



T.C.

İSTANBUL YENİ YÜZYIL UNIVERSITY

HEALTH SCIENCES INSTITUTE

DEPARTMENT OF ORHODONTHICS

**The Need and Demand for Orthodontic Treatment and  
Perception of Dental Appearance in Egyptian School  
Children**

MASTER OF THESIS

RABIE T. D. NAAJI

Supervisor

Prof. Dr. Mustafa Haluk İŞERİ

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## **Abstract**

### **Purpose:**

The aim of this study was to evaluate the prevalence and severity of malocclusion and orthodontic treatment needs in a sample of 11-18-year-old Egyptian school children.

### **Materials and Methods:**

The total number of sample subjects required for this study was 140 comprising of 45.7% males and the remaining females. The sample was taken from two schools in Istanbul.

The study took place from February to April 2018. A two-stage cluster sample was selected.

Two schools were randomly selected among all junior-high schools in Istanbul (Turkey) and a random sample of 140 children aged 11–18 years old attending these schools was selected.

Parents of sampled children were notified about purposes of the study and invited to participate.

All parents who provided informed written consent completed a questionnaire related to sociodemographic details (name, sex, age, employment status, education level).

The test items assessed the subject's ability to recognize the presence or absence of malocclusion, knowledge to perceive the impact of mal-occlusion and attitude about orthodontic treatment.

The AC is designed to complement the DHC by recording the severity of anterior aesthetic tooth arrangement using 10 photographs size and color by using Microsoft Office Picture Manager.

Printouts of the photographs were shown to the patients' chair-side and were scored in accordance to the standard IOTN-AC, that graded from number 1, the best and most beautiful situation, to number 10, the worst situation in terms of tooth aesthetics.

## **Results:**

Based on the AC of the IOTN, 64.3% of the total number of the research population classified themselves as having good occlusal condition (i.e. grade 1-4). In contrast, only 2.9% of the schoolchildren put themselves in great need grade (grade 8-10).

However, (50.7%) of schoolchildren fall in 'no need' area, while (49.3%) had little need for orthodontic treatment according to the DHC.

The percentage of agreement (proportion of results in diagnostic agreement) between DHC and AC of the IOTN in the determination of treatment need or no need, for total sample, showed very low agreement.

## **Conclusions:**

Widespread use of the IOTN along with the detailed study of occlusal traits is suitable for planning community dental health resources. In the Egyptian school children living in Istanbul, 51% of school children presented an orthodontic treatment need and 49% have great need for orthodontic care.

## **Key words:**

IOTN, Orthodontic treatment, Dental appearance, School children.

## **Dedication**

**To** my homeland Libya and to my second homeland Turkey

**To** my first home Tripoli University and magnificent second home Istanbul Yeni Yüzyıl university.

**To** My dear parents, who never stop giving themselves in countless of ways.

**To** My dearest wife, who leads me through the valley of darkness with light of hope and support.

**To** my children Rasiel and Rakan of religion planted Via hope to complete this stage

**To** my supervisor Prof. Dr. Mustafa Haluk İŞERİ, this is the creative person who gives without stopping to push you towards the top.

**To** Prof. Dr. Gökmen Kurt the person I loved and how I wished he did not go.

**To** all my brothers and my friends who encourage and support me.

Last but not least to all the people in my life who touch my heart,

I dedicate this research.

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I wish to thank my parents for their love and encouragement, without whom I would never have enjoyed so many opportunities.

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# 1.Literature review

## 1.1 INTRODUCTION

A normal dental occlusion was defined by Angle (1899) as a situation where “the sizes, forms, interdigitating surfaces, and positions of the teeth in the arches are such as to give to one another, singly and collectively, the greatest possible support in all directions”. to Angle’s definition is considered an ideal occlusion. A such an occlusion is scarce in nature. However, normal occlusion could be defined as an occlusion which contain minor deviations from the ideal dental occlusion (1). In 1972, Andrews defined his six keys of the normal occlusion: correct molar relationship, no rotations, correct crown inclination, correct crown angulation and flat occlusal plane. (2).

Malocclusion can be defined as appreciable deviation from normal or ideal occlusion (Andrews 1972).

The etiology of malocclusion had been clarified by many theories, it was categorized into; genetic and environmental (3). Potter and Nance (1976) assessed that the hereditary of occlusal dentition and, in turn, the dental character are culmination of the reaction between multiple gene together with local impacts occurs. Moreover, Houston and Tulley (1986) stated that environmental impacts in modern population had increased the need for orthodontic care.

A research at 4, 14 and 20 years aimed at investigating the heritability of skeletal and dental related factors (4). They concluded that several craniofacial criteria are crucial in craniofacial development with significant heritability. In contrast, the heritability of occlusal and arch criteria was minimal and local factors have the greatest impact throughout postnatal development. Cassidy et al. (5) stated that arch width, posterior and cuspid relationships showed marked heritability. Conversely, the local impacts primarily affect dental rotation and overjets. A several of local effects were known as well. Those are habits, caries, trauma, chronic nasal obstruction, periodontitis, and decreased masticatory pressure emerging from delicate eating methodologies urban areas.

The spectrum of malocclusion differs a broadly in many areas internationally. Ethnicity plays an important role and this has been attributed to the effect of natural selection in breeding versus out-breeding and local influences (6). Recently, prevalence and severity of malocclusion has been reported higher.

Evensen et al (7) studied the occlusion condition in a sample of medieval Norwegians and made a comparison of the results with others, according to that a marked spur of malocclusion in the last 400 to 700 years in Norway was found. In the Middle East countries, malocclusion evaluation surveys had also been carried out. Their outcomes revealed a high of malocclusion prevalence. Behbehani et al. (2005) had a target sample of an adolescent Kuwaiti population with the aim of estimating the prevalence and severity of malocclusion. The conclusion was higher than 70% of the research population had moderate to severe discrepancies in Kuwait. Gelgö r et al. (2007) studied sample in Turkey and reported the major population (89.9%) had different kinds of malocclusion.

**Table 1.1:** of researches on malocclusion prevalence in brief.

Authors (year)	Population	Subjects		Registration Method	Malocclusion Prevalence (%)
		N	Age (years)		
Krzypow et al. (1975)	Israeli	538	18-20	Angle Classification	95.9
Lew et al. (1993)	Chinese	1050	12 - 14	Foster and Day (1974)	92.9
Tschill et al. (1997)	French	789	4 - 6	FDI method	57.6
Thilander et al. (2001)	Colombian	1441	13 - 17	Björk et al. 1964	88
Onyeaso (2004)	Nigerian	636	12 - 17	Angle Classification	76
Ciuffolo et al. (2005)	Italian	810	11 - 14	Criteria of National Health and Nutrition US Survey (Brunell et al. 1996)	93
Abu Alhaija et al. (2005a)	Jordanian	1003	13 - 15	Björk et al. 1964	92
Gábris et al. (2006)	Hungarian	483	16 - 18	WHO method (1986)	70.4
Jonsson et al. (2007)	Icelandic	829	31 - 44	Björk et al. 1964	54.5
Gelgö r et al. (2007)	Turkish	2329	12 - 17	Angle Classification	89.9
Dhar et al. (2007)	Indian	812	11 - 14	WHO method (1999)	38.9
Borzabadi-Farahani et al. (2009)	Iranian	502	11-14	Angle Classification	77.1
Martins and Lima (2009)	Brazilian	264	10 - 12	Angle Classification	74.2
Mtaya et al. (2009)	Tanzanian	1601	12 - 14	Modified Björk method by Al-Emran et al. (1990)	63.8
Jamilian et al. (2010)	Iranian	350	14 - 17	IOTN	83.7
Ekuni et al. (2011)	Japanese	641	18 - 19	IOTN	40.0

Malocclusion had a great interest in research field not only because it is common, but also as result of social well-being and self-confidence impacts. Researches on the psychosocial influences of malocclusion demonstrated that subjects with dento-facial discrepancies negatively perceived their dental appearance and had less self-confidence (8). Many reports have revealed that adolescents with unsatisfied dental alignment had tendency to neglect oral hygiene measures (9) (10), especially in individuals who tested bad psycho social impacts of their appearance decline. In contrast, the finding of many research revealed that there is a direct impact of malocclusion on the quality of life (11) (12) (13). Moreover, history of orthodontic intervention had indirect effects on stability and dental compliance and good oral hygiene (14) (15).

It was intriguing to take note of that appealing people without malocclusion were viewed as being more famous and perceived as having more prominent insight and furthermore indicated more confidence than subjects with malocclusion (16).

In clinical practice occlusal and skeletal characteristics determines the type malocclusion. For instance, Angle in 1899 classified the malocclusion to three types (Class I; neutroclusion, Class II; distocclusion, Class III; mesiocclusion), according to the sagittal molar relationship. Even though it was developed a century ago, Angle's classification is widely used in orthodontic clinical practice nowadays. However, due to its limitation, several endeavor such as, Incisor relationship classification index, was developed. Moreover, Bjork suggested more sophisticated method which take into account the individual morphological variables to register malocclusion (17).

**Table 1.2:** epidemiological surveys on malocclusion based on Angle classes assessment.

Authors (year)	Population	Subjects		Occlusion measurement			
		N	Age (years)	Normal	Malocclusion		
					Class I	Class II	Class III
Krzypow et al. (1975) <sup>(A)</sup>	Israeli	538	18-20	4.1	65.2	28.1	2.6
Isiekwe (1983) <sup>(A)</sup>	Nigerian	617	10-19		76.8	14.7	8.4
Garner and Butt (1985) <sup>(A)</sup>	Kenyan	505	13-14	16.8	51.7	7.9	16.8
	Black Americans	445	13-15	27.0	44.0	16.0	8.7
Kerosuo et al. (1988) <sup>(A)</sup>	Tanzanian urban	642	11-18		96.0	3.0	1.0
Al-Emran et al. (1990) <sup>(A)</sup>	Saudi Arabian	500	14			16.4	3.0
Diagne et al. (1993) <sup>(A)</sup>	Senegalese	1708	11-19		73.3	12.7	4.4
Tang (1994) <sup>(M)</sup>	Chinese	201	20 mean		63.7	16.4	19.9
Thilander et al. (2001) <sup>(A)</sup>	Colombian	1441	13-17			20.8	3.7
Lauc et al. (2003) <sup>(M)</sup>	Croatian	224	7-14		47.3	45.1	5.4
Onyeaso (2004) <sup>(A)</sup>	Nigerian	636	12-17	24.0	50.0	14.0	12.0
Abu Alhaija et al. (2005a) <sup>(M)</sup>	Jordanian	1003	13-15		79.8	18.8	1.4
Behbehani et al. (2005) <sup>(M)</sup>	Kuwaiti	1299	13-14		57.8	31.2	11.0
Behbehani et al. (2005) <sup>(C)</sup>					36.1	56.2	7.7

However, Occlusal traits are generally evaluated in clinical examination by recording single feature of malocclusion, but diagnostic divisions do not offer a measure of the severity of malocclusion. Thus, many standardized indices have been developed in an attempt to estimate occlusal discrepancies in research field and for clinical aims. Index of Orthodontic Treatment Need was developed on the basis that population with highest need for orthodontic care could be assigned priority when resources and accessibility of treatment are limited. Likewise, population with negligible need for care could be defended from the potential threats of orthodontic intervention (19). The story behind development of (IOTN) was government activity in UK and to help decide the possible influences of a malocclusion on an individual's oral health and psychosocial development (20). The orthodontic offices at the Universities of Bristol and Manchester were charged to embrace to carry out the task of building up an occlusal index to priorities for orthodontic treatment. The Index, in fact,

estimate the orthodontic treatment require depend on malocclusion severity. IOTN has two separate parts to measure malocclusion; objective assessment of the dental health and function indications for treatment (Dental Health Component, DHC), and subjective assessment of aesthetic decline due to malocclusion (Aesthetic Component, AC). The grades of Dental Health Component were based on The Swedish Public Health Index (21). Functional and dental health indication for treatment consisted of five grades. Grade 1- No need for treatment, grade 2- negligible need, grade 3- borderline need, grade 4- marked need, and grade 5- Very great need for orthodontic care (Appendix 1). Brook and Shaw (1989) tried to cut-off values between grades for each occlusal feature that represented a quantifiable trait to the dentition (22). The worst occlusal feature recorded as the highest scoring trait need. Recording of misalignment in Dental Health Component was measured according to the largest displacement between dentitions

The Dental Health Component of IOTN is an objective approach for recording of normative orthodontic care need of a population in an attempt to gain information on treatment priority. The index utilized the Dental Health Component ruler developed for clinical assessment which offered assessment standard for occlusal characteristics, as it relates to IOTN. Richmond et al. (1992a) stressed on the use of the Dental Health Component ruler to maintain a strategic distance from any perplexity in practice, the use of the DHC ruler was necessary for orthodontic care evaluation depending on the Index of Orthodontic Treatment Need. Standardized Continuum of Aesthetic Need (SCAN) by Evans and Shaw (1987) was used in the Index of Orthodontic Treatment Need as component of measuring aesthetic (24). Dental photographs of 1000 12-year old subjects was the base for AC scale construction. In fact, six lay judges related these photographs on a visual analogue scale, and at equal distances along the judged range. Representative photographs were selected giving a ten-point scale as follows: Grades 1, 2, 3 and 4 - No/ Slight need for treatment Grades 5, 6 and 7 - Moderate / Borderline need for treatment Grades 8, 9 and 10 - Great / need for treatment. Each rating was obtained by assessing the expanse in millimeters between the very unattractive ends of the scale corresponds to 10 possible degrees of dental aesthetics (25). The most attractive appearance gains 1 on the scale, while the least gains 10. It is important to mention that the health care provider should grade the anterior teeth according to their attractiveness and he should ignore any chipped tooth, poor restoration and/or poor gingival condition. Future dental appearance could not however, be made by this measurement system (26).

Index of Orthodontic Treatment Need was firstly validated by Brook and Shaw (1989) and Shaw et al. (1991). Then, the index was verified by several authors. For instance, Richmond et al. (1995) reported a Spearman's correlation coefficient of 0.86 and 0.64 for Aesthetic Component and dental health component, respectively. These results indicate a good correlation with the subjective opinions.

The findings of multitude numbers of studies related to the reliability and validity of IOTN index showed that IOTN offered precious data for assessing orthodontic treatment need. Trivedi (28) in his longitudinal study of reliability of IOTN assessed dental occlusion over time from orthodontists' perspective. Photographs and dental casts of a 45 12 year-old subjects were compared with follow-up records for same subject at 16 years of age. No one of the subjects received any orthodontic care during the 4 years. Four skilled orthodontists assessed the Aesthetic Component of IOTN while only one of the authors assessed the Dental Health Component of IOTN scores for both series of dental models. The outcomes revealed no significant decline in Aesthetic Component of IOTN overtime. However, the Dental Health Component of IOTN was proofed to be more firm overtime. The validity of the Orthodontic Treatment Need index over time was also asserted by (29) in their study on a sample of 314 11-15-year-old respondents, and 142 respondents aged 19 years. The exclusion criteria were; no previous orthodontic care or extractions. The alterations in the AC and the DHC of IOTN were measured. The findings were DHC was reliable over time. However, the AC had tendency to show an upgrade with time. This study removed clinicians' doubts to that an IOTN grading at the age of 11 was impossible to alter by the age the respondents approached 19 years old. The reliability and validity of IOTN formed the focus of a study by (30) in which the opinion of a panel of 15 experienced orthodontists were taken. They utilized 170 models as a representative of all types of malocclusion. The mean rating of the experienced orthodontists panel regarding the treatment need was used as the gold standard for deciding the index's validity. The IOTN was observed to be reliable for evaluating treatment need by orthodontists. Recently, in the other survey 100 diagnostic study models of adolescent patients with permanent dentition was examined (31). A panel of 10 orthodontists individually assessed the same models for malocclusion severity degree. The mean scores of the panel were analyzed. Moreover, re-evaluation for reliability on ten randomly selected models were done. In summary, the findings revealed that the IOTN was a reliable and valid approach for malocclusion evaluation.



**Table 1.3:** Summary of studies based on normative orthodontic treatment need

Authors (year) Population.

Authors (year)	Population	Subjects		Registration Method	Need for Treatment (%)		
		N	Age (years)		No need	Border line	Definite
Burden and Holmes (1994)	Manchester	874	11 - 12	DHC			31
	Sheffield	955					32
Brikeland et al. (1996)	Norwegian	359	11	DHC	46.8	27	26.2
Stenvik et al. (1996)	Norwegian	50	18	NOTI	74	26	0
		73	35		52	40	8
Otuyemi et al. (1997)	Nigerian	704	14 mean	DHC	61.5	25.9	12.6
Ng'ang'a et al. (1997)	Kenyan	919	13 - 15	NOTI			29
Ugur et al. (1998)	Turkish	572	6 - 10	TPI	62	25	13
Mandall et al. (2000)	Manchester	434	14 - 15	DHC	48	34	18
Hamdan (2001)	Jordanian	320	14 - 17	DHC	50.3	22.2	27.5
Abdullah and Rock (2001)	Malaysian	5112	12 - 13	DHC	20.3	31.8	46.9
Esa et al. (2001)	Malaysian	1519	12 - 13	DAI	62.6	19.6	27.8
Üçüncü and Ertugay (2001)	Turkish	250	11 - 14	DHC	37.2	24	38.8
Abu Alhaja et al. (2004)	Jordanian	1002	12 - 14	DHC	26	40	34
Tausche et al. (2004)	German	1975	6 - 8	DHC	48.3	25.5	26.2
Kerosuo et al. (2004)	Kuwaiti	139	14 - 18	DHC	57	38	38
Souames et al. (2006)	French	511	9 - 12	DHC	50.1	28.6	21.3
Bernabé and Flores-Mir (2006a)	Peruvian	281	18	DHC	35.2	34.9	29.9
Hedayati et al. (2007)	Iranian	2000	11 - 14	DHC	55.7	25.8	18.4

**Table 1.3:** (continuous)

Shivakumar et al. (2009)	Indian	1000	12 - 15	DAI	80.1	15.7	4.2
Sharma (2009)	Nepalese	700	7 - 48	DHC	9.9	28.1	62
Safavi et al. (2009)	Iranian	5200	14 - 16	DHC	57	23	20
Chu et al. (2009)	Chinese	240	18 - 27	DHC	20	47	33
Manzanera et al. (2009)	Spanish	363	12	DHC	46.5	31.7	21.8
		292	15 - 16		63.4	19.5	17.1
Danaei and Salehi (2010)	Iranian	900	12 - 15	DAI	70.0	18.0	12.0
Dias and Gleiser (2010)	Brazilian	407	9 - 12	DHC	42.3	23.5	34.2
Poonacha et al. (2010)	Indian	100	12 - 14	DAI	3.0	15.0	82.0
Perillo et al. (2010)	Italian	703	12	DHC	35.8	36.7	27.3

Orthodontic treatment aims mainly to improve dental appearance. Thus, the individual's attitude to their occlusion is considered an important factor in determining the necessity of treatment (32). Generally aesthetic and psychological aspects are the main factors influence the decision for treatment; However, the patient's perception of malocclusion usually is not along with the objective measurements.

Improving the aesthetic appearance is one of the main motivating factors for patients seeking orthodontic care. Thus, one needs to realize the importance of aesthetic parameters in rating the treatment need (33). Different people view the same aesthetic impairment very differently. Hence, it is quite valuable to get a valid representation of society's perceptions in term of treatment necessity (34).

The Aesthetic Component (AC) of the Index of Orthodontic Treatment Need (IOTN) is one of the available indices for clinicians which allow for the assessment of treatment need on the basis of aesthetics. A major problem, however, is that the treatment need's threshold might vary significantly among populations from different geographical and socio-demographic backgrounds, as societal expectations varies among countries and economic subsets (35) (36) (37) (38) (39). Professionals determined the current grading system, and which categories reflect the "treatment need" for this index, but it has been criticized that such borderline does not truly reflect the patients' views (40) (41).

One should not underestimate the difference in orthodontic treatment need between patients

and orthodontists. It has been confirmed by several studies that children with a professionally determined need for treatment do not have a worse psychosocial quality of life than those who are not considered to be in need for orthodontic treatment by professionals. However, it was confirmed that when treatment need was considered on a more consumer-based approach, the children who concern about their malocclusion did have a worse quality of life (42).

Determining treatment need through indices is a hard task for clinician, for Patients' concerns do not always match with clinicians' (43) (44) (45). And at the end of the day, it is the patient who should be satisfied with the improvement in aesthetics and function resulting from orthodontic treatment (47).

For attaining a successful treatment outcome from any aesthetic treatment, the doctor and patient should agree on the severity of the chief complaint for which treatment is undertaken (48) (49). Without this congruency of opinions, suboptimal understanding, communication and poor compliance levels from patients is possible. Thus, building communication tunnels, explain the treatment options and creating mutual understanding with the patient is essential for successful treatment.

Although some studies showed that there are significant correlations in young adults between self-perceived and normative treatment need assessments, there was still considerable difference between the both needs (50). Thus, understanding and assessing self-perception of malocclusion, as well as normative needs for orthodontic treatment, and comparing the two for a specific population are important issues for successful orthodontic practice nowadays (52). Moreover, using indices to determine where treatment is needed is extremely useful in case of lack of resources. And it can eliminate the potential of over-treatment (52) (53).

## 2. MATERIALS AND METHODS

The total required number of sample subjects for this study was 140 comprising of 45.7% males and the rest were females. The sample was taken from two schools in Istanbul.

The study took place from February to April 2018. A two-stage cluster sample was selected. Two schools were randomly selected among all junior-high schools in Istanbul (Turkey) and a random sample of 140 children aged 11–18 years old attending these schools was selected.

### 2.1 Age distribution of the study sample

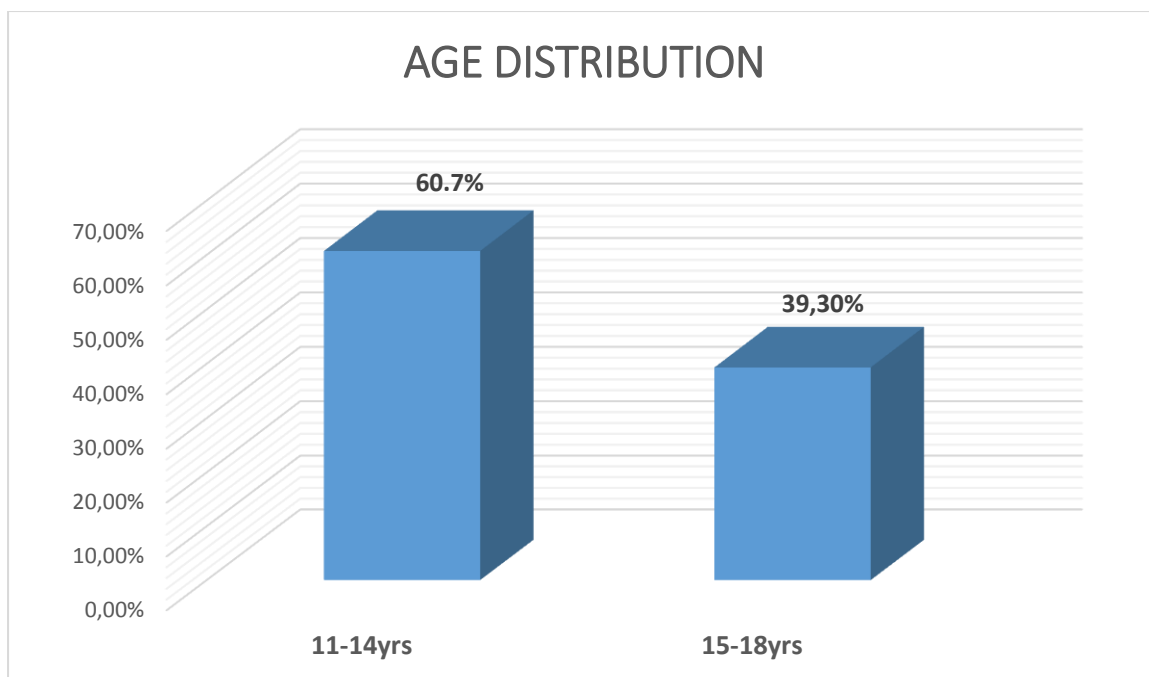
The age distribution of the children ranged from 11-18 years and is summarised below in Table 2.1.

Most of the children (17.5%) were 12 years of age, followed closely by 11 year olds who accounted for (14.5%) of the sample, 16 year olds made up (18%), 18 years old made up (13.5%), 15 years old made up (9.5%), 17 years old made up (9%), and 13 year olds made up the smallest proportion (2.5%).

**Table 2.1:** Age distribution of sample

Age	11-14y	15-18y	Total
Valid	85	55	140
Percent	60.7%	39.3%	100%

From table 2.1 were grouped into two age groups, first group 11 to 14y with majority of respondents about 60.7%, second group 15 to 18y with majority of respondents about 39.3%.



**Figure 2.1:** Bar-chart of age distribution of sample

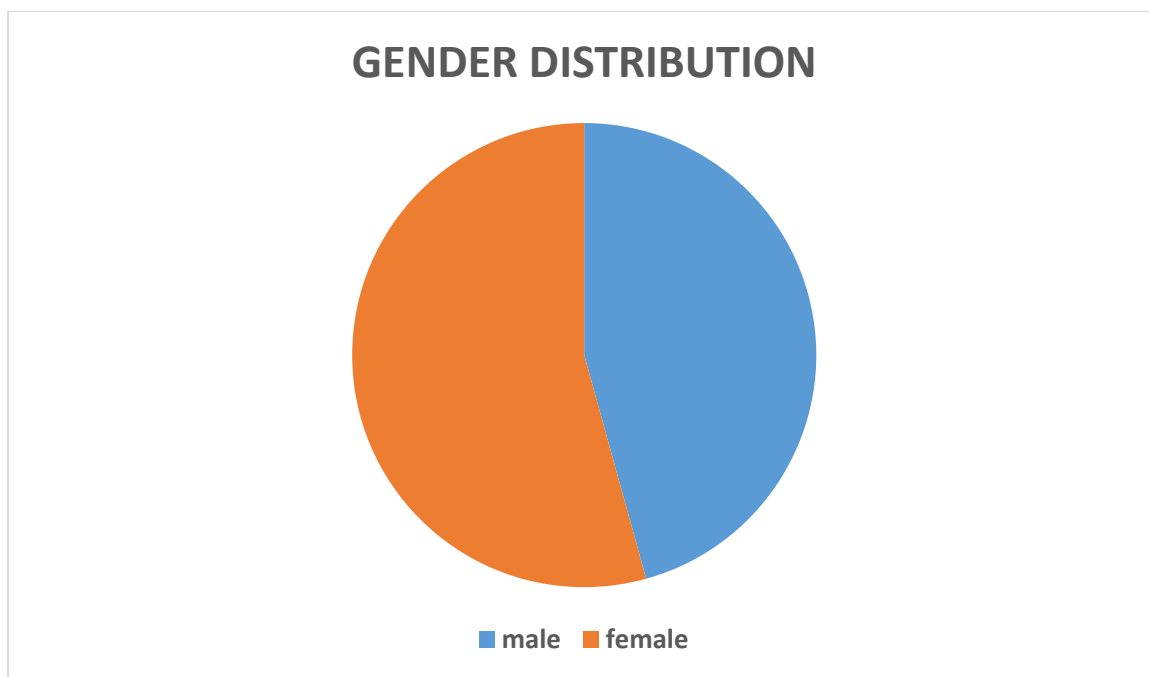
## 2.2 Gender distribution of the study sample

The gender distribution of sample was evaluated to see whether it can significantly affect the survey results.

**Table 2.2** Gender distribution of sample

Gender	Male	Female	Total
Valid	64	76	140
Percent	45.7%	54.3%	100%

The table above gives a general synopsis of the distribution of the respondent's gender, as depicted the majority of the survey population were 45.7% of the children (n=64) were males, and 54.3% of the children (n=76) were females.



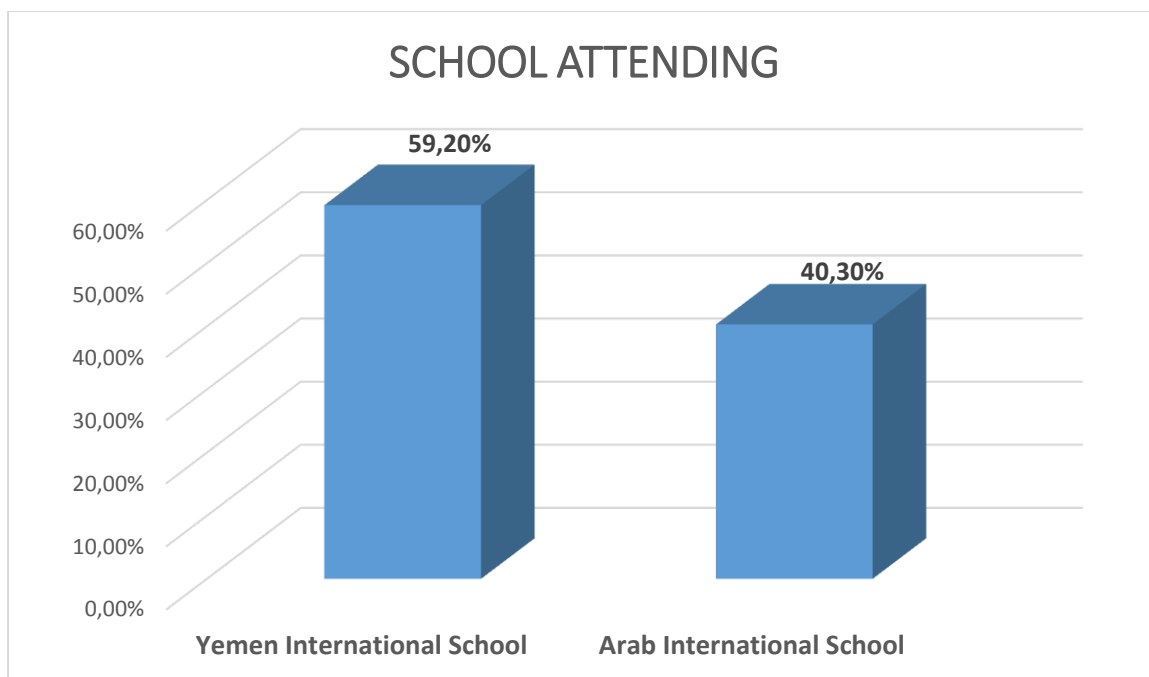
**Figure 2.2:** Bar-chart of gender distribution of sample

### 2.3 distribution of sample by school attending

**Table 2.3** Distribution of sample by school attending

School	Yemen International School	Arab International School
Valid	83	57
Percent	59.2%	40.3%

As it can be seen from the table above, The Egyptian schoolchildren who took part in the survey were selected mainly from two schools which are Yemen international school and Arab International School, the chart above explains the distribution of the subjects in terms of the two schools. The chart shows that majority (49.2%) of the respondents were selected from Yemen international School. Only (40.3%) of the respondents were selected from the Arab International School.



**Figure 2.3:** Bar-chart of school attending

Parents of sampled children were notified about purposes of the study and invited to participate. All parents who provided informed written consent completed a questionnaire related to sociodemographic details (name, sex, age, employment status, education level) The questions were prepared as follows: Five questions on awareness about their dentition, two questions on their self-satisfaction and four questions about their attitude toward orthodontic treatment. Each question had three possible answers, ranging from the positive response to a negative response, and these answers were given scores ranging 0-2, the highest score to the best and the lowest to the worst. The test items assessed the subject's ability to recognize the presence or absence of mal-occlusion, knowledge to perceive the impact of mal-occlusion and attitude about orthodontic treatment. and on the following factors: dental and orthodontic history, as well as factors related to malocclusions [occurrence and duration of breastfeeding, non-nutritive sucking habits (fingers and pacifiers), experience of caries and/or extractions for any reason of deciduous teeth], and perception of orthodontic treatment need for their children. Parents also assessed the Aesthetic Component (AC) of the IOTN of their children.<sup>18</sup> Parents were sent 10 photographs in the AC range and detailed written instruction were given to identify the dental appearance that mostly resembled that of their child.

Before the dental examination, trained and standardized personnel interviewed all children on utilization of dental services and perception of orthodontic treatment need. The questions on

the use of dental services included whether the child had ever had a dental visit and time since last visit. Information on use of orthodontic devices and perception of orthodontic treatment need was asked, and the AC of IOTN index was also administered to children, as described for parents.

The examinations were conducted at school, by one trained and calibrated dentist with the subject seated on a chair using portable equipment, 60 Watt white-blue spectrum lamp as the source of illumination. The examination instruments employed were number 5 plain disposable mouth mirror and WHO-type periodontal probe. No more than 25 children were examined during one session to avoid the effects of tiredness. No radiographs or plaster models were taken. Caries experience was recorded through The Decayed, Missing, Filled Teeth (DMFT) index.<sup>19</sup> Also calculated were the Dental Health Component (DHC) and the AC of IOTN,<sup>18</sup> and the Angle classification of malocclusions.<sup>20</sup> The DHC of the IOTN has five categories classifying progressively increasing severity of malocclusions and indicating the relative need of orthodontic treatment (Grade 1: no treatment required, Grade 2: little need, Grade 3: borderline need, Grade 4: treatment required, Grade 5: great need of treatment). In each category the different malocclusions are included (overbite, displacement of the teeth anterior and posterior cross bite, overjet, impeded eruption, open bite, hypodontia, clefts of lip and/or the palate and molar relationship) according to their severity. The most severe occlusal trait is registered by the examiner for any particular patient and the patient is then categorized in a score from 1-5 according to this most severe trait of malocclusion.

The AC is designed to record the severity of anterior aesthetic tooth arrangement using 10 photographs size and color (from color photographs to mono- chrome) using Microsoft Office Picture Manager, printouts of the photographs were provided to the patients' during examination and were scored in a scale from 1-10 according to the standard IOTN-AC where the best and most beautiful situation is graded 1 and the worst is graded as number 10 in the scale.

Pilot study was done to validate the questionnaire and for revealing major difficulties and weaknesses in the study.



### **Statistical analysis**

During the assessment of the data obtained in the study, SPSS (Statistical Package for Social Sciences) for Windows 22.0 program was used for statistical analysis. During the assessment of the study data, conformity of the parameters to the normal distribution was assessed by the Shapiro Wilks test. During the evaluation of the study data, regarding the comparisons of quantitative data as well as descriptive statistical methods (Mean, Standard deviation), Kruskal Wallis test was used for the intergroup comparisons of parameters. Kappa was used to evaluate the agreement of orthodontic treatment need by DHC and AC of IOTN. Chi-Squared test was used to evaluate qualitative variables. Significance was evaluated at a level of  $p < 0.05$ .

## **3. Results**

### **3.1 The Prevalence of Malocclusion**

Each participant was examined to determine the prevalence of DHC features (MOCDOO):

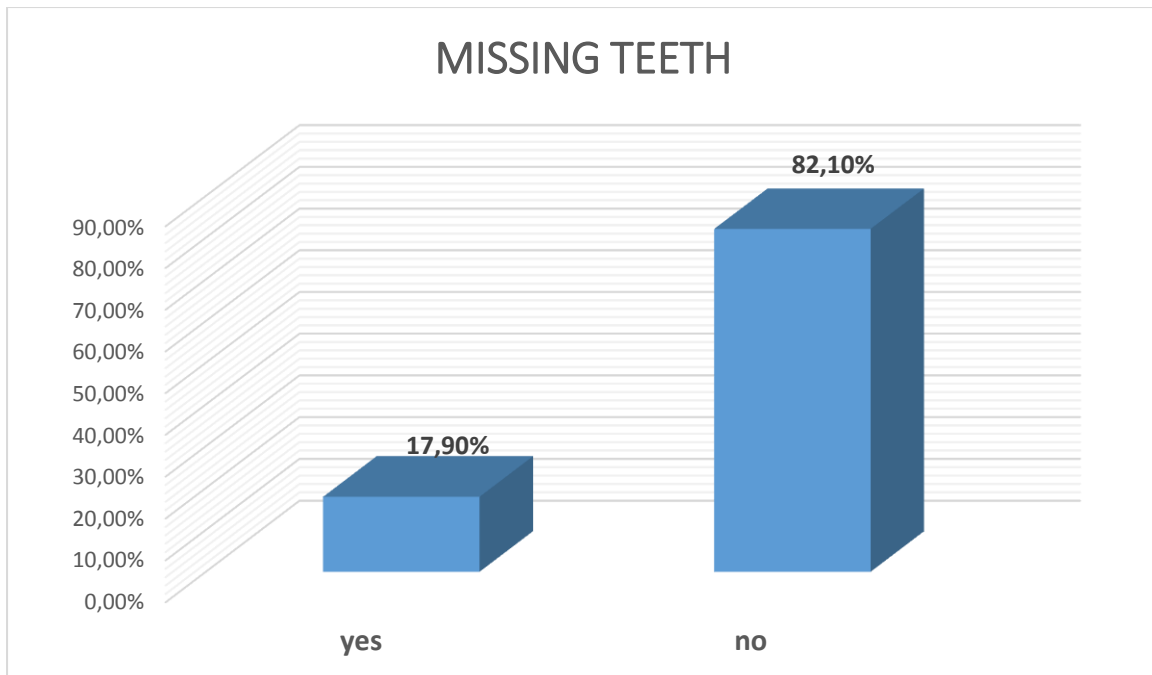
1. Missing teeth
2. Overjet
3. Crossbite
4. Displacement of contact point/s
5. Overbite
6. Openbite

The prevalence and percentage of each category is illustrated in table 3.1.

**Table 3.1** Prevalence of the occlusal traits in the children

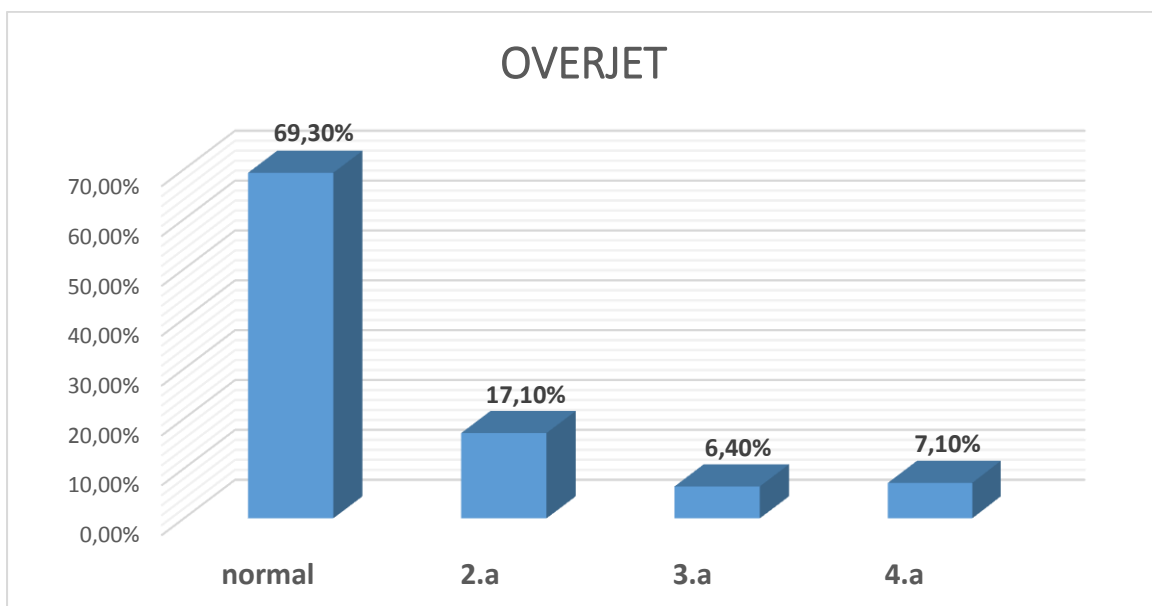
		n	%
<b>Missing teeth</b>	Yes	25	17.9
	No	115	82.1
<b>Overjet</b>	2.a	24	17.1
	3.a	9	6.4
	4.a	10	7.1
	No	97	69.3
<b>Crossbite</b>	2.c	3	2.1
	3.c	11	7.9
	4.i	5	3.6
	No	121	86.4
<b>Displacement teeth</b>	2.d	62	44.3
	3.d	24	24.3
	4.d	25	17.9
	No	19	13.6
<b>Overbite</b>	2.f	9	6.4
	3.f	1	0.7
	4.f	1	0.7
	No	129	92.1
<b>Openbite</b>	2.e	2	1.4
	3.e	4	2.9
	No	134	95.7

Table 3.1 shows the prevalence of the occlusal traits of the children. (17.9%) of all children had missing teeth,



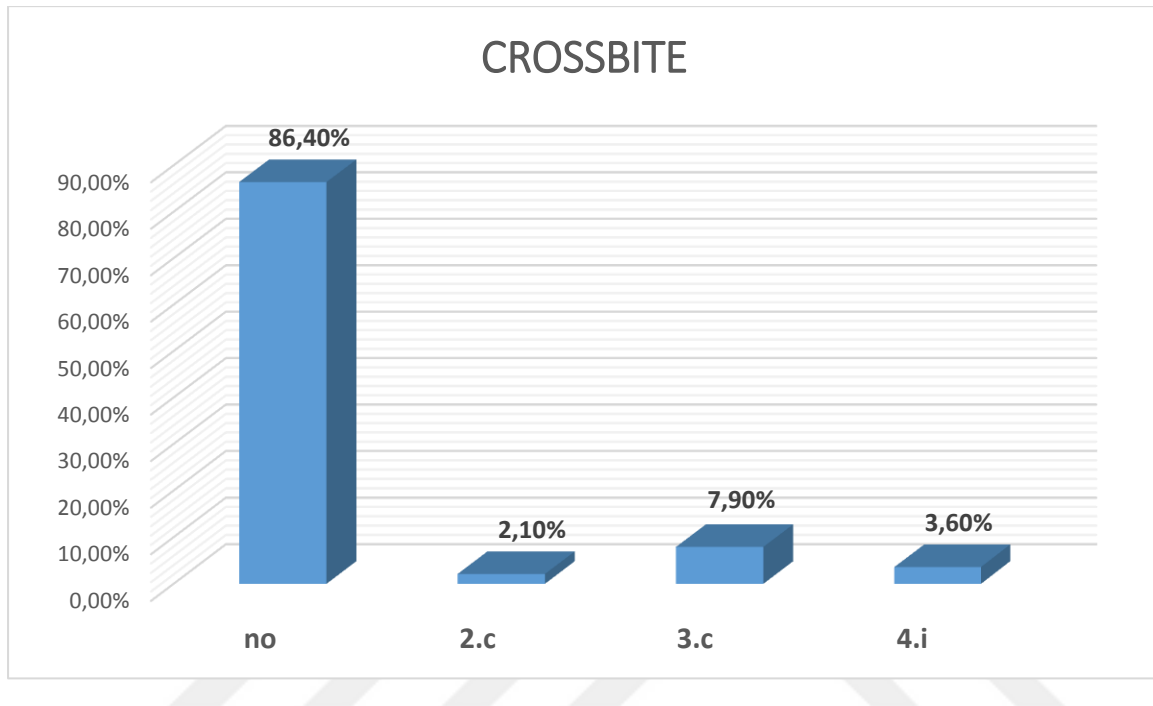
**Figure 3.1:** Bar-chart of missing teeth of sample

The results showed that the majority of children had normal overjet (69.3%), while (32.6%) of them had up normal overjet. In fact, (17.1%) of children had 2.a at frequency of 24, followed by 4.a (7.1%), and only 9 students had overjet's rated as 3.a,



**Figure 3.2:** Bar-chart of overjet of sample

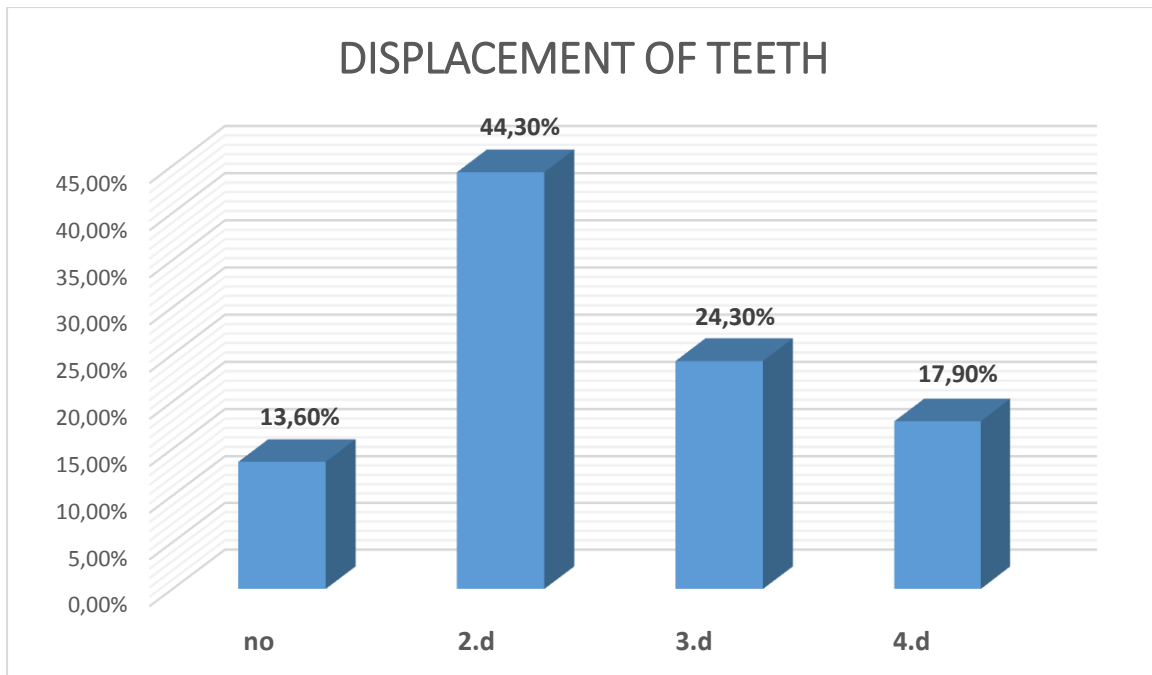
The results showed that the majority of children had crossbite (13.6%), most of the children did not have cross bite (86.4%), while remaining rate had cross bite of changing degrees as takes after (7.9%) was 3.c at frequency of 11, followed by 4.i was (3.6%) and last rate 2.c was (2.1%).



**Figure 3.3:** Bar-chart of cross bite of sample

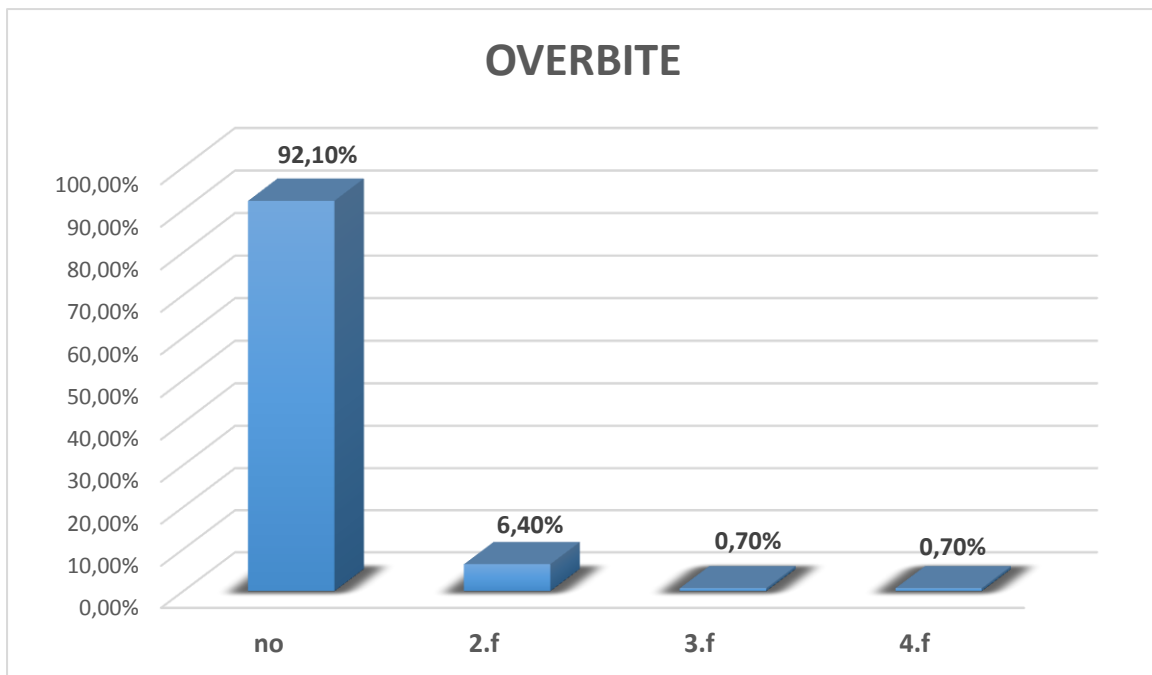
Most of the children (86.5%) had teeth displacement with varying degree; (44.3%) was 2.d at recurrence of 62, followed by 3.d was (24.3%), and only (17.9%) was 4.d.

However, (13.6%) of the children showed almost well aligned teeth with no displacement.



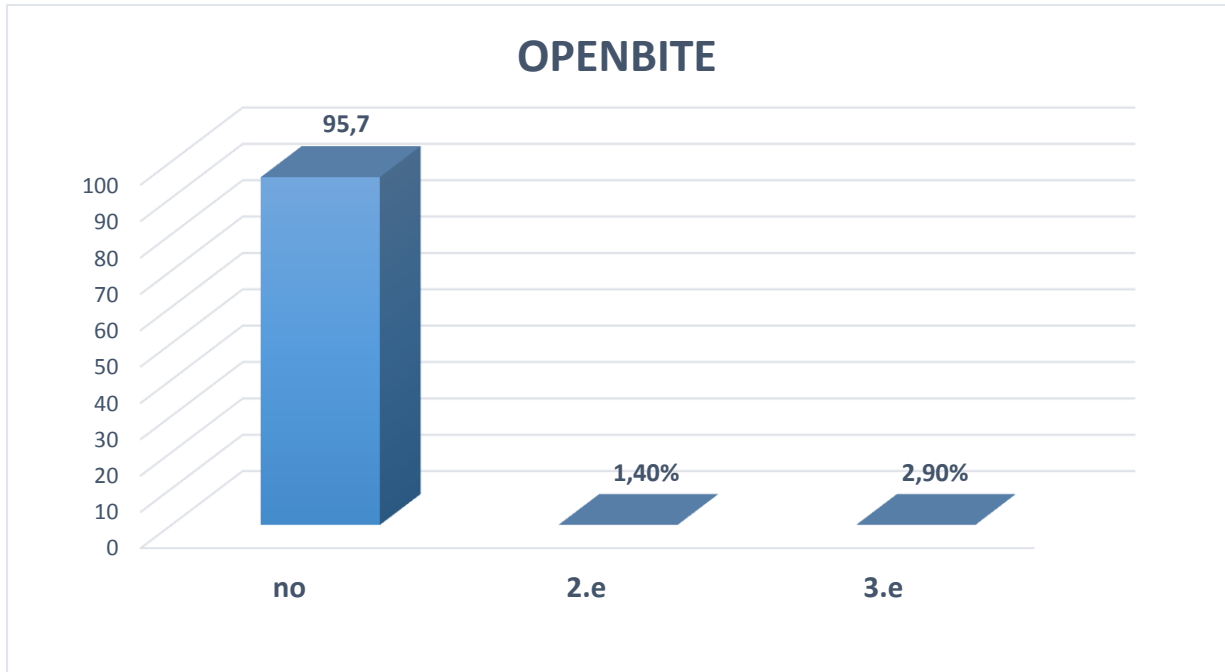
**Figure 3.4:** Bar-chart of displacement teeth of sample

The majority of the children had normal values of over bite (92.1%) while the rest suffered from varying degree of up-normal overbite as following: 2.f (6.4%), 3.f (0.7%) and 4.f (0.7%).



**Figure 3.5:** Bar-chart of overbite of sample

Only 4.3% of children had open bite; the vast majority of the children had no open bite (95.7%) The 4.3 % of children suffering from open bite had different degrees of open bite values distributed as following: 3.e (2.9%), and 2.e (1.4%).



**Figure 3.6:** Bar-chart of openbite of sample

### **3.2 Distribution of sample by sagittal relation of occlusion, facial profile, growth pattern and facial symmetry**

Sagittal dental relationship was determined using angle's molar classification.

Facial profile Studies conducted to determine facial profile preferences in the Egyptian student showed that ethnicity had a strong influence on judging facial attractiveness.

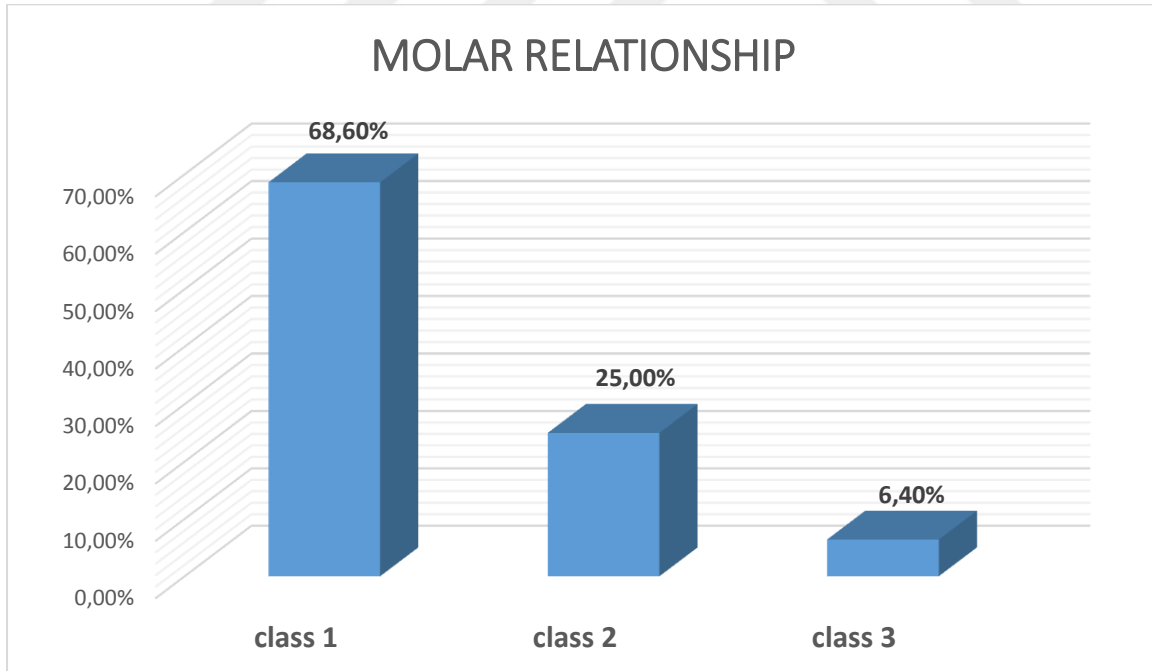
Growth pattern was classified as being normal, high or low.

Facial symmetry: determination symmetry of face according to (symmetrical face, asymmetrical face). (Table 3.2)

**Table 3.2** Descriptive statistics of other clinical features

		n	%
Molar relationship	Class 1	96	68.6
	Class 2	35	25.0
	Class 3	9	6.4
Facial profile	Straight	69	49.3
	Convex	62	44.3
	Concave	9	6.4
Growth pattern	Low	25	17.9
	Normal	109	77.9
	High	6	4.3
Facial symmetry	Symmetric	95	67.9
	Asymmetric	45	32.1

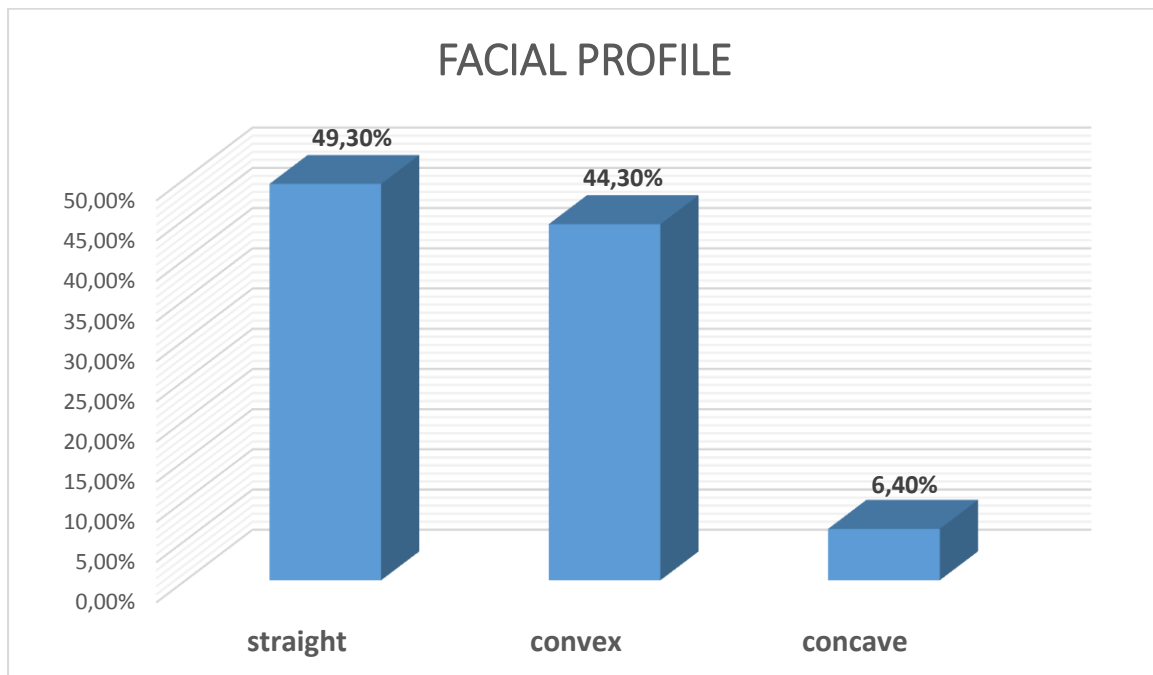
The prevalence of the clinical features as can be seen from the table above can be detailed that 68.6% of all children had class 1 molar relationship while class 2 and class 3 relationships compose 25% and 6.4% respectively.



**Figure 3.7:** Bar-chart of molar relationship of sample



In terms of the second and the third features, the major part of the participants had straight and convex facial profile with 49.3%, and 44.3% respectively



**Figure 3.8:** Bar-chart of facial profile of sample

77.9% of them had normal growth pattern. Moreover, 67.9% of the pupils had asymmetric faces.

**Table 3.3** Dental Health Component (DHC) of the Index of Orthodontic Treatment Need (IOTN): frequency by gender and age-group

DHC	11-14 years old group			14-18 years old group			Total (n=140)
	Females (n=43)	Males (n=42)	Total (n=85)	Females (n=33)	Males (n=22)	Total (n=55)	
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
<b>No need (G 1-2)</b>	17 (39.5)	20 (47.6)	37 (43.5)	21 (63.8)	13 (59.1)	34 (61.8)	71 (50.7)
<b>Moderate (G 3)</b>	15 (34.9)	10 (23.8)	25 (29.4)	8 (24.2)	3 (13.6)	11 (20)	36 (25.7)
<b>Great need (G 4-5)</b>	11 (25.6)	12 (28.6)	23 (27.1)	4 (12.1)	6 (27.3)	10 (18.2)	33 (23.6)

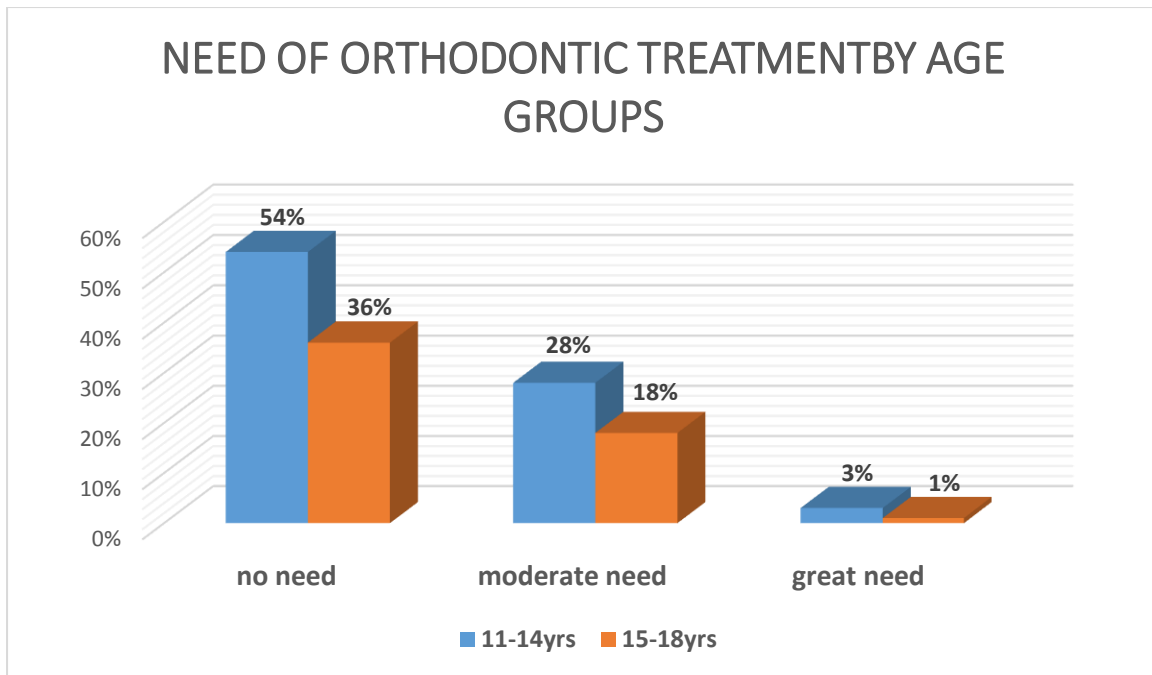
*No significant difference by gender and age group ( $p>0.05$ )*

**Table 3.4** Aesthetic Component (AC) of the Index of Orthodontic Treatment Need (IOTN) frequency by gender and age-group

AC	11-14 years old group			14-18 years old group			Total (n=140)
	Females (n=43)	Males (n=42)	Total (n=85)	Females (n=33)	Males (n=22)	Total (n=55)	
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
No need(G 1-4)	26 (60.5)	28 (66.7)	54 (63.5)	22 (66.7)	14 (63.6)	36 (65.5)	90 (64.3)
Moderate(G 5-7)	14 (32.6)	14 (33.3)	28 (32.9)	11 (33.3)	7 (31.8)	18 (32.7)	46 (32.9)
Great need(G8-10)	3 (7.0)	0 (0.0)	3 (3.5)	0 (0.0)	1 (4.5)	1 (1.8)	4 (2.9)

*No significant difference by gender and age group ( $p>0.05$ )*

Based on the AC of the IOTN, 64.3% of the total number of the children considered their occlusal as aesthetically accepted (i.e. grade1-4). In contrast, only 2.9% of the schoolchildren defined themselves in great need grade (grade 8-10).

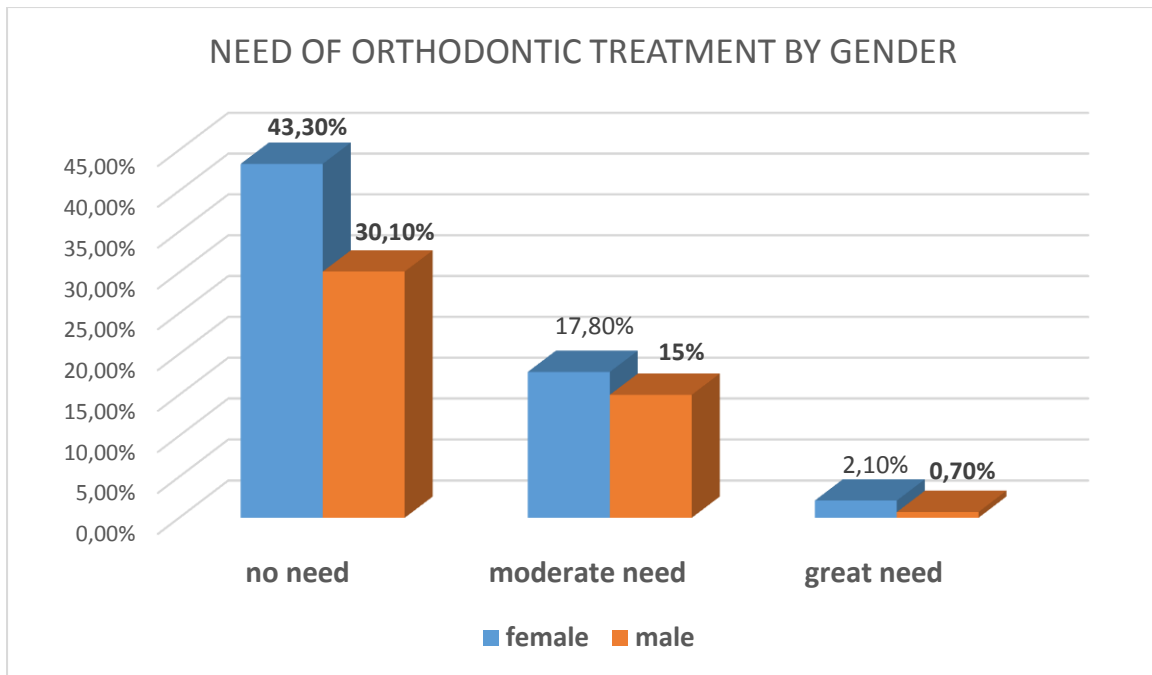


**Figure 3.9:** Bar-chart of need of orthodontic by age of sample

Classification of the Aesthetic Component (AC) by age and gender:

- 11-14 years old group:

Majority of both male and females 11-14 year-old children defined their occlusion as aesthetically acceptable (grade 1-4). Interestingly, no One of Egyptian male schoolchildren and only 3 females marked themselves as having great need for orthodontic treatment (grade 8-10). However, 14 males and 14 females' children filled within the average need (grade 5-7).



**Figure 3.10:** Bar-chart of need of orthodontic by gender of sample

- 14-18 years old group

The distribution of orthodontic treatment need according to aesthetic component for 14-18-year-old children showed that most of children have aesthetically good or minor affected occlusion (grade 1-4). However, 14-18-year-old female children's orthodontic treatment need as no need, moderate need, or great need was 66.7%, 33.3%, and 0% respectively. For 14-18-year-old male children, orthodontic treatment need as no need and moderate need groups (63.6%, 31.8%, respectively). However, 4.5% of male children showed a great need for treatment.

**Table 3.5** Correlation table showing the determination of orthodontic treatment need by DHC and AC of IOTN in the total sample

	IOTN DHC	IOTN AC
	n (%)	n (%)
No need	71 (50.7)	90 (64.3)
Need	69 (49.3)	50 (35.7)
Kappa ( $\kappa$ ); p	0.245	0.003

*Kappa ( $\kappa$ ) is a chance-corrected measure of agreement.*

The percentage of agreement (proportion of results in diagnostic agreement) between DHC and AC of the IOTN in the determination of treatment need or no need, for total sample, showed very low agreement (Kappa ( $\kappa$ ): 0.245, p:0.003; p<0.05, Table 3).

**Table 3.6** Feelings, Attitudes, and Conducts about Teeth Condition

	Not concern	Somewhat concern	Very concern	Total
Feeling about the appearance of teeth	3.5%	61.5%	35%	100%
Comments on the appearance of teeth	52.8%	25%	22.2%	100%
Teasing about the appearance of teeth	83.5%	15%	1.5%	100%
Avoid smiling because of the appearance of teeth	80.7%	17.1%	2.2%	100%
Cover mouth because of the appearance of teeth	93.5%	5.7%	0.8%	100%

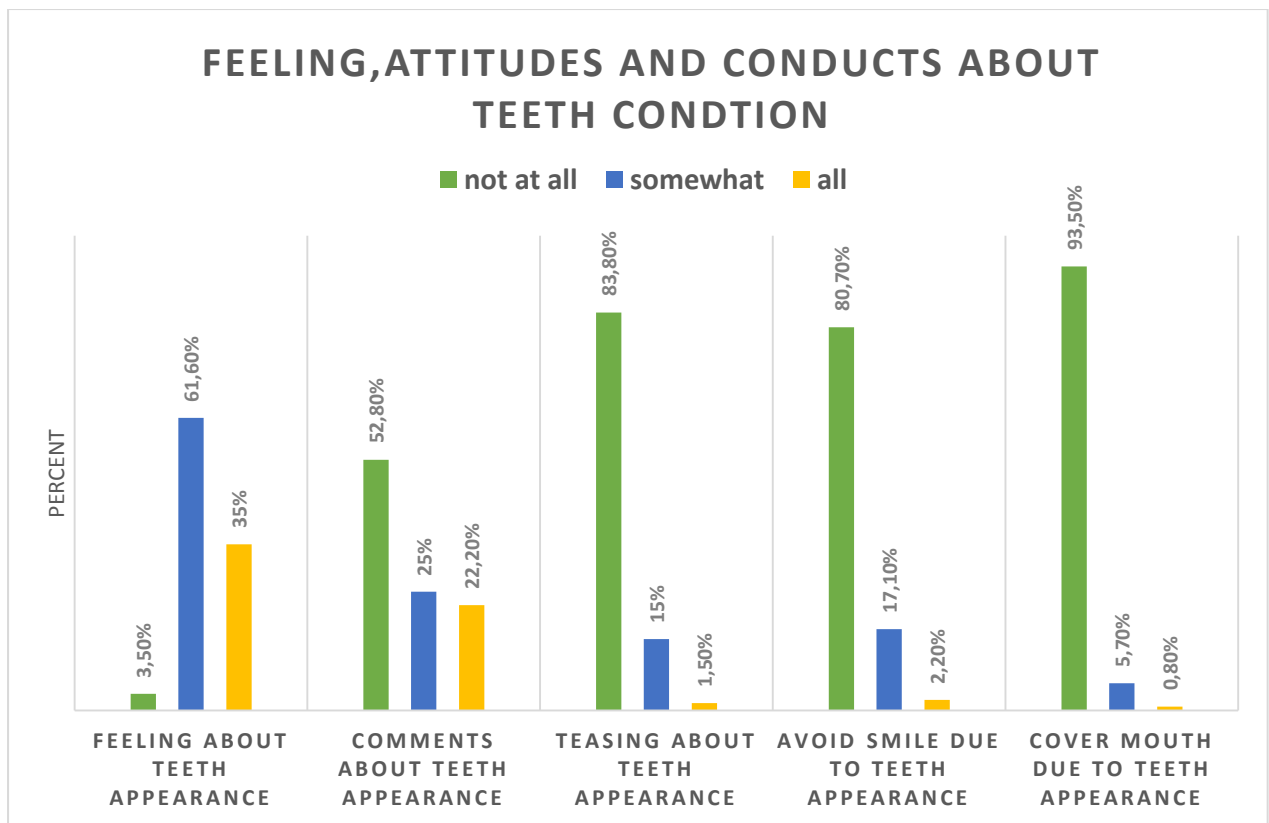
Table 3.6 indicates that most of children (61.5%) replied that they were concern sometimes from the appearance of their teeth, while only (3.5%) were not concern at all about their teeth appearance.

Around half (52.8%) of the children did not confront any comments about their teeth's appearance and only 25% replied that sometimes they confronted comments about their teeth's appearance. Nonetheless, around quarter of the children (22. 2%).confronted continually comments about their teeth's appearance.

Hopefully, most of the children (83.5%). did not suffer from any teasing, while 15% had been teased sometimes and 1.5 % are being teased continually.

Only 19.3% of the children was avoiding smiling due to their teeth appearance either sometimes (17.1%) or continuously (2.2%). However, the teeth's appearance did not prevent the majority of children (80.7%) from avoiding smiling.

Only very limited number of children 0.8% were continually covering their mouth while smiling to hide their teeth's appearance.



**Figure 3.11:** Bar-chart of feeling, attitudes and conducts about teeth condition of sample



**Table 3.7** Satisfaction with the Dental Aesthetics

<b>Question</b>	<b>Answer</b>	<b>valid</b>	<b>percent</b>
<b>Q1-</b> Healthy and arrangement teeth and their relationship to the appearance of teeth?	<b>Yes</b>	136	97.1%
	<b>No</b>	4	2.9%
<b>Q2-</b> Satisfaction with dental aesthetics?	<b>Yes</b>	75	53.6%
	<b>no</b>	65	46.4%
<b>Q3-</b> The need to change anything in the appearance of teeth?	<b>Yes</b>	71	50.7%
	<b>no</b>	69	49.3%
<b>Q4-</b> What is required to change the appearance of teeth?	<b>Arrangement</b>	51	71.8%
	<b>Color</b>	15	21.1%
	<b>Size</b>	4	5.6%
	<b>other</b>	1	1.4%
<b>Q5-</b> Having any problem with (speak, chewing and facial pain) caused by teeth?	<b>Yes</b>	56	40%
	<b>No</b>	84	60%
<b>Q6-</b> Need to start orthodontic treatment?	<b>Yes</b>	15	10.7%
	<b>No</b>	125	89.3%
<b>Q7-</b> There is advice to start orthodontic treatment?	<b>Yes</b>	15	10.7%
	<b>no</b>	125	89.3%
<b>Q8-</b> What prevents to start orthodontic treatment?	<b>Cost</b>	4	4.8%
	<b>Fear</b>	14	16.7%
	<b>other</b>	66	78.7%

Descriptive statistics of the other subjective questions were given in Table 3.5, 97.1% of the children had yes answers for Q1, 53.6% of the children had yes answers for Q2, 50.7% of the children had yes answers for Q3, 71.8% of children for Q4 have would like to change

arrangements, 60% of the total children had no answers for Q5, 89.3% of the children had no answers for Q6 and Q7.



## **4. Discussion**

No doubt that orthodontic treatment entail identifying dental and skeletal deformities. Moreover, it is a powerful tool in positively improving the oral health quality of life, if it is done correctly and to the awarded, motivated and in demand subjects. Thus discussion below aims to identify the need, demand, and necessity of orthodontic treatment among Egyptian children who live in Istanbul. Moreover, it aims to identify the current level of perceptions, personal opinions, attitudes and awareness about their dental condition and how they are related and affected by the orthodontic treatment necessity. Nonetheless, the study illustrates the level of agreement between orthodontist and patient in turn of orthodontic treatment need perception. In fact, it is a common of sense that patients who seek orthodontic treatment in dental clinics are aware about their malposed teeth and dental appearance; furthermore, they are aiming for better quality of life. However, what about the subject of this study? Are they aware about their teeth condition? And do they agree with their doctors about the necessity for orthodontic treatment?

### **4.1 Malocclusions and quality of life (QOL):**

There are few longitudinal studies of the prevalence of malocclusions and possible self-correction of malocclusions during the development of the dentition. Early intervention might be unnecessary if self-correction of the malocclusion occurs during the transition from the primary to the permanent dentition. Most studies are cross-sectional and in those of longitudinal design, the results are inconsistent and difficult to interpret. Malocclusions may or may not influence the quality of life in children and adolescents. Thus, evaluations of the influence of different malocclusions on quality of life will certainly underpin a broader understanding and knowledge about how malocclusions affect the daily life of young patients. This information may also be important when it comes to assessing the most appropriate time for starting orthodontic treatment, not only from a professional point of view, but also, most importantly, from the patients' perspective. The overall aim of this thesis was therefore to evaluate the prevalence of malocclusions, and to document changes occurring during the development of the dentition, from the mixed and early permanent dentition at age 11, to the late permanent dentition at age 18 years. Further aims were to review the current state of knowledge about the impact of malocclusions on oral health

related quality of life (OHRQoL) and to investigate how malocclusions affect the quality of life in a cohort of children, aged 11.5 years, whose dental care is provided by the Swedish Public Dental Service.

#### **4.2 Design of the study**

This is a cross-sectional epidemiological survey carried out on a sample of population of 11-18-year-old Egyptian school children in Istanbul.

#### **4.3 Sampling**

Sampling included sample size calculation, determination of age sample.

#### **4.4 Calculation of sample size**

measuring of a proper sample size is an indispensable part of the survey. Insufficient sample size will have impacts on the quality and accuracy of research analysis. Awareness in the calculation of a minimum sample size required and the application of appropriate sampling approaches used are indispensable in obtaining scientifically and statistically firm findings (54).

If the sample size is too small, even a well conducted study may fail to answer its research question, or may fail to recognize imperative impacts or affiliations. Correspondingly, if the example measure is too substantial, the study will be more difficult and costly, and may even lead to a loss in accuracy. Thus, ideal sample size is basic part of any study (55).

#### **4.5 Sample age determination**

This investigation was performed on the example age that ought to have a full arrangement have Mixed and changeless teeth. This dentition arrange has been viewed as the most dependable evaluation of malocclusion in the populace (56). Age of subjects incorporated into the investigation ran from 11-18 years. Genuine changes in malocclusion happen with time and amid childhood stage or mixed dentition development for example, overjet may improve enough to diminish the proposal for treatment (57). Thus it was chosen to evaluate the 11-18 years old because this age was considered to be sufficiently mature and self-confident to be able to make a balanced judgement for the relative dental stylish assessment. This opinion was proven in a study conducted by Stenvik et al. (1997). They found that children in the early ages were significantly less critical in their aesthetic perception.

#### **4.6 Missing Permanent Teeth**

Among the examined Egyptian children, 10% had impacted teeth. The observed finding was concurrent with previously reported results in other Middle Eastern studies. Al-Emran et al. (1990) reported 10.4% impacted teeth among Saudi Arabian children. Abu Alhaija et al. (2004) reported that 17% of North Jordanians aged 12-14 year-old had impacted teeth. However, the prevalence of impacted teeth in Egyptian children was higher than Caucasian children. For example, Thilander et al. (2001) reported a 3.1% prevalence of impacted teeth. The possible explanation for this extreme variation between results in different ethnicity group is that cultural beliefs and practice in the different ethnic groups might be the reason for early loss of primary teeth. For instance, the high caries incidence and poor oral hygiene habits leads to early loss of primary teeth which is one of the most causes for tooth impaction. The reported prevalence of hypodontia in this study was 4.4%. In fact, hypodontia prevalence ranges from 2% to 11.3% among different populations (58). The prevalence of hypodontia among Egyptian children was very close to that of Saudi children 3.5% and 4%, respectively. However, the 3.5% in Egyptian children could be considered low in comparison of prevalence of hypodontia in Scandinavian children which ranged from 6-8% (59). A possible explanation for that low prevalence of hypodontia among the Egyptian children might be due to hereditary factor differences and/or shortcoming of the current study which did not involve radiographic examination; therefore, an underestimation might be possible.

The prevalence of missing teeth due to extraction or trauma in the current study is 3.5%. This finding is very close but slightly higher than reported by other previous studies (60).

#### **4.7 Overjet**

Almost three quarter of the sample (69.3%) had an acceptable overjet, which is along with other studies (61).

With regards to increased overjet, this study showed that 32.6% of Egyptian children had increased overjet. The results were higher but close to other studies on Middle East populations. For instance, Al-Emran et al. (1990) reported that almost fifth of Saudi Arabian children had increased Overjet. However, Gelgör et al. (2007) reported a higher prevalence (25.1%) of overjet in 12-17 year-old of Turkish children.

The children who have increased maxillary overjet of  $\geq 6$  mm was consisting (7.1%) of the sample; this value is almost similar to the finding in a Kuwaiti's children by Behbehani et al.

(2005) who reported that 7.8% of the Kuwaiti's children had overjet greater than 6 mm. Moreover, Jonsson et al. (2007) reported 10.6 % of an increased overjet greater than 6 mm in Iceland.

Strikingly, no one of the Egyptian children had reverse overjet. Although the prevalence of reverse overjet in other middle eastern population was very low, reverse overjet is still existed on those populations. For example, Al-Emran et al. (1990) reported that 3.2% of Saudi Arabia 14-year-old children have reverse overjet. Moreover, 4% of Kuwaiti children had reverse overjet (62). Nonetheless, Borzabadi-Farahani et al. (2009) reported a 4.2% of reverse overjet in Iranian children.

#### **4.8 Crossbite**

The prevalence of cross bite in Egyptian children was 10%. This finding was close but slightly higher than that in Saudi children. In fact, Emran et al. (1990) reported 7.2 % of crossbite prevalence in Saudi children.

The prevalence of scissor in this study was 3.6 % of the sample. This result is concurrent with other studies which reported a 3.2% and 2% in Saudi and Iranian children, respectively (63). However, the prevalence of scissor bite in Egyptian children was higher than that of Senegalese. Diagne et al. (1993) reported a 1% prevalence of scissor bite in Senegalese. This difference might be due to racial differences and the fact that scissor is highly associated with Class II division 1 malocclusion. And The prevalence of Class II malocclusion in Egyptian children was two times higher than Senegalese children.

#### **4.9 Displacement of teeth**

Crowding was extremely high in the study sample. More than three quarter of children (86.5%) suffered from varying degree of crowding. These results are much higher than in other studies. For instance, the prevalence of crowding in Jordanian, Israeli and American children was 50.4%, 50.5% and 54.5%, respectively. This difference might be due to the fact that most of the Egyptian immigrants to Turkey are from middle to high socioeconomically class where soft diet and marriage from other ethnicities is highly founded.

#### **4.10 Overbite**

The measurement tool of deep bite varied considerably in the literature making comparisons somehow difficult (64). For instance, overbite was recorded in millimeters in studies like (65). However, other studies used other subjective indices by grades, categorizing overbite into mild, moderate, and severe (66). Nonetheless, several studies categorized overbite by fractions of overlap of the incisors namely;  $1/3$ ,  $2/3$  and more than  $2/3$  (67) (68) (69) (70) (71) (72).

The present study found that the prevalence of all type of deep overbite is 7.8%. This finding is lower than the results in Caucasian children which was 11.6% (73). Interestingly, the prevalence of grade 2 deep overbite in Saudi children was almost 3 times higher than Egyptian children in our sample 17.4% and 6.4%, respectively. Nonetheless, grade 3 deep overbite consist of 3.6% of Saudi children, while in Egyptian children was only 0.7%.

#### **4.11 Openbite**

The prevalence of open bite varies in the literature among different populations. For example, Lavelle et al. (1976) reported 8.8% of British subjects with open bite, while Al-Emran et al. (1990) found that 3.6% of Saudi children suffer from open bite. In fact, the prevalence of open bite in Egyptian children was 4.4% which was close to that in Saudi population. However, the severity of open bite in Egyptian was higher, because the highest encountered open bite in Saudi population was 1.9mm, while up to 4mm open bite was recorded in Egyptian children. This finding might be as a result of the African origin of Egyptian children where bimaxillary protrusion is much higher.

#### **4.12 Molar relationship**

Molar relationship is considered as critical clinical data in the evaluation of buccal portion. Numerous orthodontists analyzed orthodontic cases as indicated by Angles molar relationship. This study found that class I molar relationship is the most common trait among the Egyptian children with 68.8% prevalence followed by class II and class III relationship with 25% and 6.4% prevalence, respectively. This is concurrent with different other studies. (74). For example, Behbehani et al. (2005) reported that class I relationships prevalence in 13-year-old Kuwaiti children was 57.8%. Moreover, Garner and Butt (1985) found that 69% of the Kenyan children has class I molar relationship.

#### **4.13 Facial profile**

The most common facial profile in the Egyptian children was the straight facial profile (49.3%), followed by convex (44.3%) and concave (6.4%) profiles. These results are along with the results of other studies. For instance, Gudipaneni et al. reported that The most common facial profiles for Saudi children, were the straight facial profile (49.2%), convex (42.6%) and concave (8.2%).

#### **4.14 Facial Asymmetry**

The study showed that most if the children had a symmetrical face (67.9%). And almost third (32.1%) of the total sample had asymmetrical face. This result is slightly higher than found in other populations. Willems et al. reported that 23% of the Belgium population suffer from a degree of facial asymmetry. However, Sheats e al. reported only 12% of facial asymmetry in USA.



#### **4.15 Orthodontic Treatment Needs as Measured by AC of IOTN**

To date, there is lack of data regarding the clinic-measured orthodontic care need in Egyptian children. Such data is valuable and relevant for planning and providing dental services for these children in the future. In this study, the Index of Orthodontic Treatment Need was harnessed to facilitate comparison to be made with other global similar studies. Moreover, the Index had been examined to be reliable Middle Eastern societies (75). It composed of two components, the Dental Health Component that evaluate normative orthodontic treatment needs and the Aesthetic Component which evaluate the orthodontic treatment need from aesthetic point of view by a scale of 1-10 according to the closest photo in the scale to the patient's status. Aesthetic Component of the Index of Orthodontic Treatment Need (AC-IOTN) was developed utilizing intraoral photographs of dentition with different occlusal disharmony. The aesthetic component depended on the notion that individual's perception about their own dental appearance would have importance and impact on both patient's treatment need and cooperation throughout the treatment (76). It is important to mention that several studies had reported on the importance of patient's age and its influence on the way patients perceived their aesthetic (77) suggested that of younger children are less aware of the aesthetics demand, because providing judgement such topic would be a challenge task for them. Thus, the present study examined two age groups to find out the treatment need among them and to examine the previous hypothesis.

The study showed that 2.9% of the children are in definite need for treatment. This finding is concurrent with the Turkish (78) (4.8%) and Iranian (79) (4.1%) populations; however, it was lower than that found in the Norway (9%) (80). This differences in orthodontic treatment need between Norwegian and Egyptian children could be as a result of the good number of public health care programs which runs in Norwegian's schools and consequently a higher public awareness to the orthodontic treatment need in that population.

Interestingly, no statistically significant differences were recorded age groups and gender. Thus, Holmes's hypothesis is rejected for Egyptian children who live in Istanbul. Moreover, our finding contradicts Abu Alhaija et al study which found that Jordanian male children are less aware about their dental aesthetics and orthodontic treatment demand. This latter difference might be due the fact that most of the Egyptian immigrants to Turkey are from middle to high socioeconomically class where aesthetic demand is higher.

#### **4.16 Satisfaction of Dental Appearance**

Children's self-perceptions of their smiles and dental appearance is an essential psychological aspect for Oral health related quality of life (OHRQoL) (81). It is well documented that negative occlusal traits including increased overjet and spaced dentition have a negative effect on the quality of life of adolescents (82) (83). Moreover, orthodontic treatment most important motivation is an improvement in dental appearance (84). Dissatisfaction of facial appearances usually arise from dissatisfaction with teeth arrangement than any other facial feature (85).

Only half of the children (53.6%) were satisfied from their dental appearance. This finding was higher than found in Kenyan children where only 24.6% were satisfied from their dental appearance. On the other hand, Boeira et al. reported that 82.6% of the Brazilian children were satisfied from their dental aesthetics. However, this inconsistency might be as a result of cultural differences and also to the fact that nearly 65% of the studied Brazilian children had history of orthodontic treatment.

#### **4.17 Correlation between normative and perceived needs:**

Normative and perceived orthodontic care needs reflects the orthodontic treatment need for individuals. And It is quite important to differentiate between them, because the perceived needs might be biased due to age, the area of residence, way of life etc. Furthermore, the majority of the children were not in definite need category for orthodontic treatment need; however, orthodontic intervention was a choice for most of them, because their orthodontic treatment need was in borderline.

Understanding perceptions and attitudes of particular demographic is quite essential for gaining a better understanding of that demographic group. Moreover, any intended positive changes for that group require deep and comprehensive analyzing of the demographic group's perceptions and. Thus, understanding the personal dental health behaviors and notions of the demographic group will give better insight about how could orthodontic treatment affect children's perceptions and attitudes. Nonetheless, understanding the negative perceptions in the demographic and eliminating them would have a major positive overall effect on the latter attitude of children (86).

Personal perceptions assessment for dental satisfaction and confidence reveals that the majority children were confident about their smile and their dental appearance. However,

they were aware about their abnormal dental condition and they seek improvement in dental aesthetics throughout orthodontic treatment. So, the research revealed the high self-awareness of children to correct the dental arrangement of their teeth by orthodontic treatment. However, it is stated in the literature that most of the patient undergo orthodontic treatment after being advised by their dentists (87). In fact, Saibel et al. reported that those patients seek professional orthodontic consultation and then act accordingly. However, there is a quite interesting number of dissatisfied children about their dental appearance who suffer alone on the backyard. Thus, it is quite important to conduct awareness campaigns about malocclusion deformities and to inform people about available treatments and make communication channels between the patients and healthcare providers. Besides, society should be awarded of this reality to guarantee that children with dental deformities are not defamed, ridiculed or stigmatized from their surroundings.

The research had identified the relationship between the normative and self-assessment needs. Interestingly, the Kappa values showed that there was a minor agreement between the normative assessment (DHC) which was related to examiner and self-assessment needs (AC) which was related to child's perception. In other words, nearly one third of children demand orthodontic treatment to improve dental aesthetics, while 49.3% of the children needs orthodontic treatment.

from the point view of the examiner. This finding is not concurrent with Mwang'ombe's findings. Mwang'ombe reported that there was a moderate agreement between the normative assessment (DHC) by examiners and self-assessment needs (AC) by Kenyan's children. This difference might be related the what mentioned earlier about the high socioeconomic level of the Egyptian residents in Turkey.

#### **4.18 Limitations of This Study**

In this study, occlusal traits evaluations were carried out without x-ray and only FDI criteria was utilized to recognize different reasons of hypodontia. Thus, anomalies such as impacted teeth and congenitally missing teeth would not be accurately being diagnosed. Thus, an overlooking of the real orthodontic care necessity is a possibility.

Although Aesthetic Component (AC) of IOTN is a better indicator for individual's perception regarding dental attractiveness than a questionnaire (88), some children were not able to decide which grade in the AC is the closest for their dental condition, for some dental condition, like openbite, are not included in the AC scale.



## 5. Conclusion

The treatment limit review of the AC of the IOTN ought to be brought down to better speak to the societal and self- perceived needs of the Egyptian schoolchildren.

Treatment require is seen as important for review 4 or more of the AC scale, by the greater part of children in this study, and the as of now acknowledged limit review ought to along these lines be brought from review 4 down to review 3 to better reflect the perspectives of Egyptian schoolchildren.

Normative need is higher than perceived need from the patients' perspective (subjective and self-perceived need), yet lower than the apparent need from the inspector's perspective (objective perceived need). Dental experts rate the feel of the children more basically than children themselves. It is essential for experts to comprehend that the requirement for treatment require as apparent by them may not be viewed in an indistinguishable way from by the patients.

schoolchildren with a subjective perceived requirement for treatment will probably have a self- perceived requirement for treatment than those without a subjective perceived require. This fortifies the unwavering quality of the AC to precisely anticipate self- perceived require despite the fact that it really measures subjective perceived require.

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## 7. Appendix

### 1.examination form



T.C.  
*Istanbul*  
YENİ YÜZYIL  
ÜNİVERSİTESİ

DİŞ HEKİMLİĞİ FAKÜLTESİ

#### Examination sheet form for school children :

##### Geographic information:

##### Macro-Esthetic Examination:

- Profile: convex  straight  concave
- Skeletal discrepancy: class 1  class 2  class 3
- Facial symmetry: symmetric  asymmetric
- Growth pattern: Normal  High  Low
- Lip and incisor prominence: protrusion  normal  retrusion
- mandibular plane angle: normal  flat  steep

##### Bad habits examination:

- Finger sucking
- Finger biting
- Nail biting
- Lip sucking
- Others: .....

##### Mini- Esthetic Examination:

##### Lip examination

- Tonicity .....
- Posture .....
- Labial frenum .....
- Smile line .....

##### Upper midline

Normal  deviated to right  deviated to left

##### Lower midline

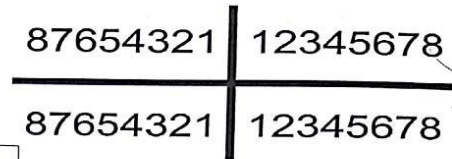
normal  deviated to right  deviated to left

The smile arc : ■ consonant  ■ non-consonant

**Micro-Esthetic Examination:**

**Impeded eruption:**

- 5.i Impeded eruption of teeth  
(except for third molars) due to:
- crowding
  - displacement
  - the presence of supernumerary teeth
  - retained deciduous teeth



**Defects**

- 5.p Defects of cleft lip and palate and other craniofacial anomalies
- 5.s Submerged deciduous teeth
- 4.t Partially erupted teeth, tipped and impacted against adjacent teeth
- 4.x Presence of supernumerary teeth

**Extensive hypodontia with restorative implications :**

- 5.h (more than 1 tooth missing in any quadrant) requiring preresorative orthodontics
- 4.h Less extensive hypodontia requiring preresorative orthodontics or orthodontic space closure to obviate the need for a prosthesis

**Increased overjet :**

- 5.a Greater than 9 mm
- 4.a Greater than 6 mm but less than or equal to 9 mm
- 3.a Greater than 3.5 mm but less than or equal to 6 mm with incompetent lips
- 2.a Greater than 3.5 mm but less than or equal to 6 mm with competent lips

**Reverse overjet :**

- 5.m Greater than 3.5 mm with reported masticatory and speech difficulties
- 4.m Greater than 1 mm but less than 3.5 mm with recorded masticatory and speech difficulties
- 4.b Greater than 3.5 mm with no masticatory or speech difficulties
- 3.b Greater than 1 mm but less than or equal to 3.5mm
- 2.b Reverse overjet greater than 0 mm but less than or equal to 1 mm

**Crossbites**

- 4.c Anterior or posterior crossbites with greater than 2 mm discrepancy between retruded contact position and intercuspal position
- 3.c Anterior or posterior crossbites with greater than 1 mm but less than or equal to 2 mm discrepancy between retruded contact position and intercuspal position
- 2.c Anterior or posterior crossbite with less than or equal to 1 mm discrepancy between retruded contact position and intercuspal position
- 4.l Posterior lingual crossbite with no functional occlusal contact in one or both buccal segments

**Open bites**

- 4.e Extreme lateral or anterior open bites greater than 4 mm
- 3.e Lateral or anterior open bite greater than 2 mm but less than or equal to 4 mm
- 2.e Anterior or posterior open bite greater than 1 mm but less than or equal to 2 mm



**Overbite**

- 4.f Increased and complete overbite with gingival or palatal trauma
- 3.f Deep overbite complete on gingival or palatal tissues but no trauma
- 2.f Increased overbite greater than or equal to 3.5 mm without gingival contact

**contact point displacements**

- 4.d Greater than 4 mm
- 3.d Greater than 2 mm but less than or equal to 4 mm
- 2.d Greater than 1 mm but less than or equal to 2 mm

**Periodontal conditins**

- healthy gums
- good
- bad

**Dentition**

- Number .....
- Shape .....
- Size .....
- Restoration .....
- Caries .....
- Extraction .....
- Impaction .....
- Attrition .....

87654321		12345678
<hr/>		
87654321		12345678

**Molar relation**

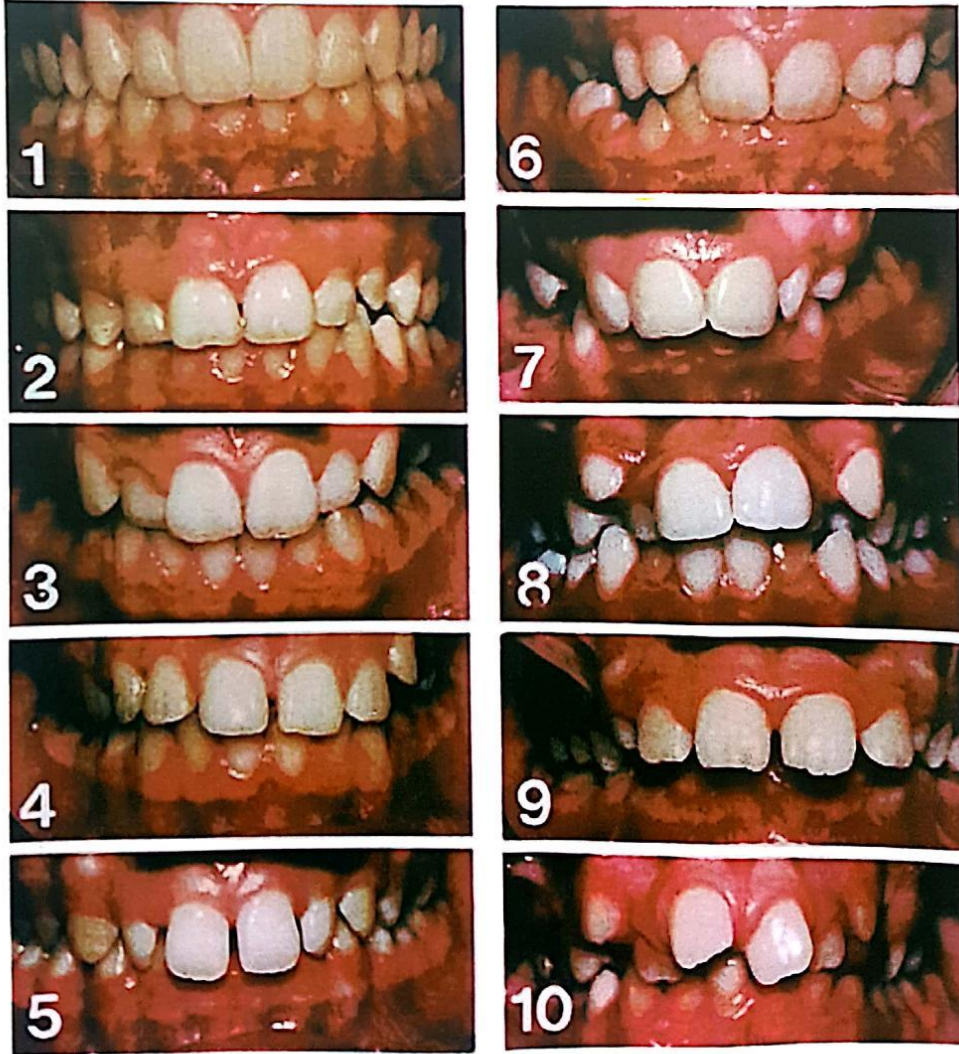
- Right .....
- Left .....

**Canine relation**

- Right .....
- Left .....

في هذه الصورة مطلوب من الطالب ان ينظر الى اسنانه في المرآة وان يحدد اي صورة هي القريبة لحالة اسنانه

وبعدها يكتب رقم الصورة هنا



2. Questionnaire (English version)

- The questions used to contribute to the oral aesthetic subjective impact scale (OASIS):

1. How do you feel about the appearance of your teeth?

1

2

3

Not concerned at all

somewhat concerned

very concerned

2. Have you found that other people have commented on the appearance of your teeth?

1

2

3

Not at all

sometimes

all the time

3. Have you found that other people have teased you about the appearance of your teeth?

1

2

3

Not at all

sometimes

all the time

4. Do you try to avoid smiling because of the appearance of your teeth?

1

2

3

Not at all

sometimes

all the time

5. Do you ever cover your mouth because of the appearance of your teeth?

1

2

3

Not at all

sometimes

all the time

## The subjective assessment of orthodontic treatment aesthetics and attitude to orthodontic treatment:

1. Do you think healthy and well-arranged teeth are important for your appearance?

Yes

No

2. Are you satisfied with your dental aesthetics?

Yes

No

3. Is there any thing you would like to chqngе about your teeth?

Yes

No

4. If yes what would you like to change?

Color

size

— arrangement

others

5. Do you have any trouble with speaking ,chewing, facial muscle pains caused by teeth arrangement?

Yes

No

6. Do you think you should have orthodontic treatment?

Yes

No

7. Has anyone ever auggested orthodontic treatment to you?

Yes

No

8. If you are in need of treatment, what might prevent you from doing so :

Traditional factors

financial factors

Socail factors

others

### 3. Questionnaire (Arabic version)



T.C.  
İstanbul  
YENİ YÜZYIL  
ÜNİVERSİTESİ

استبيان بخصوص دراسة حول الطلبة المقيمين في اسطنبول ما بين عمر (11-18 سنة ) ومدى حاجتهم لتقويم الأسنان  
وإصلاح تشوهات الفكين

هذا الاستبيان هو جزء من الدراسة التي تجري تحت إشراف جامعة İstanbul Yeni yuz yıl.  
نحن ممتنون لمشاركتكم في هذه الدراسة.  
يرجى ملء البياناتك الشخصية أدناه والإجابة على الأسئلة التالية.

ملاحظة: الاجابة بقلم الرصاص لتجنب الأخطاء

كما يرجى من الاب والام التوقيع على النسخة العربية والانجليزية نيابة عن الطالب

#### المعلومات الشخصية للطالب:

.....إسم المدرسة  
.....إسم الطالب  
.....الفصل الدراسي  
.....تاريخ الميلاد  
.....العمر  
.....الجنس  
.....الجنسية

..... توقيع (الاب) ..... توقيع (الام)

The questions used to contribute to the oral aesthetic subjective impact scale (OASIS)

1- كيف تشعر بخصوص مظهر أسنانك

ليس مهم  أحيانا اهتم  اهتم جدا

2- هل يعلق الناس على مظهر أسنانك

لا أبدا  أحيانا يعلقون  لا يعلقون أبدا

3- هل يسخر بعض الناس من مظهر أسنانك

لا أبدا  أحيانا  دائما

4- هل تحاول إخفاء ابتسامتك بسبب مظهر أسنانك

لا أبدا  أحيانا  دائما

5. هل تقوم بتغطية فمك بسبب مظهر أسنانك؟

لا أبدا  أحيانا  دائما

The subjective assessment of orthodontic treatment aesthetic and attitude to orthodontic treatment

1- هل تعتقد أن الاسنان الغير مرتبة تؤثر على مظهر الأسنان

نعم  لا

2- هل انت راضٍ عن جمال أسنانك

نعم  لا

3- هل هناك شيء ترغب بتغييره بأسنانك

نعم  لا

4- لو أجبت بنعم، مالشي الذي تود تغييره

اللون  الحجم  الترتيب  غير ذلك

5- هل تعتقد أنك بحاجة إلى لتبدأ علاج وتقويم الأسنان

نعم  لا

6- هل تواجه مشاكل في الكلام أو مضغ الطعام بسبب سوء ترتيب الأسنان

نعم  لا

7- هل نصحك أحد ان تبدأ علاج تقويم الأسنان

نعم  لا

8- لو انت بحاجة لتقويم أسنانك، ما الذي يمنعك

أسباب مادية  أسباب اجتماعية  الخوف  أسباب أخرى