of the Global Negative Self-Esteem scale,

1. When asked whether adolescents feel useless at times,
 - 33.9% answered that it does not apply at all,
 - 5.2% of the population felt useless at times but
2. When asked whether they wanted to change something about themselves
 - 35.8% of the population said it applied exactly.

This goes on to show that adolescent age group of 14-18 years are confused about themselves and their thought process is puzzled. There were aspects about them, that they did not like and wanted to alter them.

3. For the item, whether they are inclined to feel that they are a failure,
 - 48.1% said it does not apply at all,
 - 4.8% said it applies exactly well.

Which shows us that the adolescents seem to have a self of self and that they'll fare well in life.

4. When asked about whether they wanted to become someone else, the results were polarizing.
 - 29% of the students said it applies exactly, meaning that they felt they often feel like becoming someone else,
 - 26.1% of the population said it does not apply at all.

The above two points shows the dichotomy of the adolescent mind that almost half think they are not comfortable in their own skin and think that the other person might have a better life, while the other half are content.

From the findings of this questionnaire, it can be concluded that a notable amount of the adolescent population suffers from negative self-evaluations. There is a duality in the thought process that is seen and it occurs because of fragmented nature of adolescents and skills like abstract thinking, reasoning and decision making are developing.

According to the guidelines by the British Psychological Society, it was concluded that approximately 10% of the children who have malalignment of teeth, would suffer from emotional and behavioral problems along with other anxieties which can be significant ⁽³⁶⁾.

In our study, Self-Esteem and Malocclusion of the population was assessed and correlated. There was statistically significant correlation seen (p value <0.05) between majority of the items of Global Negative Self Esteem scale and components of IOTN. For questions pertaining to changing things about themselves, and wanting to become someone else, the results were highly notable. From this it can be concluded that adolescents who had lower self-esteem had remarkable correlation with components of IOTN, indicating dental malocclusions have an impact on Self Esteem.

Linear regression analysis showed that higher the score of Global Negative Self Esteem Scale, i.e. Low Self Esteem, higher was the association with DHC of IOTN which was statistically significant. This relayed the information that higher normative need of treatment was associated with Lower Self Esteem.

A study was done by *Serene Badran* where correlation between self-esteem and malocclusion was done, but the correlation was not significant, whereas in our investigation, the correlation was significant ⁽³⁾. Work done by *Taibah et al* also

supports our findings that malalignment of teeth has negative influence on self-worth⁽²²⁾. This is in contrast to study done by *Akpasa et al* where they saw that normative aesthetic as well as treatment need and self-esteem were not significantly associated⁽³⁸⁾. This can be contributed due to family environment, physical appearance and self-belief differences.

In our study when assessing the correlation between gender and Global Negative Self Esteem Scale it was seen that the results were not statistically noteworthy. Hence in this study we can conclude that gender played no role in influencing the self-esteem. Which is in agreement with researches conducted by *Serene Badran*⁽³⁾ and *Birkeland et al*⁽²³⁾. Whereas in investigations done by *Min-Ho Jung*, and *Eugene Twigge et al* it was noted that self-esteem being affected by malocclusion was influenced by gender, where girls were more affected^{(6) (18)}.

According to a study done by *Muqaddas Jan et al* the findings show that 88% of Facebook users make social comparisons, with upward comparisons accounting for 98% of these comparisons. It's been seen that making upward comparisons might lead to feelings of inferiority and low self-esteem. People's self-esteem is typically negatively impacted by these upward comparisons⁽³⁵⁾.

SELF PERCEIVED AESTHETICS QUESTIONNAIRE

Self-concept is a term used to refer to how someone thinks about themselves, how they perceive, evaluate and judge themselves. It is to be aware of oneself.

A youngster will learn to recognise, quantify, and control their emotions during adolescence. This implies that they'll start to become more conscious of both their own and other people's feelings. Childrens emotional development process will

enable them to hone their abilities and find their special traits. Some teenagers are looking forward to these new challenges as they grow more self-reliant. Others might require further assistance in order to boost their confidence.

The perceived need for orthodontic treatment, the need for dental appearance satisfaction, as well as the social impact of malocclusion was assessed by a questionnaire enveloped by Serene Badran and Mandall et al. There were 7 items in the questionnaire, the items had responses ranging from-

1. Not at all/ Never
2. Maybe/ A little/ Sometimes
3. Most Probably/ Satisfied/ Probably/ Most of times
4. Definitely/ Very Satisfied/ Always

The sum of these items corresponded to their need of treatment, social impact of malalignment of teeth and dental appearance satisfaction ⁽³⁾.

1. For the first item, when asked whether adolescents think they need Orthodontic treatment-
 - 30.6% responded with maybe
 - 23.5% responded with definitely

This shows that overall, the adolescents felt that they had teeth malalignment and would require orthodontic treatment for its correction.

2. When asked whether the children are satisfied with the way their teeth look-
 - 39.7% only liked how their teeth looked a little
 - 23.9% were not at all satisfied with the way their teeth looked.

This finding correlates with the results to the above question item, i.e. adolescents are dissatisfied with their teeth and want correction of malocclusion.

3. When asked about whether having straight teeth leads to popularity-

- 26.1% of the adolescents thought that having straight teeth would make them more popular amongst their peers whereas
- 28.4% did not think straighter teeth leads to popularity.

This describes the contrast which exists within the adolescent population and the impact social acceptance plays in their lives.

4. When asked if they think having straight teeth makes them more successful in life-

- Majority of population (48.7%) thought that having straight teeth does not make them more successful in life
- 15.5% definitely agreed to the statement.

This can be contributed to the fact that adolescents do not have experience of the real-life world; their whole life perspective is through school life and home life. The trials and tribulations which seen in adulthood, where aesthetics make a great impact when it comes to social acceptance and work front is something they are not familiar with. If this question item is asked in older professional age group, the majority may answer that straighter teeth definitely makes them more successful in life.

5. Regarding items about being teased for their teeth and hiding their teeth while smiling-

- 30% of the participants were sometimes teased about their teeth and the same percentage of adolescents hid their teeth while smiling.

These two question items correlate to the first two question items, showing how adolescents felt that they needed orthodontic treatment and were not satisfied with their teeth. Hence, they hide their teeth while smiling and are teased.

According to *Sumathy et al* more than half of the teenagers enrolled in higher secondary schools, have low levels of general self-esteem and require improvement (37).

High numbers of adolescents thinking that they require orthodontic treatment and being dissatisfied with their smile informs us that awareness regarding malocclusions and means of its correction i.e. Orthodontic treatment should be done by institutions and authorities. Dentals camps can be set up which provide proper education and guidance regarding the same.

The results of this questionnaire inform us that majority of the population is not satisfied with their dental aesthetics and alignment of teeth accords for great social impression.

When assessing for correlation between Self Perceived Aesthetics and components of IOTN, it was noticed that there was statistically significant correlation seen (p value <0.05) between majority of the items of Self Perceived Aesthetics Questionnaire and components of IOTN index. There was a significant correlation between thinking that straighter teeth make youngsters more popular and the increased need of treatment assessed by the IOTN. This showed how malocclusion alters the self-perceived aesthetics of an individual. Other aspects of the scale and correlation showed that malocclusion and DHC influence the adolescent's psyche, making them hide their teeth while smiling and getting teased by their peers.

Linear regression analysis between Self Perceived Aesthetic Questionnaire and demographic details and different components of IOTN showed significant results. Statistically significant differences (p value <0.05) between DHC, Age groups and AC was seen. This implied that changes in either of the above-mentioned parameters affected the Self Perceived aesthetics of the adolescents remarkably.

This is similar to results seen by *Serene Badran* where low self-esteem was strongly associated with dental dissatisfaction and when compared to adolescents who had not underwent orthodontic treatment, those who had experienced therapy reported feeling more confident about themselves⁽³⁾. In research done by *Anshika Sharma et al* it was noted that children's self-esteem was strongly correlated to their DHC and AC of IOTN with DHC being more significant, which corresponds to the results of our study⁽⁹⁾.

Feng et al concluded that dental appearance may have an impact on social interactions, play a role in social selection, and strengthen the links between socioeconomic position and health, which is in accordance of our investigation that dental appearance plays a social impact⁽⁴⁰⁾.

James JM et al, and *Claudino et al* saw that amongst schoolchildren, there was a substantial correlation found between the severity of malocclusion and their self-perception of dental aesthetics which are as per the findings of our research^{(43) (44)}.

COMPARATIVE ANALYSIS

For correlation between Global Negative Self Esteem, Perceived Social Impact, Perceived Treatment need, Student's AC score and DHC of IOTN, it is seen that there is a statistically significant correlation present. Therefore, lower levels of

self-esteem correlate to higher normative treatment needs. Lower self-esteem has an increased perceived social impact and perceived treatment need.

De Paula et al conducted a study in 2008 where they wanted to determine how body's self-image, quality of life and degree of malocclusion influenced the psychosocial effects of dental appearance in adolescents. The results of the study stated that all these above metrics are correlated to psychosocial ramifications of dental aesthetics ⁽¹¹⁾. Similar results are seen in our study where higher normative and perceived need of treatment influenced psychological well-being of adolescents.

There was a statistically significant correlation present for majority of the components i.e. Global Negative Self Esteem, Perceived treatment need and perceived social impact of malocclusion, except for Students AC score and Perceived treatment needs in correlation to them having straighter teeth and being more successful in life, those were statistically not significant. This shows that self-esteem levels affect the adolescent's perceived need for orthodontic treatment and perceived aesthetic satisfaction. It also shows that being teased about their teeth and hiding their teeth while smiling may lead to lower self-esteem levels. Straighter teeth having social impact of being more popular and more successful in life, correlates with self-esteem levels.

These results are comparable to the results seen by *Serene Badran* ⁽³⁾, *Mandall et al* ⁽¹⁰⁾ and *Kenealy et al* ⁽³⁹⁾. Self-esteem was influenced by treatment need and self-perceived aesthetics.

Eugene Twigge et al in 2016 conducted an investigation to analyse the expectations of adolescent patients in regards to their orthodontic treatment, severity of malocclusion and oral health related quality of life. The students expected an

improvement in dental aesthetics and oral health related quality of life post orthodontic treatment, which can in turn increase their psychological well-being. Hence in our study, we can expect the same that adolescents who had greater perceived and normative treatment needs can benefit in their lower self-esteem levels post orthodontic treatment ⁽¹⁸⁾.

A 20 year follow up study was done by *William Shaw et al* in 2007 to compare the dental as well as the psychosocial state of individuals who had undergone orthodontic treatment as teenagers and those who did not. The results showed that the orthodontic treatment can improve psychological well-being but there is little objective evidence to support it ⁽¹⁶⁾. From this we can conclude that, malalignment of the teeth should be corrected in order for future well-being of the individual.

According to a study done by *Burden and Pine* patients primarily seek orthodontic treatment in order to reduce psychosocial issues pertaining to their facial and dental appearance ⁽²⁴⁾. In this study, adolescents who felt that they needed more dental work, who were dissatisfied with their appearance and those who reported more social problems showed lower self-esteem than those who believed that they looked decent. Our study revealed similar results where students who felt dissatisfied with their dental appearance showed lower self-esteem.

Hence from the above discussion it is clear that malocclusion affects the self-confidence and worth of adolescents to a great extent. The DHC of IOTN determined that the majority of the children had a borderline need for therapy. A noteworthy amount of population had negative self-evaluations corresponding to lower self-esteem. The Self Perceived Aesthetics Questionnaire revealed that children who felt more need of orthodontic treatment also believed that their malocclusion made them

less successful, less popular, and more likely to be teased by their peers. The comparative evaluations between malocclusion, self-esteem and self-perceived aesthetics showed that children who had greater normative need for treatment had lower self-esteem as well as lower perceived treatment need and aesthetics. Therefore, the negative psychological effects of having unattractive teeth should not be disregarded. Sensitization programmes regarding coping with teenage psychology should be completed by parents and educators.

LIMITATIONS OF THE STUDY

- Limitation of the study was that the malocclusions that were recorded only described dental problems; skeletal and soft tissue discrepancies could not be noted.
- This study was conducted in the city of Belagavi; therefore, the findings of the study cannot be applicable to the entire population. Hence multi-centered studies regarding the same should be done.

SCOPE OF THE STUDY

- Follow up studies can be done to assess the correlation in older age groups and especially those in professional jobs since aesthetics make up for a significant part of the job.
- Effect of socio-economic status on the self-esteem and malocclusion and their correlation can be studied.
- Multi-centered studies can be done to generalize the findings.
- Sensitization programs for the teachers and parents regarding dealing with child psychology should be done.
- The students who scored low on self-esteem scale and had greater normative need for treatment can be contacted for providing help and future longitudinal study can be done to see whether post orthodontic treatment their self-esteem saw improvement.
- Orthodontic treatment awareness programs should be conducted in rural areas.
- Sensitization programs can be constructed with the help of the results of the study.

CONCLUSION

The purpose of this study was to assess the orthodontic treatment needs of the adolescents and to assess if there was a correlation between the severity of malocclusion and self-esteem in adolescents.

From our study, the following conclusions can be made-

- Majority of the students, had borderline need of treatment as assessed by the DHC of IOTN
- A large population of adolescents had negative self-evaluations which accounted for lower self-esteem.
- According to the Self-Perceived Aesthetics Questionnaire, children who felt greater need for orthodontic treatment, also felt that having poorer malocclusion made them less popular, less successful and the degree of getting teasing by fellow students increased.
- The higher the dental malocclusions in an individual, the lesser are the self-perceived aesthetics and lower is the self-esteem.

The results show the importance of creating awareness regarding Orthodontic treatment along with regular orthodontic screening and clinical visits in adolescence. Psychological counseling should be made available throughout schools in India to make the children adept in handling the changes happening to them and the environment around them. Parents and Teachers should be made aware about orthodontia and its importance. Sensitization programs regarding adolescent psychology should be provided to the teachers by the institute.

Appropriate channel should be opened for a discussion between the Orthodontist, the General Practitioner and Counselors along with other therapists for overall mental, physical and psychological development and well-being of the children.

It is imperative to remember that Self Confidence is the first requisite to great undertakings.

SUMMARY

Prior research has suggested that the appearance of an individual's teeth can have a substantial impact on their social and psychological well-being, which can be reflected in their conduct and effect their self-confidence.

The purpose of this investigation was to assess the Self-Esteem and Malocclusion of adolescents aged 14-18 years of age and to assess whether there is any correlation between the above said.

A total of 310 adolescents were taken in this study who fit into the inclusion criteria with almost equal proportions of boys and girls. Samples were collected from different zones of Belagavi City.

The malocclusion was examined by using the DHC of IOTN and Self Esteem was evaluated using the Global Negative Self Esteem Scale. The children were examined in school grounds under natural light.

The results showed significant correlation between Self-Esteem levels and Malocclusion as assessed by DHC of IOTN. Children who scored higher on the Global negative self-esteem scale i.e. had lower self-esteem scored high on the IOTN meaning they had higher need for treatment. Their self-perceived esthetics were low, which showed that they were not satisfied with their dental appearance. There was a significant social impact seen due to malocclusion. Children felt the need to hide their teeth while smiling and also thought that having straighter teeth made them more popular among their peers.

The teachers and students should be made aware about Orthodontics as a treatment. Sensitization about psychology of adolescents should be done by the authorities for the teachers.

Regular educational camps followed by early treatment and intervention can be done which can in turn increase the self-esteem in adolescents.

The study serves as a window into how the adolescent mind works, and how esthetics and malocclusion impact the psyche. Since major reason why most individuals undergo orthodontics treatment is to increase their facial esthetics, correlation of self-esteem and self-perceived esthetics to malocclusion becomes all the more important.

This study serves as a basis for further longitudinal study to assess the correlation of malocclusion and self-esteem in other older age groups.

Hence further research on this topic holds great scope.

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ANNEXURE – I - ETHICAL CLEARANCE LETTER

	Research and Ethics Committee KLE VK INSTITUTE OF DENTAL SCIENCES A Constituent Unit of KLE Academy of Higher Education & Research Accredited 'A' Grade by NAAC Placed in Category 'A' by MHRD (GoI) Nehru Nagar, Belagavi - 590 010, Karnataka State ☎: 0831-2470362 Web: http://www.kledental-bgm.edu.in FAX: 0831-2470640 E-mail: principal@kledental-bgm.edu.in	
CERTIFICATE		SI. No. : 1603
EC/NE/WINST/2021/2435 Research & Ethics Committee		
<i>This is to Certify that the synopsis titled</i>		
<i>Assessing the need for Orthodontic treatment using IOTN and impact of malocclusion on self esteem of adolescents in schools of Belagavi city : A CROSS SECTIONAL STUDY</i>		
Submitted by _____		
Dr. _____ P. G. Student /		
Staff, Guided by _____ from Department of		
<i>Orthodontics and Dentofacial Orthopaedics has been critically evaluated by committee members and granted ethical clearance to conduct the above mentioned study</i>		
Date : 31/4/24		
 Member Secretary Research and Ethical Committee KLEVK Institute of Dental Sciences Belagavi	 Chairman Research and Ethical Committee KLEVK Institute of Dental Sciences Belagavi	
MEMBER SECRETARY Research & Ethical Committee KLEVK Institute of Dental Sciences Belagavi	Chairman Research & Ethical Committee KLEVK Institute of Dental Sciences Belagavi	

ANNEXURE- II - GLOBAL NEGATIVE SELF ESTEEM SCALE

QUESTIONNAIRE

Answer the following questionnaire to the best of your abilities. Each question has ranking from 1 to 6, mark the response which you feel is correct or which applies to you. Do not mark more than one option for one question.

	1: does not apply at all	2: does not apply well	3: applies somewhat well	4: applies fairly well	5: applies well	6: applies exactly
At times I feel I'm no good at all						
I feel I don't have much to be proud of						
I certainly feel useless at times						
All in all I'm inclined to feel that I'm a failure						
I would like to change many things about myself						
I have often wanted to become someone else						

ANNEXURE- III - SELF-PERCEIVED AESTHETICS**QUESTIONNAIRE**

Answer the following questionnaire to the best of your abilities. Mark the response which you feel is correct. Do not mark more than one option for one question.

QUESTIONNAIRE				
Do you think you need orthodontic treatment?	1: not at all	2: maybe	3: most probably	4: definitely
Are you satisfied with the way your teeth look?	1: not at all	2: a little	3: satisfied	4: very satisfied
Do you think having straight teeth makes you more popular?	1: not at all	2: a little	3: probably	4: definitely
Do you think having straight teeth makes you successful in life?	1: not at all	2: a little	3: probably	4: definitely
Have you been told by other people that you need to have your teeth straightened?	1: never	2:sometimes	3: most of times	4: always
Have you been teased about your teeth?	1: never	2:sometimes	3: most of times	4: always
Do you avoid smiling to hide your teeth?	1: never	2:sometimes	3: most of times	4: always

ANNEXURE-IV - PERMISSION LETTER

PERMISSION LETTER

From:

Post Graduate Student
Department of Orthodontics and Dentofacial Orthopaedics
KLE Vishwananth Katti Institute of Dental Sciences

Through:

Professor
Department of Orthodontics and Dentofacial Orthopaedics
KLE Vishwananth Katti Institute of Dental Sciences

To:

Respected Sir/Ma'am,

SUB: Permission to carry out oral examination

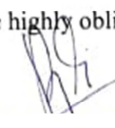
I, _____ a post graduate student in the Department of Orthodontics and Dentofacial Orthopaedics am conducting **an orthodontics awareness study** to assess the severity of malocclusion in adolescents and impact of malocclusion on self-esteem in adolescents. I will be examining the oral status/teeth arrangement of children and ask the students to fill a questionnaire to assess their self-esteem levels.

This will help the school to assess if the adolescents require orthodontic treatment or not and results indicating low self-esteem will be shared with the school/teachers/ parents for counselling of the adolescents.

It is purely an observational study, and thus there is no intervention that will be done, and I will require to only screen the children of your institute between ages 14-18 years.

I kindly request you to grant me the permission to do so. I will be highly obliged to you and your institute.

Thanking You


Professor
Consultant : 2113-A
Orthodontics KAHER, KLE VK II
BELAG AVI

Professor
KLE VK Institute of
Dental Sciences

ANNEXURE-V - ASSENT FORM

K. L. E ACADEMY OF HIGHER EDUCATION AND RESEARCH

K. L. E V.K. INSTITUTE OF DENTAL SCIENCES,

Belagavi- 590010

DEPARTMENT OF ORTHODONTICS AND DENTOFACIAL

ORTHOPAEDICS

“Assessing the Need for Orthodontic Treatment Using IOTN and Impact of Malocclusion on Self Esteem of Adolescents in Schools of Belagavi City: A Cross Sectional Study”

ASSENT FORM

This study is being done by **Dr.** _____ at KLE VK Institute of Dental Sciences, Belagavi. The study is being conducted to assess the self-esteem levels in adolescents due to the presence of malocclusion, in government and private schools.

- I agree to give my personal details like name, age, gender, address, and details required for the study to the best of my knowledge.
- I understand that I have been asked to participate in a study about assessing the correlation between self-esteem and malocclusion.
- I will be asked to fill a questionnaire, which will take about 5 minutes. I also understand that I do not have to answer any questions I do not want to answer or do anything I do not want to do.
- The researcher will also conduct oral examination (teeth check-up) which is a non-invasive, non-interventional procedure with no risks involved in this procedure.

- The information about the study to be conducted will be given to my parents/guardians/teachers.
- My teachers or anyone else who is not involved in this study will not know what I have said, only the researcher will know.
- I understand that I do not have to be in this study if I do not want to and I can stop being in this study at any time.
- By signing this paper, I agree that I have read and understood the contents of this assent form and want to take part in this study.

I, _____ aged ____ years old have
been informed about my involvement in the study.

Signature of Participant:

Date:

Signature of Investigator:

Date:

ANNEXURE-VI - CONSENT FORM

**KLE Vishwanath Katti Institute of Dental Sciences, Belagavi Department of
Orthodontics and Dentofacial Orthopedics**

**“Assessing the Need for Orthodontic Treatment Using IOTN and Impact of
Malocclusion on Self Esteem of Adolescents in Schools of Belagavi City: A Cross
Sectional Study”**

Description of the Study: This study is to assess the self-esteem levels in adolescents due to the presence of malocclusion, in government and private schools.

This can help us identify the psychological well-being of children and identify the need of orthodontic treatment.

CONSENT FORM

1. I, __aged__ years old have been informed about my involvement in the study.
2. I agree to give my personal details like name, age, sex, address, previous, medical history and the details required for the study to the best of my knowledge
3. I will cooperate with the researcher for Self-esteem and Severity of malocclusion examinations.
4. I permit the researcher to utilize the information given by me and results obtained from this study for presentation and publication purpose.
5. I understand that the tests to be performed are non-invasive observational tests, and do not carry any risks.

6. I will not claim any returns for my cooperation in the study, even if it is being sponsored by any agency. I am participating with my own will and wish.

7. In my full consciousness and presence of mind, after understanding all the procedure in my vernacular language, I am willing and giving my consent to participate in this study.

Signature of the participant :.....

Signature of the researcher:.....

Date:.....

Place:.....

ANNEXURE-VII - PATIENT INFORMATION SHEET

**KLE Vishwanath Katti Institute of Dental Sciences, Belagavi Department of
Orthodontics and Dentofacial Orthopedics**

Patient Information Sheet

**“Assessing The Need For Orthodontic Treatment Using IOTN And Impact Of
Malocclusion On Self Esteem Of Adolescents In Schools Of Belagavi City: A
Cross Sectional Study”**

Dear Patient,

You are invited to take part in a research study to assess the need of orthodontic treatment and effect of malocclusion on self-esteem. This research is a part of a M.D.S. main dissertation at KLE Academy of Higher Education and Research. You will be also asked to sign a consent/assent form. The purpose of this research study is to assess if there is a correlation between the severity of malocclusion and self-esteem in adolescents. The tests are non-invasive, and do not carry any side-effects. The information gained from this research might be used to publish in scientific platforms/ journals without revealing your identity to make recommendations for the best practice and adequate methods to improve awareness about need of orthodontic treatment.

Dr.

PG Student (MDS)

Department of Orthodontics and Dentofacial Orthopaedics

KLE-VKIDS, Belagavi

ANNEXURE-VIII - STUDY PROFORMA

**KLE ACADEMY OF HIGHER EDUCATION AND RESEARCH
(KAHER) KLE VISHWANATH KATTI INSTITUTE OF DENTAL
SCIENCES, BELAGAVI- 590010**

DEPARTMENT OF ORTHODONTICS AND DENTOFACIAL ORTHOPAEDICS

**“Assessing The Need For Orthodontic Treatment Using IOTN And Impact Of
Malocclusion On Self Esteem Of Adolescents In Schools Of Belagavi City: A
Cross Sectional Study”**

Study ID No:
Date of Birth:

Name:
Age:

Sex:

IOTN DENTAL HEALTH COMPONENT	5	4	3	2	1
Missing Teeth	5h	4h			
	5s				
Overjet	5a	4a	3a	2a	
		4b	3b	2b	
		4m			
Crossbite		4c	3c	2c	
		4l			
Displacement of Contact points	5i	4d	3d	2d	
		4t			
		4x			
Overbite (including Open Bite)		4e	3e	2e	
		4f	3f	2f	

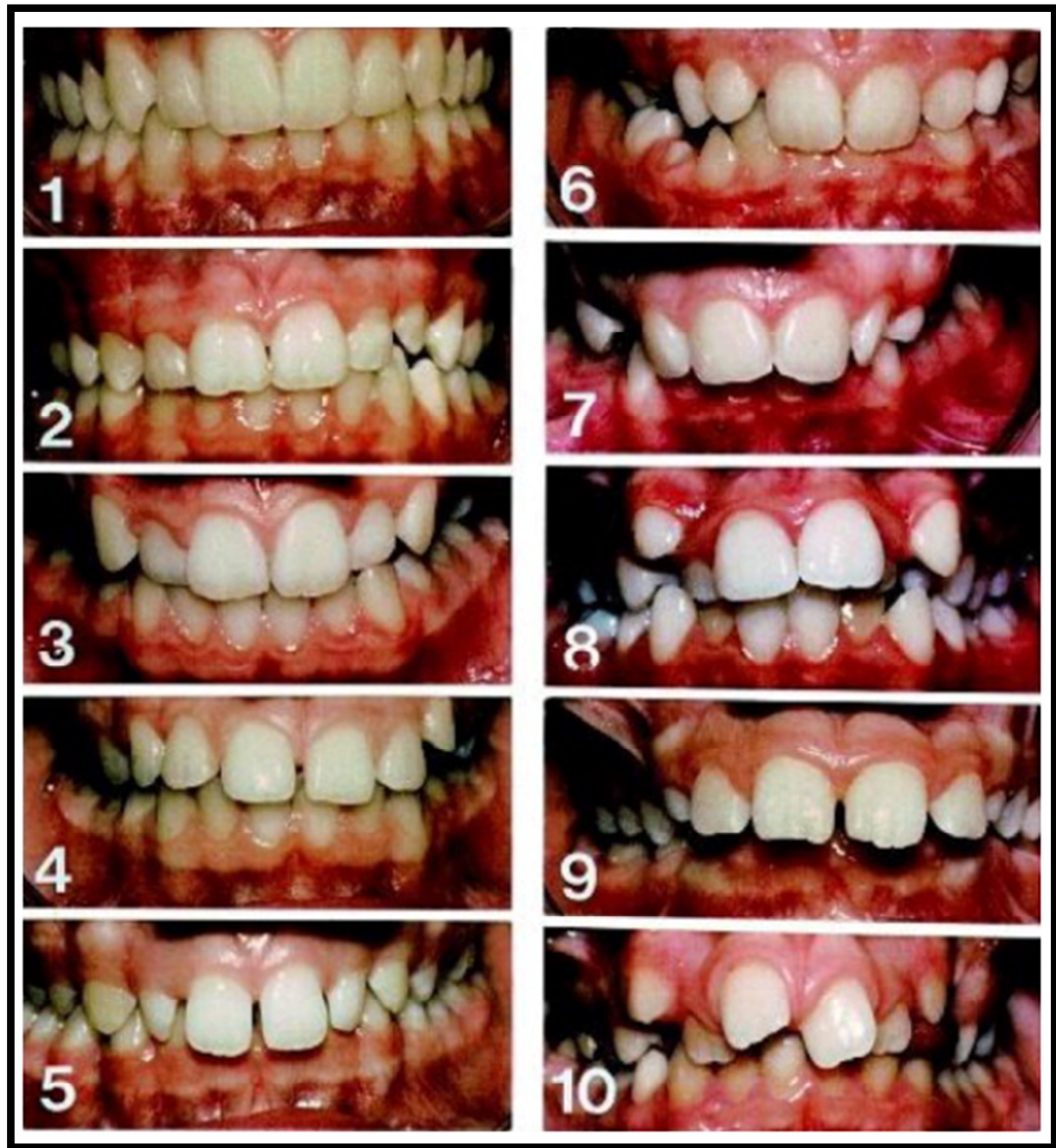
SCORE:

ANNEXURE-IX - INDEX OF ORTHODONTIC TREATMENT NEEDS**DENTAL HEALTH COMPONENT:**

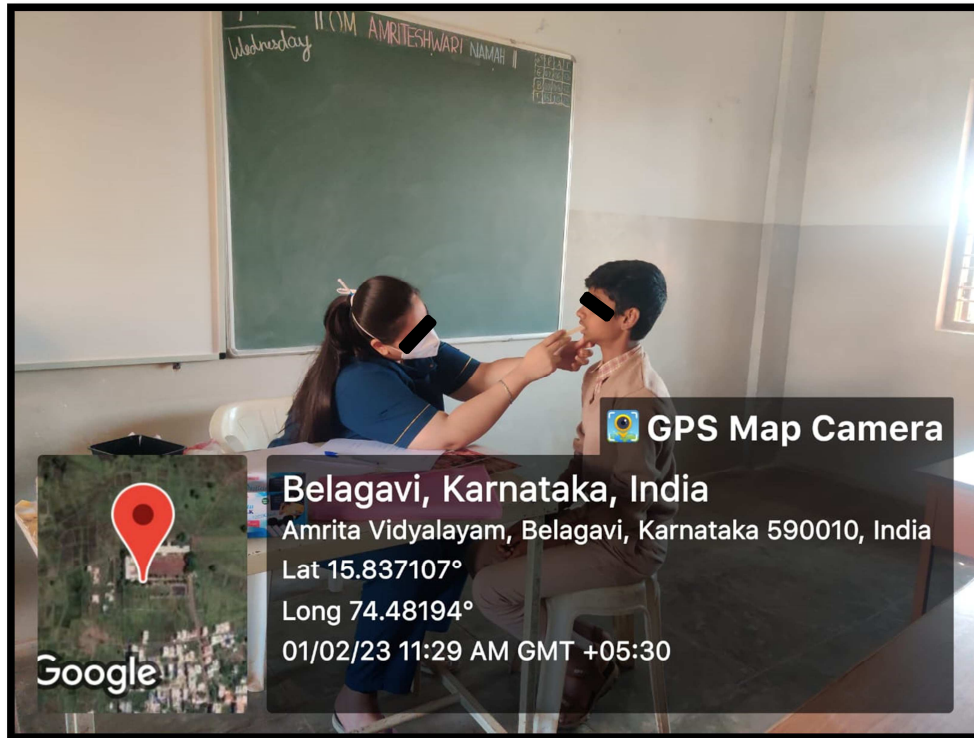
Dental Health Component of IOTN (Treatment need from a dental health perspective)	
Grade 5 (Very Great)	<ul style="list-style-type: none"> a. Increased overjet >9mm b. Extensive hypodontia with restorative implications c. Impeded eruption of teeth due to crowding, displacement, the presence of supernumerary teeth, retained deciduous teeth and any pathological cause d. Reverse overjet greater than 3.5mm with reported masticatory and speech difficulties e. Defects of cleft lip and palate f. Submerged deciduous teeth
Grade 4 (Great)	<ul style="list-style-type: none"> a. Increased overjet >6mm but <9mm b. Reverse overjet >3.5mm with no masticatory or speech difficulties c. Anterior or posterior crossbites with >2mm discrepancy between retruded contact position and intercuspal position d. Severe displacement of teeth >4mm e. Extreme lateral or anterior open bite >4mm f. Increased and complete overbite with gingival or palatal trauma g. Less extensive hypodontia requiring pre-restorative orthodontics or orthodontic space closure to obviate the need for a prosthesis h. Posterior lingual crossbite with no functional occlusal contact in one or both buccal segments i. Reverse overjet greater than 1mm but <3.5mm with recorded masticatory and speech difficulties j. Partially erupted teeth, tipped and impacted against adjacent teeth k. Supplemental teeth
Grade 3 (Borderline)	<ul style="list-style-type: none"> a. Increased overjet >3.5mm but <6mm with incompetent lips b. Reverse overjet greater than 1mm but <3.5mm c. Anterior or posterior crossbite with >1mm but <2mm

	<p>discrepancy between retruded contact position and intercuspal position</p> <p>d. Displacement of teeth >2mm but to <4mm</p> <p>e. Lateral or anterior open bite greater 2mm but <4mm</p> <p>f. Increased and complete overbite without gingival or palatal trauma</p>
<p>Grade 2 (Little)</p>	<p>a. Increased overjet >3.5mm <6mm with competent lips</p> <p>b. Reverse overjet >0mm but <1mm</p> <p>c. Anterior or posterior crossbite with <1mm discrepancy between retruded contact position and intercuspal position</p> <p>d. Displacement of teeth >1mm but <2mm</p> <p>e. Anterior or posterior open bite >1mm but <2mm</p> <p>f. Increased overbite >3.5mm without gingival contact</p> <p>g. Prenormal or postnormal occlusions with no other anomalies. Includes upto half a unit discrepancy</p>
<p>Grade 1 (None)</p>	<p>a. Extremely minor malocclusions including displacements <1mm</p>

AESTHETIC COMPONENT:



ANNEXURE-X - PHOTOGRAPHS



ANNEXURE-XI - APPROVAL LETTERS

From: The Principal,
RN Shetty Polytechnic College
Belgaum

To: Whomever it may concern

Respected Sir/Ma'am,

SUB: Oral examination for sample collection for thesis

This is to inform that _____ Post Graduate student from Department of Orthodontics, KLE VK Institute of Dental Sciences, conducted an oral examination on children aged between 14-18 years on *30/01/2024*. The oral examination for thesis sample collection occurred on school ground.

Thanking you

[Signature]
Principal *24/03/24*
PRINCIPAL
S. S. Education Trust's
R. N. Shetty Polytechnic
Shivbasa Nagar, BELAGAVI-10

From: The Principal,
KLES International School
Belgaum

To: Whomever it may concern

Respected Sir/Ma'am,

SUB: Oral examination for sample collection for thesis

This is to inform that _____ Post Graduate student from Department of Orthodontics, KLE VK Institute of Dental Sciences, conducted an oral examination on children aged between 14-18 years on *01-02-2024*. The oral examination for thesis sample collection occurred on school ground.

Thanking you

[Signature]
Principal
KLES International School

From: The Principal,
Vanita Vidyalaya,
Belgaum

To: Whomever it may concern

Respected Sir/Ma'am,

SUB: Oral examination for sample collection for thesis

This is to inform that _____, Post Graduate student from Department of Orthodontics, KLE VK Institute of Dental Sciences, conducted an oral examination on children aged between 14-18 years on 31.01.2024. The oral examination for thesis sample collection occurred on school ground.

Thanking you

Principal
[Signature]
Vanita Vidyalaya
JANTA VIDYALAYA HIGH SCHOOL
BELGAUM

From: The Principal,
Amrita Vidyalayam,
Belgaum

To: Whom it may concern


Respected Sir/Ma'am,

SUB: Oral examination for sample collection for thesis

This is to inform that _____, Post Graduate student from Department of Orthodontics, KLE VK Institute of Dental Sciences, conducted an oral examination on children aged between 14-18 years on 01.02.2023. The oral examination for thesis sample collection occurred on school ground.

Thanking You

Principal
[Signature]
PRINCIPAL
AMRITA VIDYALAYAM
BELAGAVI.



From: The Principal,
Jyoti Central School,
Belgaum


To: Whomever it may concern

Respected Sir/Ma'am,

SUB: Oral examination for sample collection for thesis

This is to inform that Post Graduate student from Department of Orthodontics, KLE VK Institute of Dental Sciences, conducted an oral examination on children aged between 14-18 years on 05.02.2024. The oral examination for thesis sample collection occurred on school ground.

Thanking you

Principal 
PRINCIPAL
Jyoti Central School
Camp, Belgaum

From: The Principal,
Love Dale Central School
Belgaum


To: Whomever it may concern


Respected Sir/Ma'am,

SUB: Oral examination for sample collection for thesis

This is to inform that Post Graduate student from Department of Orthodontics, KLE VK Institute of Dental Sciences, conducted an oral examination on children aged between 14-18 years on 6/02/2024. The oral examination for thesis sample collection occurred on school ground.

Thanking you

Principal 
Love Dale Central School



ANNEXURE-XII - DATA EXTRACTION SHEET**Global Self-Esteem Questionnaire**

Participant Code	M/F	Age	Q1	Q2	Q3	Q4	Q5	Q6
1	2	14	3	4	2	1	4	3
2	2	15	1	1	3	1	5	1
3	2	15	3	3	1	3	6	6
4	1	15	4	5	2	3	6	6
5	2	15	3	2	3	3	6	6
6	2	14	4	4	4	3	6	6
7	1	14	6	1	5	1	6	1
8	2	15	3	6	4	2	6	5
9	1	14	3	1	1	1	4	4
10	2	14	2	1	2	1	6	5
11	2	15	4	2	1	1	2	1
12	2	15	5	3	3	3	5	2
13	1	15	5	1	5	1	1	1
14	2	14	1	2	5	1	6	6
15	2	14	6	2	4	1	3	6
16	2	15	4	4	2	2	5	4
17	1	15	6	1	1	2	6	6
18	2	14	5	3	5	3	2	3
19	2	15	3	5	3	3	6	3
20	1	15	1	3	2	1	6	6
21	1	15	3	4	3	3	6	5
22	1	15	1	3	2	5	5	1
23	1	15	6	5	1	6	6	6
24	1	16	2	1	2	1	6	1
25	2	16	2	3	1	3	6	1
26	1	15	1	2	2	2	5	2
27	1	15	3	3	1	1	3	1
28	1	14	4	1	1	1	6	6
29	1	15	1	2	1	1	3	4
30	1	15	2	3	2	1	6	4
31	1	14	2	1	1	1	3	4
32	1	15	5	1	4	2	6	6
33	2	14	2	3	2	2	6	3
34	1	14	1	2	1	1	6	2
35	1	15	3	2	3	1	6	1
36	1	15	2	1	2	1	3	2
37	2	14	3	3	2	2	5	6
38	1	14	3	2	2	1	3	2
39	1	15	3	2	1	1	5	4
40	2	14	3	4	2	2	4	3
41	1	16	1	2	1	1	2	1
42	2	16	2	2	1	1	5	1
43	1	16	3	2	1	3	1	2

44	2	16	4	5	5	5	6	5
45	1	16	1	1	1	1	5	4
46	1	16	4	4	3	2	4	4
47	1	16	1	2	1	1	4	1
48	1	16	2	2	2	1	6	6
49	1	16	1	2	2	1	5	5
50	1	16	1	2	2	1	2	1
51	2	15	2	2	2	1	2	1
52	2	15	3	5	4	2	6	5
53	2	15	2	3	2	1	2	2
54	1	15	1	1	2	2	3	1
55	1	15	4	4	5	5	3	6
56	1	16	2	2	3	1	6	6
57	1	15	3	1	1	2	5	6
58	1	15	2	3	1	1	3	1
59	1	15	1	3	1	1	5	4
60	1	15	1	3	1	1	5	4
61	1	15	2	3	1	1	4	4
62	1	16	1	3	1	1	1	2
63	2	15	3	2	3	2	2	1
64	2	15	2	1	3	3	5	1
65	2	15	3	2	3	2	2	1
66	2	16	1	2	2	1	2	3
67	2	16	2	1	3	1	3	1
68	1	16	2	2	1	1	2	1
69	2	15	4	3	5	4	4	3
70	2	15	4	4	3	4	6	5
71	2	16	3	4	5	6	6	3
72	1	15	3	3	1	2	4	2
73	1	16	2	3	3	2	3	1
74	2	15	5	3	5	3	5	1
75	2	16	3	2	2	1	3	1
76	1	16	2	1	3	1	6	1
77	1	15	3	3	1	1	5	1
78	1	15	1	1	1	1	6	1
79	2	16	5	5	5	3	6	5
80	2	15	3	2	3	1	5	1
81	2	15	3	3	1	1	4	2
82	1	14	3	2	2	3	1	2
83	1	15	1	1	1	1	6	6
84	1	16	1	1	1	1	6	5
85	1	15	1	2	2	4	5	5
86	2	15	2	1	2	1	6	2
87	2	15	2	1	2	1	4	6
88	2	16	5	6	2	2	6	6
89	2	16	1	1	1	1	6	2
90	2	15	6	6	1	1	6	3
91	2	15	6	1	2	1	1	2

92	2	16	6	1	1	1	6	2
93	2	16	5	2	1	1	4	6
94	2	15	6	1	1	2	6	6
95	2	16	6	6	1	1	5	6
96	2	15	3	1	1	1	6	6
97	2	16	6	1	1	2	3	4
98	2	15	6	3	3	4	6	6
99	2	15	1	6	1	1	6	6
100	2	16	1	6	1	1	5	6
101	2	15	5	6	2	2	5	6
102	2	16	5	6	2	2	6	5
103	1	15	5	6	2	2	6	5
104	2	15	5	6	2	1	5	6
105	2	15	5	6	2	1	5	6
106	2	16	5	6	2	1	6	5
107	2	16	5	6	2	1	6	2
108	2	15	6	6	2	1	5	4
109	2	15	5	1	1	3	4	6
110	2	15	5	6	2	1	6	5
111	2	16	5	5	1	1	5	6
112	2	15	6	2	6	6	6	6
113	2	16	2	1	1	1	4	5
114	2	16	2	1	1	2	2	4
115	2	15	2	1	5	6	6	6
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Self-Perceived Aesthetic Questionnaire

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258	2	3	4	1	1	1	2
259	3	1	3	1	2	2	2
260	4	1	3	1	1	1	2
261	1	3	2	2	2	1	2
262	1	2	1	2	1	1	2
263	1	4	1	1	1	1	1
264	4	1	4	4	4	4	4
265	2	2	1	2	3	1	1
266	4	1	4	4	3	4	3
267	1	4	1	1	1	1	1
268	1	4	2	2	2	1	1
269	2	3	1	1	1	1	1
270	1	3	2	1	1	2	1
271	2	2	3	2	1	1	1
272	1	2	1	1	1	1	1
273	3	2	1	1	2	4	4
274	3	2	3	1	3	3	2
275	4	2	2	2	3	2	1
276	3	1	3	1	2	2	3
277	2	3	3	2	1	1	1
278	4	2	3	3	2	3	2
279	3	2	1	1	2	2	1
280	1	4	3	4	2	1	1
281	3	2	2	2	2	2	3
282	2	4	1	1	2	1	1
283	4	1	2	3	2	3	2
284	1	3	2	1	1	1	1
285	2	2	1	2	1	1	1
286	4	1	4	3	4	3	2
287	1	2	1	1	2	1	1
288	2	3	1	1	1	1	1
289	3	1	4	2	3	2	3
290	1	4	2	1	2	1	1
291	4	1	3	2	2	2	2

292	2	4	1	1	2	1	1
293	4	1	3	3	3	3	2
294	1	2	4	1	1	1	1
295	2	2	4	3	1	1	1
296	1	3	3	2	1	1	2
297	4	2	3	1	1	1	1
298	4	1	2	2	4	4	2
299	3	2	1	3	2	1	2
300	3	2	3	2	2	1	2
301	4	1	4	1	4	2	2
302	4	1	2	2	4	2	4
303	2	2	1	1	1	2	1
304	4	1	4	4	3	3	4
305	2	3	2	3	2	1	1
306	2	3	1	2	2	1	2
307	3	2	1	2	2	1	1
308	4	2	3	1	2	2	1
309	4	3	1	1	2	2	2
310	1	3	3	1	1	1	1

IOTN- DHC AND AC AND MALOCCLUSION

Participant Code	DHC	AC	Malocclusion
1	3d	1	Class I
2	3d	1	Class I
3	3a	3	Class I
4	4a	3	Class I
5	4b	6	Class II
6	3b	1	Class I
7	2a	1	Class I
8	3c	3	Class II
9	4a	1	Class II
10	4d	1	Class I
11	4c	6	Class I
12	3a	6	Class I
13	3a	1	Class I
14	2d	1	Class I
15	4e	10	Class III
16	3e	2	Class I
17	3a	1	Class I
18	2a	1	Class I
19	4a	3	Class II
20	4d	1	Class I
21	3d	1	Class I
22	2e	2	Class I
23	3a	2	Class I
24	3d	1	Class I
25	4d	2	Class II
26	3a	2	Class I
27	4a	2	Class I
28	4e	5	Class II
29	3d	2	Class I
30	4a	3	Class I
31	4d	1	Class I
32	3d	2	Class I
33	2e	4	Class I
34	3a	3	Class I
35	3d	1	Class I
36	4a	2	Class II
37	3d	3	Class I
38	3a	4	Class I
39	4e	3	Class I
40	5a	8	Class II
41	4a	4	Class I
42	4a	9	Class II

43	2a	2	Class I
44	4a	3	Class I
45	3a	2	Class I
46	3a	3	Class I
47	3d	3	Class I
48	4e	4	Class II
49	4d	3	Class I
50	3d	3	Class I
51	3a	4	Class I
52	4a	1	Class I
53	3a	2	Class I
54	3d	2	Class I
55	3d	6	Class I
56	4d	9	Class II
57	3a	2	Class I
58	4a	4	Class II
59	3d	3	Class I
60	4a	2	Class I
61	4a	2	Class I
62	3a	1	Class II
63	2a	1	Class I
64	4d	2	Class I
65	2a	3	Class I
66	3c	3	Class I
67	3a	2	Class I
68	3a	4	Class I
69	3a	1	Class I
70	4a	10	Class III
71	4a	5	Class I
72	3a	1	Class I
73	3a	1	Class I
74	3a	2	Class I
75	3c	3	Class II
76	3a	3	Class I
77	3a	2	Class I
78	5a	2	Class II
79	4c	3	Class I
80	4d	3	Class I
81	4a	3	Class I
82	4a	8	Class I
83	5a	9	Class II
84	4a	3	Class I
85	3e	5	Class II
86	4a	5	Class I
87	3a	2	Class I

88	3a	2	Class I
89	3d	3	Class I
90	4a	1	Class I
91	3a	3	Class I
92	3a	1	Class I
93	3d	2	Class II
94	3d	1	Class I
95	4d	6	Class I
96	3d	1	Class I
97	2a	1	Class I
98	3d	1	Class I
99	2a	1	Class I
100	3d	1	Class I
101	3d	2	Class II
102	2a	1	Class I
103	4a	3	Class I
104	3a	3	Class I
105	3a	2	Class I
106	3d	3	Class I
107	4d	1	Class I
108	2d	1	Class I
109	3d	1	Class I
110	4a	2	Class I
111	3a	1	Class II
112	4d	1	Class I
113	3a	3	Class I
114	5a	2	Class I
115	3d	2	Class I
116	4a	4	Class I
117	2d	3	Class I
118	4a	1	Class I
119	3d	3	Class II
120	4a	8	Class I
121	3a	1	Class I
122	3d	4	Class I
123	3a	1	Class I
124	3d	2	Class I
125	3a	2	Class I
126	4c	3	Class II
127	3d	4	Class II
128	4d	3	Class I
129	3d	4	Class I
130	4c	3	Class I
131	4d	3	Class I
132	3a	3	Class I
133	4a	3	Class I

134	3d	3	Class II
135	4e	3	Class I
136	3a	3	Class I
137	3a	1	Class I
138	3d	1	Class I
139	4a	4	Class I
140	3a	2	Class I
141	3a	1	Class I
142	4d	4	Class I
143	3a	3	Class I
144	3d	1	Class I
145	3d	1	Class I
146	3a	3	Class I
147	2a	1	Class I
148	3a	1	Class I
149	3d	1	Class II
150	2d	1	Class I
151	3d	1	Class II
152	4a	3	Class II
153	3e	1	Class I
154	3c	2	Class I
155	3c	2	Class I
156	4h	2	Class II
157	3a	1	Class I
158	4a	2	Class I
159	2d	1	Class I
160	3d	1	Class II
161	2a	1	Class I
162	3d	4	Class II
163	3d	3	Class I
164	3d	1	Class I
165	2d	3	Class I
166	2a	2	Class I
167	3d	3	Class II
168	2a	1	Class I
169	4a	3	Class II
170	4d	1	Class I
171	3d	1	Class I
172	2e	2	Class I
173	3d	3	Class II
174	3d	2	Class I
175	3a	1	Class I
176	3c	1	Class II
177	3a	1	Class I
178	3d	1	Class I
179	3d	2	Class I

180	4d	2	Class I
181	4d	1	Class I
182	3c	1	Class II
183	3a	1	Class I
184	3d	1	Class I
185	3d	2	Class I
186	4a	3	Class II
187	3d	2	Class I
188	2d	1	Class I
189	3d	1	Class II
190	2a	1	Class I
191	3d	4	Class II
192	3d	3	Class I
193	3d	1	Class I
194	2d	3	Class I
195	2a	2	Class I
196	3d	3	Class I
197	2a	1	Class I
198	3a	3	Class I
199	2d	3	Class I
200	2a	2	Class II
201	3d	3	Class I
202	2a	2	Class I
203	3a	1	Class I
204	4a	2	Class II
205	3a	2	Class I
206	3c	3	Class I
207	3a	3	Class I
208	3a	2	Class I
209	3a	2	Class I
210	4c	3	Class II
211	2a	2	Class I
212	3d	3	Class I
213	2a	2	Class II
214	3a	1	Class I
215	2a	2	Class I
216	3d	3	Class I
217	2a	2	Class I
218	3a	1	Class I
219	2a	2	Class II
220	3d	3	Class I
221	2a	1	Class II
222	3d	2	Class I
223	2a	2	Class I
224	4d	3	Class II

225	3a	2	Class I
226	4a	2	Class I
227	2a	1	Class II
228	3d	2	Class I
229	4a	2	Class II
230	3d	3	Class I
231	4a	6	Class I
232	3a	2	Class II
233	2a	2	Class I
234	3d	2	Class I
235	4a	3	Class II
236	2c	2	Class I
237	3d	3	Class I
238	3a	3	Class II
239	3a	2	Class I
240	2a	2	Class I
241	2a	2	Class I
242	2a	2	Class II
243	2a	1	Class I
244	2a	2	Class I
245	2a	1	Class I
246	3d	2	Class I
247	2d	1	Class I
248	2d	2	Class I
249	2a	2	Class I
250	2a	2	Class II
251	4a	1	Class II
252	3d	2	Class I
253	3c	1	Class I
254	3a	1	Class I
255	3a	1	Class II
256	4a	1	Class I
257	3d	3	Class I
258	3a	2	Class II
259	3a	2	Class I
260	3d	2	Class II
261	3a	1	Class I
262	3d	2	Class I
263	3a	1	Class II
264	4d	9	Class III
265	2a	5	Class II
266	4a	4	Class I
267	3a	1	Class I
268	2a	1	Class I
269	2e	2	Class I

270	3a	1	Class I
271	3a	1	Class II
272	3a	2	Class I
273	3d	3	Class II
274	4a	3	Class I
275	4a	2	Class I
276	4a	6	Class II
277	3b	1	Class I
278	3a	1	Class I
279	3c	3	Class I
280	2a	1	Class II
281	4d	2	Class I
282	2a	2	Class I
283	4a	6	Class II
284	2a	1	Class I
285	2d	1	Class II
286	4d	8	Class II
287	3e	2	Class I
288	3a	4	Class II
289	3d	2	Class II
290	2a	1	Class I
291	4c	3	Class I
292	3a	2	Class I
293	4a	5	Class II
294	2a	2	Class I
295	2a	2	Class I
296	2d	2	Class II
297	3d	1	Class I
298	3c	2	Class II
299	4a	2	Class I
300	3d	2	Class II
301	4d	1	Class I
302	3d	2	Class I
303	3a	2	Class I
304	2a	2	Class I
305	2a	2	Class II
306	2d	2	Class I
307	3d	1	Class II
308	3a	3	Class I
309	3a	1	Class II
310	3d	2	Class I