T.C.
İSTANBUL YENİ YÜZYIL UNIVERSITY
HEALTH SCIENCES INSTITUTE
DEPARTMENT OF ORTHODONTICS

THE NEED AND DEMAND FOR ORTHODONTIC TREATMENT AND ITS CORRELATION WITH THE PERCEPTION AND AWARENESS OF PERSONAL DENTAL APPEARANCE BETWEEN LIBYAN AND SYRIAN SCHOOL CHILDREN LIVING IN ISTANBUL

MASTER OF THESIS

Alper BAYRAKTAR

Supervisor
Prof. Dr. Mustafa Haluk İŞERİ

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Abstract

Purpose: The purpose of this study is to measure the prevalence of malocclusion, perceived and normative orthodontic treatment need in Syria and Libya; and to compare the results between the two ethnic groups.

Materials and Methods: The study was designed and done by Alper BAYRAKTAR. A random sample of 180 (N =45) 9-12 years old Syrian and Libyan schoolchildren were selected from Two international schools which are located in Istanbul (Turkey). The children completed a questionnaire on sociodemographic variables, satisfaction, and perception of their child orthodontic treatment need (with parents). It is good to mention that parents have shown a very well interaction. A screening question was asked before each interview in order to verify that each respondent was met by the inclusion criteria. Children were interviewed for questionnaire forms to be filled by children themselves; additionally, each student was invited to participate in a clinical examination for orthodontic assessment. The interviews were done in Yeni Yüzyıl University's dental hospital and Alfayez International Schools' dental clinic. The dental health component (DHC) of the Index of Orthodontic Treatment Need (IOTN) were used as an assessment measures of the need for orthodontic treatment. The demand for orthodontic treatment was measured by the Aesthetic Component (AC) of IOTN was assessed by children.

Results: almost one fifth of Syrians (20.1%) of Syrians scored grade 4 or 5 IOTN score, only (13.34%) of Libyans scored the same, which means that Syrians have more need to pass orthodontic treatment. Definite orthodontic care need (AC score 8-10) reported for 5.55% of both Syrians and Libyans. According to results most of the children fall in "no need" group but the Syrians always showed more need of treatment in all of measured parameters.

Conclusions: The prevalence of malocclusion in both groups is low, most of the children fall in the "no need" for orthodontic treatment zone. Although

there was no significant statistical difference between the two groups, Syrians show more need for orthodontic treatment.

The prevalence of malocclusion among Libyan school children is low, only 2.1% had great treatment need.

Keywords: Libya, Syria, schoolchildren, IOTN, malocclusion, normative treatment need, perceived treatment need, comparison.

Özet

Amaç: Bu çalışmanın amacı Suriye ve Libya'daki maloklüzyon, hissedilen ve normatif ortodontik tedavi ihtiyacının prevalansını ölçmek; ve iki etnik grup arasındaki sonuçları karşılaştırmaktır.

Gereç ve Yöntem: Çalışma Alper BAYRAKTAR tarafından tasarlanmış ve yapılmıştır. İstanbul'da (Türkiye) bulunan iki uluslararası okuldan (N = 45) tane 9-12 yaş arası Suriyeli ve Libyalı okul öğrencilerden rastgele 180 öğrenci çalışmaya alınmıştır. Öğrenciler sosyodemografik değişkenler, tedaviden memnuniyet, ortodonti tedavisine duyulan ihtiyacın algılanması konularını içeren bir anketi ebeveynleri ile birlikte doldurmuşlardır. Ebeveynlerin de çok iyi uyum gösterdiğini belirtebiliriz. Her katılımcıya deneye dahil olmadan önce, katılım kriterlerini yerine getirdiklerini doğrulamak için tarama soruları soruldu. Çocukların kendilerinin dolduracağı anket formları için görüşme yapılmış ve her bir çocuk tek başına ortodontik değerlendirme için klinik muayeneye davet edilmiştir. Görüşmeler Yeni Yüzyıl Üniversitesi diş hastanesi'nde ve Alfayez Uluslararası Okulları diş kliniği'nde yapılmıştır. Ortodontik Tedavi İhtiyacı Endeksinin (IOTN) diş sağlığı bileşeni (DHC) ortodontik tedavi ihtiyacının değerlendirme ölçütü olarak kullanılmıştır. Ortodontik tedaviye olan talep, IOTN'nin Estetik Bileşeni (AC) ile ölçüldü, öğrenciler üzerinde değerlendirildi.

Bulgular: Suriyelilerin neredeyse beşte biri (%20.1) 4. veya 5. sınıf IOTN puanına sahipken, Libyalıların yalnızca %13.4'ü aynı puanı aldı; Kesin ortodontik bakım ihtiyacı (AC skoru 8-10) hem Suriyelilerin hem de Libyalıların% 5.55'ini bildirmiştir. Elde edilen sonuçlara göre çocukların çoğu "ihtiyaç yok" grubuna girmekte ancak Suriyeliler ölçülen tüm parametrelerde her zaman daha fazla tedavi gereksinimi göstermişlerdir.

Sonuçlar: Her iki grupta da maloklüzyon prevalansı düşüktür, çocukların çoğu ortodontik tedaviye ihtiyaç duymamaktadır. İki grup arasında istatistiksel

olarak anlamlı bir fark olmamasına rağmen, Suriyeliler ortodontik tedaviye daha fazla ihtiyaç duydukları sonucuna varılmıştır.

Libyalı öğrenciler arasında maloklüzyon prevalansı düşüktür, sadece% 2.1'inde büyük tedavi ihtiyacı vardı.

Anahtar Sözcükler: Libya, Suriye, okul öğrencileri, IOTN, maloklüzyon, normatif tedavi ihtiyacı, hissedilen tedavi ihtiyacı, karşılaştırma

Dedication

This thesis is dedicated to my role models;

My great parents,

You are the candles that lightened my way in the dark, mom you are my first tutor that taught me to walk, talk and behave.

My beloved sisters;

To all my family,

The symbol of love and giving,

My dearest friend,

whom I can't force myself to stop loving, the one who supported me through this foreignness, loved me despite all my negative manners.

Acknowledgements

First and foremost, I owe a deep debt of gratitude to our university for giving us an opportunity to complete this work. I am grateful to some people, who worked hard with me from the beginning till the completion of the present research particularly my supervisor Prof. Dr. Mustafa Haluk İŞERİ. And, I highly appreciate the efforts expended by, Prof. Dr. İlter Uzel, Assoc. Prof. Dr. Göksu Trakyalı and Assoc. Prof. Dr. Ayşe Bahat YALVAÇ

I would like to take this opportunity to say warm thanks to all my beloved friends, who have been so supportive along the way of doing my thesis. I also would like to express my wholehearted thanks to my family for the generous support they provided me throughout my entire life and particularly through the process of pursuing the master degree. Because of their unconditional love and prayers, I have the chance to complete this thesis.

I am very appreciative of my colleagues at the Istanbul Yeni Yüzyıl University, who participated in this study. Last but not least, deepest thanks go to all people who took part in making this thesis real.

To my mother Randa, I would like to first and foremost thank you for the amazing love and support you have given to me throughout the years. Thank you for encouraging me endlessly to pursue higher education. I wish that you and dad are always proud of me.

I also would like to thank all of the orthodontic staff for educating me.

Abbreviations:

Abbreviations	Explanation
DHC	Dental Health Component
AC	Aesthetic Component
SCAN scale	Standardized Continuum of Aesthetic Need
IOTN	Index of Orthodontic Treatment Need
OHRQoL	Oral health-related quality of life
DS	Down Syndrome
CP	Cerebral Palsy
OHIP	The Oral Health Impact Profile
MOCDO	Missing, Overjet, crossbite, Displacement of contact points, Overbite and Openbite.

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1. INTRODUCTION

1.1. Introduction

There are three basic dental problems which inhibits people's awareness about alignment and occlusion of teeth: low sense of social well-being, impaired facial appearance and poor oral health. In clinical orthodontic practice, the patients who look forward to orthodontic treatment generally complain of one or more of these problems, it is essential to assess their relative significance to them in order to help us set the most correct treatment plan for each patient. Some people seek for orthodontic treatment only for aesthetic reasons to improve their quality of life (QOL).

In our modern days, it's a fact that oral appearance has a big influence on quality of life of an individual which played a main role in increasing the interest in occlusion care. Additionally, the oral appearance effect on quality of life is particularly important for children and adolescents as well as for adults, especially when talking about the psychological effects of the oral conditions, such as avoiding smile and being teased about teeth. When looking from this corner of view we can say that oral-appearance is as much important as it can characterize the social life and self-esteem of a child (1).

There is no Syrian or Lybian data in the past studies showing this diversity of geographic distribution or compare the two people. The current research is designed to determine the need for orthodontic treatment among Syrian and Libyan schoolchildren between 9-12 years old in Istanbul, Turkey. The process involves measuring the distribution as well as malocclusion prevalence and severity and care need among randomly selected children population and comparing those between Syrians and Libyans. The secondary purpose was to carry out the cross-sectional study and compare the findings with those from other people as well as the association between the need and demand for treatment.

The aim of the research was to use cross-sectional study approach to assess the need and demand for orthodontic care as well as its relationship with perception and awareness of dental appearance among Syrian and Libyan schoolchildren in Istanbul. The evaluation involved details on the behavior of children with occlusion and how the condition influences their well-being. The following objectives were used to design the cross-sectional study:

1- To assess the distribution, prevalence and the severity of malocclusion and treatment need among Syrian and Libyan schoolchildren sample.

2- To test the normative and observed orthodontic treatment needs of Syrian and Libyan schoolchildren aged 9-12 years in Istanbul/Turkey.

3- To compare the normative and observed orthodontic treatment needs between Syrian and Lybian children aged 9-12 years in Istanbul/Turkey

The objectives were comprehended by a cross-sectional approach that classified the children and teenagers into Grade 5 to 1, based on the severity and prevalence of malocclusion. The survey targets on improving the behavior of children with occlusion by boosting their self-esteem.

1.2. Ideal and Normal Occlusion:

The approach to study malocclusion starts with a deep knowledge of the ideal and normal occlusion separately since they are completely different of each other (2). The term of ideal occlusion, from one perspective, the relationship existing when all teeth are perfectly placed in the arcades of the jaws and have a normal anatomic relationship to each other, therefore its value is to identify different malocclusions by comparing them to the ideal occlusion. Nonetheless, changes identified with age are not considered in this kind of assessment. The normal occlusion, then again, can't be definitely characterized.

Normal occlusion is the occlusion which slightly differs from the ideal one but the differences are aesthetically and functionally accepted. Those differences may be minor discrepancies of alignment and relation of teeth (3). Any more severe forms of these variations or any mal-relationship between the maxillae are defined as ‘malocclusion’

1.3. Malocclusion:

The word malocclusion literally means "bad bite." The condition may also be referred to as an irregular bite, crossbite, or overbite. Malocclusion may be seen as crooked, crowded, or protruding teeth. It may affect a child's appearance, speech, and/or ability to eat. It is an international-spread oral case. It is not considered as a disease but as a set of dental or skeletal anomalies. That is the reason why the treatment of malocclusion is done by attempts to restore the occlusion to its ideal condition (4).

Malocclusion is admitted when there is tooth malposition above the normal limits or when there is a misalignment or incorrect relation between the jaws in at least one of the three planes of space (3).

Most malocclusions are asymptomatic and identifies with aesthetic issues so wellbeing measurements created in dentistry are not fitting to orthodontic patients.

furthermore, malocclusion may not be related to its severity but to the level of consciousness, while evaluating the effect of malocclusion, it is recommended to consider the different affected domains and their relationship to the severity of malocclusion. In our practice we can meet a lot of patients with a severe malocclusion but they are happy or unconcerned with their oral appearance. On the other hand, we can meet patients that are very worried about minor malocclusions. Then, if the malocclusion is functional and doesn’t cause a problem to the aesthetic morals of the patient, the malocclusion if thought to be settled.

1.3.1. Etiology of malocclusion:

There are a lot of possible causes of malocclusions. Anyway, the specific etiology of most malocclusions is not completely understood. The malocclusion causative factors are classified into three major categories: Hereditary causes, environmental influences, and specific causes.

Hereditary influences (the Habsburg jaw, the protruding lower jaw of this royal family of European, is the most well-known case). Additionally, environmental influences are made up of equilibrium consideration, masticatory function, sucking and other habits, tongue thrusting and respiratory patterns.

Furthermore The specific causes of malocclusion includes: disturbances in embryologic development (e.g. teratogens consequence), developmental disorders in fetal and perinatal stages (e.g. the forceps-caused trauma to the mandible during the labor process, progressive deformities in childhood (e.g. childhood fractures of the jaw and muscle dysfunction), disturbances arising in adolescence or early adult life (e.g. acromegaly), and disturbances of dental development (e.g. congenitally missing teeth, malformed and supernumerary teeth).

1.3.2. Epidemiology of malocclusion:

The currency of malocclusion varies from one group to another based on age groups and ethnicities (5).

A number of studies conducted on a similar target population and utilizing the IOTN index waived variable outcomes, an investigation applying the IOTN to evaluate orthodontic care need in Italy, the prevalence was (59.5%) (6), and it was 34% revealed by a study undertaken on 1002 (12–14) years old Jordanian schoolchildren (7), and of 15% in a research carried out in England on a target population of 3500 participants 12–14 years old of minority ethnic groups (8). A value closer to that in Italy was found in 5112 Malaysian (12–13) years old children (47.9%) (9), whereas it was lower than the 71% in Jordanian subjects with an average age of 15 years (10).

Tang (1994) (11) conducted a study on 108 male dental students from Hong Kong utilizing the Occlusal Index. The finding was 58% of subjects were with good occlusion or no need for orthodontic care (Grade 1 or 2), while 19% of them had little treatment need (Grade 3) and 46% required definite treatment (Grade 4 or 5). Crowding was the most common occurring trait (39%) followed by Class II malocclusion (21%) and Class III malocclusion (15%).

Hägg et al. (2001) (12) aimed at assessing the need and demand for orthodontic treatment among youthful Chinese adults and to contrast it to that of Chinese children utilized the IOTN (grade index scales) to study 223 young Chinese adults attending a dental clinic. They detailed that the greater part (54%) of the studied adults had ‘great’ or ‘very great’ orthodontic treatment need. 31% of those adults had ‘moderate’ treatment need, and 15% had ‘little’ or ‘no’ treatment need.

1.3.3. Oral health-related quality of life and malocclusion:

The concept of oral health-related quality of life (OHRQoL) defined as “the absence of negative effects of oral circumstances on social life and positive sense of dentofacial self-esteem” (13). accordingly, the problem appears in the subjective evaluation of the patient’s detected physical, psychological, and social factors of oral health. It is hard to use any one standard assessment tool to decide how the patient feel about themselves (14). However, the “good oral health” idea is specified when a patient has the good self-esteem, good psychological conditions, and social well-being, as well as the absence of hard and soft tissue oral diseases (13).

A research was carried out on 8 to 10-year-old primary school children in Belo Horizonte, Brazil reported that students with malocclusion from poor families have a more negative effect on OHRQoL (15).

Dental malocclusions are not only considered as an oral health problem but they are also connected to life quality concept. Malocclusion has negative effects on a person's dental wellbeing, dentofacial appearance and social acceptance (16).

Malaligned teeth may cause food debris trapped between teeth and can waste the patient's efforts to keep his/her mouth hygienic, which increase the probability of dental diseases. Malocclusion causes terrible dentofacial appearance, which will influence a person's social acceptance and self-esteem (17).

Plenty components identified with malocclusion have strong effects on the perception of facial aesthetics (e.g. anterior teeth alignment, tooth shape and position, lip thickness, symmetric gingival or tooth contour, and overjet). Many studies have shown that the perception of facial esthetics can have negative effects on psychological development from early adolescence to adulthood (18).

Yet, Badran (19) reported in 2010 the effect of physical appearance on self-esteem and social adoption, showing that students with malocclusion showed a lower self-esteem than those with little or no need for orthodontic treatment.

As a whole, people who belong to high income social class are more critical, whereas young children are usually less mindful of their dental appearance.

1.4. Strategies for Occlusion evaluation

Several methodologies have been suggested to check orthodontic treatment need and/or occlusion. Tang (1994) (20) have allocated the regular methods and reasoned that the approaches for evaluating occlusion can be classified into: qualitative, quantitative (indices) and grade index scales.

1.4.1. Qualitative strategy:

1.4.1.1. Angle's Classification of malocclusion:

The most widely recognized evaluation of malocclusion is Angle's arrangement (21) which separates occlusion into three gatherings (Table 1). This order of occlusion has been a standout amongst the most prevalent and is broadly educated in dental schools. Nonetheless, it just looks at molar

connections and does not assess the relationship of anterior teeth, which are aesthetically essential.

Furthermore, the reliability of Angle's arrangement of a grouping of malocclusion has been analyzed. Between-examiner errors were found to be high and there were also high within-examiner error levels in categorizing Angle Class II division 2 malocclusions. It is presumed that the examinations of the distribution of malocclusions in various groups, classified according to Angle's system (Table 1), should not be made unless observations are made in each community by the similar analyst. The usefulness of Angle's characterization to both clinician and epidemiologist is questioned (26).

Table 1: Angle's classification of malocclusion

Angle's classification	Description
Class I (neutrocclusion)	The mesiobuccal cusp of the maxillary first permanent molar occludes with the mesiobuccal groove of the lower first molar.
Class II (distocclusion)	The mesiobuccal cusp of the mandibular first permanent molar occludes distal to the Class I position.
Class III (mesiocclusion)	The mesiobuccal cusp of the lower first permanent Molar occludes mesial to the Class I position.

1.4.1.2. British standard incisor classification:

To complement the occlusal evaluation with the relationship of the front teeth, the British Standard Institute (B.S.I.) built up an incisor relationship arrangement (Table 2), which depicts occlusal attributes by methods for arranging distinctive kinds of malocclusion for snappy and simple documentation, and gives a typical and straightforward technique for correspondence between dental specialists (British Standard Institute, 1983) (22).

The study conducted by Bugaighis, Karanth, and Borzabadi-Farahani (2015, p.100) (23) aimed to investigate the tooth size discrepancy (TSD) in a sample of Libyan pupils and to compare TSD between genders, demonstrates that British Standard Incisor Classification is the most proper approach in evaluating incisor relationship.

Table 2: British Standard Incisor Classification

Incisor Classification	Description
Class I	The lower incisor edges occlude with or lie immediately underneath the cingulum level of the upper central incisors.
Class II	The lower incisor edges lie posteriorly to the cingulum level of the upper incisors. There are two subdivisions: Division 1 – the upper central incisors are proclined or of average inclination and there is an increase in overjet and; Division 2 – the upper central incisors are retroclined. The overjet is usually minimal or may be increased.
Class III	The lower incisor edges occlude in front of the cingulum plateau of the upper incisors. The overjet is reduced or reversed.

The relationship between maxillary and mandibular incisors is described using the terms ‘over jet’ and ‘overbite’. Overbite measures the vertical coverage of the upper and lower incisors when seen anteriorly and the typical range is 0-3 mm. Overjet records the separation between the upper and lower incisors in the horizontal plane and the ordinary range is 3 mm.

1.4.2. Quantitative strategy:

1.4.2.1. The Occlusal Index (OI)

Occlusal Index (OI) (24) is one of the most vastly known quantitative measurement to evaluate the occlusion. It contains nine estimations: molar relationship, midline relation, maxillary median diastema, overjet, overbite, posterior open bite, posterior crossbite, congenitally missing maxillary incisors and tooth displacement.

The OI provides scores running from 0 to 16. The severity of malocclusion and orthodontic treatment need as indicated by the OI score appear in (Table 3) OI measures malocclusion traits as manifested in intra- or inter-arch deviations. In any case, it doesn't consider soft tissue profiles or facial asymmetries.

Table 3: Orthodontic treatment need according to the Occlusal Index Score

Grade OI	Score	Treatment need
I	**0.0 – 2.5**	**Great occlusion; no proof of an occlusal issue.**
II	**2.6 – 4.5**	**No treatment; minor deviations, no treatment indicated.**
III	**4.6 – 7.0**	**slight treatment; negligible deviations in occlusion, a simple treatment is needed.**
IV	**7.1 – 11.0**	**Definite treatment; major deviations, major treatment is required.**
V	**11.1 – 16.0**	**Worst occlusion; these occlusions were highly disfiguring to the patients and would rank first in treatment priority**

1.4.2.2. Grade index scale

It was developed by the orthodontic department of the Swedish Dental Society and Swedish Medical Board (25). The Index of Orthodontic Treatment Need (IOTN) is used vastly.

1.4.2.2.1. Index of Orthodontic Treatment Need (IOTN):

Peter Brook and William Shaw developed the index and called it the Index of Orthodontic Treatment Priority (26). Later on, the index was named as the Index of Orthodontic Treatment Need (IOTN). The IOTN is the most used index to evaluate the orthodontic care needs among the research community.

IOTN is made of two elements, The Dental Health Component (DHC) (Table 4) “alternation of the index previously used by the Swedish Dental Board” and the Aesthetic Component (AC) (Figure 1). As a result of investigation accessible literature, it was found that this could be best done by using two independent segments to register firstly the dental health and functional indications for treatment, and then the esthetically compromised teeth because of malocclusion. There is no attempt to combine these two components and they are recorded separately (26).

In Table 4 (1), we can find that DHC has five grades ranging from grade one to grade five (no need to very great need respectively). A grade is selected according to the severity of the worst occlusal feature and gives an indication of treatment priority.

The subsequent hierarchical scale is used for recording the worst occlusal characteristics (in a descending order), Missing teeth, Overjet, Crossbites, Displacement of contact points, and Overbite (including openbite). For the hierarchical scale not to be forgotten, the abbreviation of ‘MOCDO’ can be developed. If two or more occlusal anomalies record the same DHC grade, we can use the hierarchical scale to allocate which dental anomaly should be recorded (i.e. dental anomaly with higher rank in the hierarchical scale is recorded). It is worthwhile to mention that in recording the DHC only the worst occlusal feature/anomaly is recorded.

The AC is based on then SCAN scale which is rarely used these days (figure 1). It is made of 10-point scale demonstrated by a series of photographs that are rated for attractiveness by a committee of lay judges and were selected as being centrally allocated through the range of grades (28). The photographs of AC are sorted from the most to the least attractive. The photographs for this research were taken from 12 years old children during a vast multi-disciplinary survey (28).

According to Shaw and co-workers, the process of measuring the IOTN components should take between 1 to 3 minutes (29). The DHC and AC can

be done either clinically or in lab depending on dental casts (27). Without clinical information, the dental cast protocol is used when measuring the DHC on study casts. This protocol always supposes the worst-case scenario. For example, if crossbite is present on study cast the protocol assumes that a discrepancy between the retruded contact position and intercuspal position of more than 2 mm is present and the DHC recording will be 4a. The details and conventions for the IOTN can be found in the literature (27).

The validity and reliability of the IOTN have been verified previously (30). In order to assess the validity of the Aesthetic Component of IOTN, a validation exercise involving 74 dentists (44 orthodontist and 30 non-orthodontist) was carried out (31). This was aimed at determining the cutoff points representing the different levels of orthodontic treatment need.

A scale of 10 colored photographs showing different levels of dental attractiveness was used, grade 1 representing the most attractive and grade 10 the least attractive dentitions. The validation panel judged grades 1- 4 to represent ‘no or little need’, grades 5, 6, and 7 as ‘borderline need’, and grades 8, 9, and 10 to represent a clear need for treatment on aesthetic grounds. However, different cut-off points and major changes in the Aesthetic and Dental Health Components of the IOTN has been suggested (37.38). An improved reliability has been reported for the IOTN if both Dental Health and Aesthetic Components were reduced to three grades (32).

Beglin and co-workers (33) assessed the validity of DHC and AC of the IOTN by a group of American orthodontists and suggested the optimized cut-off points of 3 and 5, respectively. Sometimes, there is a discrepancy between the DHC and AC grades and they can be contradictory. Some occlusal anomalies such as ectopic teeth, hypodontia, deep traumatic overbites or crossbites have dental health implications; however, they do not necessarily attract high Aesthetic Component grades.

The previous study of Borzabadi-Farahani and co-workers (34) showed there is only a moderate agreement between AC and DHC. This difference

between the DHC and AC reflects that AC assesses the aesthetic aspects of the malocclusion, only in frontal view, and highlights the subjective nature of it. Then, any clinician who is interested in using the IOTN should receive adequate training and pass the calibration process (35).

Modified IOTN simplifies introducing people in need of treatment and improves the reliability and validity of the index. By using the modified IOTN (36), every case with IOTN DHC ≥ 4 and/or IOTN AC ≥ 8 is judged as being in need of treatment. The modified IOTN is a two-grade scale (need/no definite need), instead of 5-grade scale with 30 sub-categories. Since its introduction, few epidemiological studies used the modified IOTN (42,43).

It has been suggested that the use of the occlusal indices would offer several advantages: (1) uniformity in prescribing patterns, (2) safeguards for the patient, (3) patient counseling and (4) are monitoring and promoting standards (37).

An advantage of using the IOTN is that only the worst feature is recorded and thus it is simpler and less time consuming, which makes clinical examination more practical and simpler. However, the IOTN overestimates tooth displacement and crossbite and puts a heavy weight on missing teeth (38).

Table 4: The Dental Health Component of the IOTN

Grade 1: No treatment need
1. Extremely minor malocclusion with contact point displacements of less than 1 mm
Grade 2: Minor anomaly, no treatment need
2.a Overjet > 3.5 mm and ≤ 6 mm (with competent lip closing) **2.b** Reverse overjet between 0 and ≤ 1 mm **2.c** Anterior or posterior crossbite with 1 mm discrepancy between RCP and ICP **2.d** Contact point displacements > 1 mm and ≤ 2 mm **2.e** Anterior or posterior open bite > 1 mm and ≤ 2 mm

2.f Increased overbite of ≥ 3.5 mm (without gingival contact)
2.g Class II or class III occlusion without other anomalies (up to half a premolar width)

Grade 3: Borderline treatment need

3.a Overjet > 3.5 mm and ≤ 6 mm (incompetent lip closing)
3. b Reverse overjet between 1 and ≤ 3.5 mm
3.c Anterior or posterior crossbite with > 1 mm and ≤ 2 mm discrepancy between RCP and ICP
3.d Contact point displacements > 2 mm and ≤ 4 mm
3.e Lateral or anterior open bite > 2 mm and ≤ 4 mm
3.f Deep overbite with gingival contact or contact with palatal mucosa (but without trauma)

Grade 4: Treatment need

4.h Less severe hypodontia requiring prerestorative orthodontics or orthodontic space closure to obviate the need for prosthetic restoration
4.a Overjet > 6 mm and ≤ 9 mm
4.b Reverse overjet > 3.5 mm (without masticatory or speech problems)
4.m Reverse overjet > 1 mm and ≤ 3.5 mm (without masticatory or speech problems)
4.c Anterior or posterior crossbite with > 2 mm discrepancy between RCP and ICP
4.l Posterior lingual crossbite with no functional occlusal contact in one or both buccal segments
4.d Major contact point displacements > 4 mm
4.e Extreme lateral or anterior open bite > 4 mm
4.f Increased and complete overbite with gingival or palatal trauma
4.t Partially erupted teeth, tipped and impacted against adjacent teeth
4.x Existence of supernumerary teeth

Grade 5: Treatment need

5.i Impeded tooth eruption (3rd molars) attributable to crowding, displacements, supernumerary teeth, retained deciduous teeth and all pathological reasons
5.h Extensive hypodontia with restorative impact (more than 1 congenitally missing tooth in any quadrant) requiring prerestorative orthodontics
5.an Increased overjet > 9 mm
5.m Reverse overjet > 3.5 mm with masticatory problems and speech disorders
5.p Cleft lip and palate and other craniofacial anomalies
5.s Retained deciduous teeth

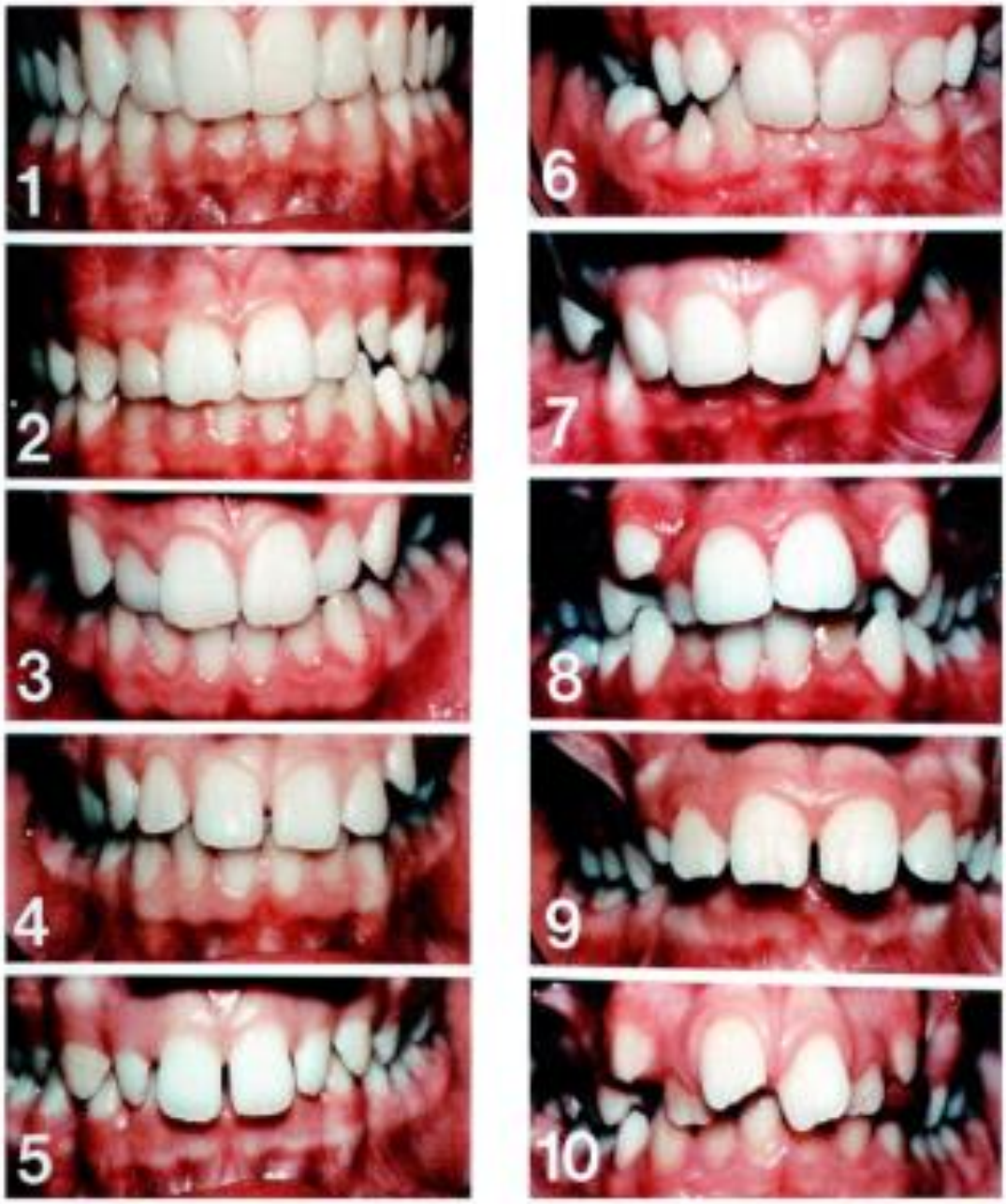

Figure 1: The Aesthetic Component of the IOTN

When recording AC, the severity of the shape of malocclusion should be matched to the nearest photograph and then the score is recorded

A scientific study by Borzabadi-Farahani (39) indicates that despite the shortcomings of orthodontic treatment need indices they are used in many

European countries and some states in the United States. The use of multifunctional orthodontic indices, based on international consensus, that provides information on the need/complexity and treatment outcome is recommended. As mentioned earlier orthodontic treatment need indices are based on consensus opinion of their developer(s) and are not entirely based on the research evidence.

A study was carried out between July and October 2009. The study involved the assessment of a sample of 131 pairs of dental casts selected randomly from the archive of the Specialization Course in Orthodontics at the Faculty of Dentistry, Universidade Federal de Minas Gerais, Brazil. This archive contains 198 models of oral cavities of all orthodontic patients from Universidade Federal de Minas Gerais. Models in inadequate conditions (with fractures in casts) and models of patients who had received previous orthodontic treatment were not included. The age of participants whose models were included in this study ranged from 12 to 15 years, an age group recommended in studies of occlusal indices by several authors (47,49). The patients, whose models were evaluated, were at early permanent dentition. The results of the study indicate that there were different outcomes in clinical and model assessment, whereby the model was preferentially reported.

The introduction of dental epidemiologic indices aims at estimating the prevalence of malocclusion in particular population such as Turkey and to compare the socio-demographic features and self-perception of parents concerning the malocclusion of their children with the orthodontist's opinion of normative orthodontic treatment need (40). The application of IOTN is based on the child’s dental appearance as well as the treatment priorities. The method is extensively used in determining children who are more likely to benefit from the treatment. The technique has been successful in defining the degree of occlusion based on the five grades.

According to the survey conducted by Marisa Reichmuth and others (41), the demand for orthodontic treatment among children is enhanced by the desire

to correct dental discrepancies and care for oneself. Anyway, the need and demand for the occlusion vary in different populations. The previous high need for treatment facilitates the creation of awareness to ensure that there is the availability of information to the children who may be willing to undergo occlusion care. The comparison of the data from the studies that use similar index shows that malocclusion is a dental anomaly that is influenced by the population (8,52,53).

The critical goal is to justify the need for orthodontic treatment in improving the well-being of Libyan children with malocclusion. Besides the treatment benefits, the research also recognizes that issues arising from the process among 11-16-year-old Libyan children in Istanbul. The study design also incorporates the analysis of the behavior of schoolchildren with malocclusion and how the treatment helps them to change their physical and psychological aspects. The power analysis helps in revealing the sample size and allows the use of statistical power during the investigation.

Answering the questionnaire by students is critical in obtaining information regarding. The Grade 5 represents children that require treatment. The study focuses on features such as the impeded eruption of teeth as a result of crowding, supernumerary teeth, displacement, retained deciduous teeth as well as other pathological causes. The treatment is also considered to the children with great hypodontia and therapeutic implications that require corrective orthodontics. The children with on overjet that is more than 9 mm are also put in Grade 5 and need treatment.

Orthodontic care is also considered when children experience bullying associated with certain occlusal traits which have a negative impact on self-esteem and OHRQoL (42).

However, the need for the occlusion care is high to the patients with the defects of the cleft lip as well as the palate and craniofacial anomalies caused by submerged deciduous teeth. Similar to the Grade 5, Grade 4 children also require treatment. The children under this grade have less

extensive hypodontia that needs restorative orthodontics as well as increased overjet that is more than 6 mm, but less than 9 mm. The reverse overjet for the Grade four is more significant than 3.5 mm with no masticatory or speech difficult.

The Grade 3 is considered a borderline within over jet that is more excellent than 3.5 mm. The child may feel treatment or can opt not to undergo the process. The study does not recommend for the treatment of children under Grade 1 and Grade 2.

The assessment incorporates lip examination based on toxicity, posture, labial frenum and smile line. The upper midline and lover midline are also examined to identify deviation from the standard state. Other critical elements of the research include incisor display examination, micro-esthetic evaluation as well as increased on reverse overjet.

2. MATERIALS AND METHODS

2.1. Sample size and research design:

In the sum, 180 students selected randomly to represent two different countries in Asia and in Africa. The target population of the research were Syrian and Libyan schoolchildren aged between 9 and 12 years, participants are males and females from both countries– comprising 49.44% males of the sample population. The gathered data apropos the requirement for orthodontic treatment was demonstrated in a cross-sectional design.

2.2. Power analysis calculation:

The power analysis was done and sample size estimated to be 87 individuals for each group (Syrian schoolchildren and Lybian School children).

Power analysis:

Calculation of sample size revealed that at least 174 patients for orthodontic treatment need group (for frequency %29) should be included, with statistical power (1-β value) of 90% allowing for a type I (α) error of 0.05.

2.3. Research approval:

The research approval was given by the Ethics Committee of İstanbul Yeni Yüzyıl University. The parents of the children were given consent forms to read, understand and sign. The purpose of the research was taught in detail to guardians. At the same time the purpose of the study and the methodology was showed to the school management to guarantee best cooperation and make data gathering procedure delicate and easy.

2.4. Inclusion criteria:

When choosing the samples, the following criteria was followed:

1. A child who has never ever pass through orthodontic treatment.
2. Aged 9-12 years.
3. Half of them Syrian while the other half are Libyan (chosen by both origin and nationality).
4. No developmental syndromes.

2.5. Exclusion criteria:

1. Have passed through any kind of orthodontic treatment.
2. Age group smaller than 9 years or bigger than 12 years.
3. Not originally Syrian or Libyan.
4. A patient of developmental syndrome.

2.6. Date and venue for the study

The study took place in 2018 in Istanbul city. The two international schools in Istanbul that examinations of the schoolchildren performed were:

1. Al Fayez International school.
2. King Idris El-Senusi Libyan school Questionnaire Survey.

A couple of surveys has been used. OASIS survey which stands for Oral Aesthetic Subjective Impact Scale, the OASIS tool was supported by a fore tested the subjective evaluation of orthodontic treatment aesthetics and attitude to orthodontic treatment (Appendices II, IV, V, VI).

The goal of the questionnaire was to measure the subjects' awareness of aesthetics status of teeth in terms of the look of their mouth, do they think that they need orthodontic treatment or not, what do they need to change and so on.

2.7. Questionnaire interview

The questions were translated into the mother language of the children (Arabic) in a simple understandable way without changing the meaning of the original one, and they were told to ask any question they may need to ask for better understanding. The translated copies are in the appendix.

The questions asked were ensured to be clearly understood by the respondents in their own language, they were also offered to ask for more clarification when needed. Participants were asked a covering question before each meeting to assure that every participant in the surveys was acceptable according to our inclusion criteria. Translated copies of the two surveys found in the appendix were fulfilled by children themselves in eye to eye meeting.

Right after that, the examination papers were filled (Appendix I). The data started with geographical information (Name, age, sex, school name, country of origin etc.), TMJ tests, bad habit test, mini and micro aesthetic evaluation and MOCDO parameters of the DC of IOTN.

2.8. Photo Selection based on the AC of the IOTN

A paper contains the IOTN photos were shown to each participant and he/she was asked to look in the mirror and choose the nearest photograph to his/her mouth overlook. “IOTN photographs” (Appendix II).

2.9. Clinical Examination

The whole process was voluntary for our participants. 180 out of 265 children who wanted to participate were examined clinically. The examination procedures were done in Al Fayez International school’s dental clinic; it contains a dental unit and full material all in well-lit room. Disposable check-up instruments were used to handle the huge flow of participants. Dentition were dried and cleaned before checking up the whole dentition which was examined separately and as a whole (intramaxillay and intermaxillary check-up). Molar occlusal relationship was assessed while participant in intercuspal occlusion (centric occlusion).

Degree of severity of malocclusion has been measured by IOTN index. In this clinical examination anteroposterior relationship, overbite, crossbite, openbite, IOTN orthodontic need, overjet, and hypodontia or supernumerary teeth were checked.

Anteroposterior relationship was assessed according to British standard incisor classification for incisor relationship and Angle’s classification of the posterior and cuspid relationship.

Also, malposition of teeth, the space between the contact point of the malpositioned tooth and its neighboring teeth gives a sight at the degree of displacement. Grade of orthodontic treatment need is determined according to the largest contact point displacement. As there was no x-ray assessment, any unerupted tooth with enough space in the dental arch was not considered to be impeded except if the universal range of variation in eruption timing has been reported out of date.

2.10. Research questions

The research questions are asked to build this cross-sectional study of Syrian and Libyan schoolchildren living is Istanbul/Turkey:

1. What is the currency and intensity of malocclusion among Syrian and Libyan schoolchildren?
2. What are the normative and detected orthodontic treatment needs for Syrian and Libyan children who belong to 9-12 years age group and live in Istanbul/Turkey?
3. What is the difference between need and demand of orthodontic treatment for Syrians and for Libyans?

The questions of this research were easy and clear to ensure that the study meets its objectives by minimizing the possibility of misunderstanding. The data also will be beneficial for researchers who are looking for relevant literature.

2.11. Statistical method

Statistical calculations were performed with (Number Cruncher Statistical System) 2007 Statistical Software (Utah, USA) program for Windows. Besides standard descriptive statistical calculations (mean and standard deviation, frequency and percentage distributions) Chi square test was

performed during the evaluation qualitative data. Statistical significance level was established at p<0,05.

3. RESULTS

Data analysis of this study measured the prescriptive and detected orthodontic need of treatment of sampled Syrian and Libyan children 9-12 years of age and then compared this need between the two people.

3.1. Respondents' demographic profiles

The participants were separated into two groups Syrians and Libyans, each group consisted of 90 participant of schoolchildren aged between 9 and 12 years living in Istanbul/TURKEY. The ethnicity and nationality backgrounds were used to determine the occurrence of malocclusion.

3.1.1. Respondents' ethnicity distribution

Participants were selected from two Arabic countries, one of them is Syria which is located in Asia and the other is Libya from Africa.

The nationality and ethnic background of participants was the main criteria to separate the elements into two main groups.

3.1.2. Respondents' gender

Responses based on gender were assessed to see whether it can have a significant impact on the data (Table 5) and (Figure 2).

Table 5: Respondents' gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	89	49.44	49.44	49.44
	Female	91	50.56	50.56	100.0
	Total	180	100.0	100.0	

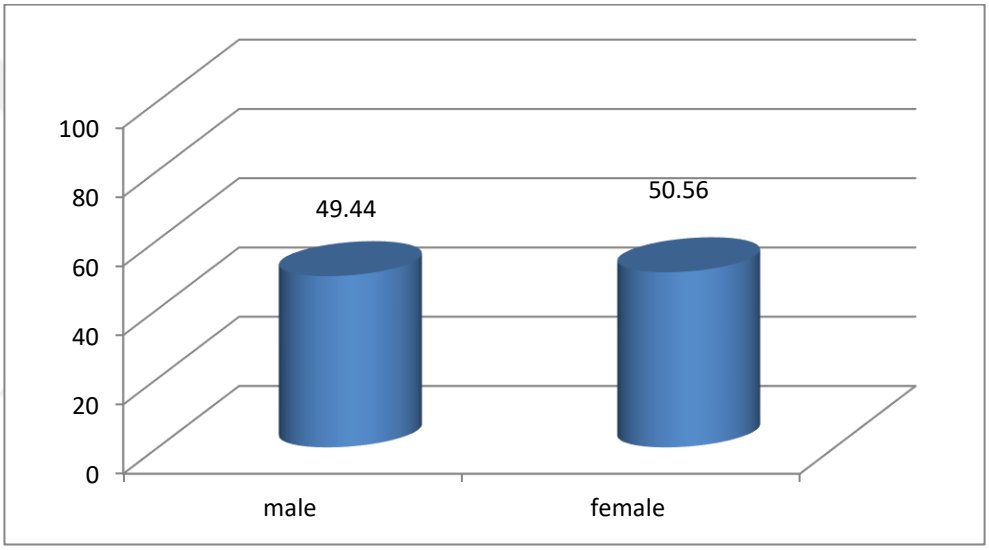

Figure 2: Respondents' gender distribution

3.1.3. Respondents' age group

Participants have been divided into 4 age groups namely 9,10,11 and 12 years (Figure 3). When talking in terms of percentage and majority the biggest age group was '10 years old' group (76 child) 42.22% out of the whole participant' age groups.

9-year-olds were (51 child) 28.34% of the participants; 11-year-olds were (35 child) 19.44% of the participants, and 12-year-olds were (18 child) 10% of the participants (Figure 3).

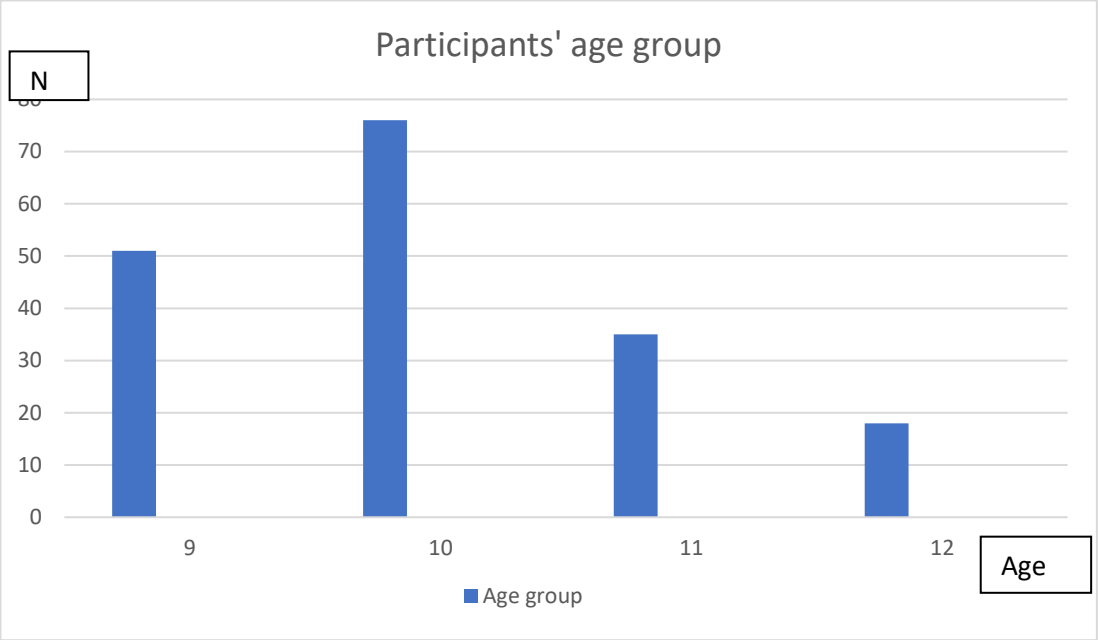

Figure 3: Respondents' age group

3.1.4. Respondents' school attending:

Two Arabic international schools in Istanbul accepted the request of us to them to do this survey, Al Fayez International School and King Idris El-Senusi School. The distribution of subjects between schools is explained in (Figure 4).

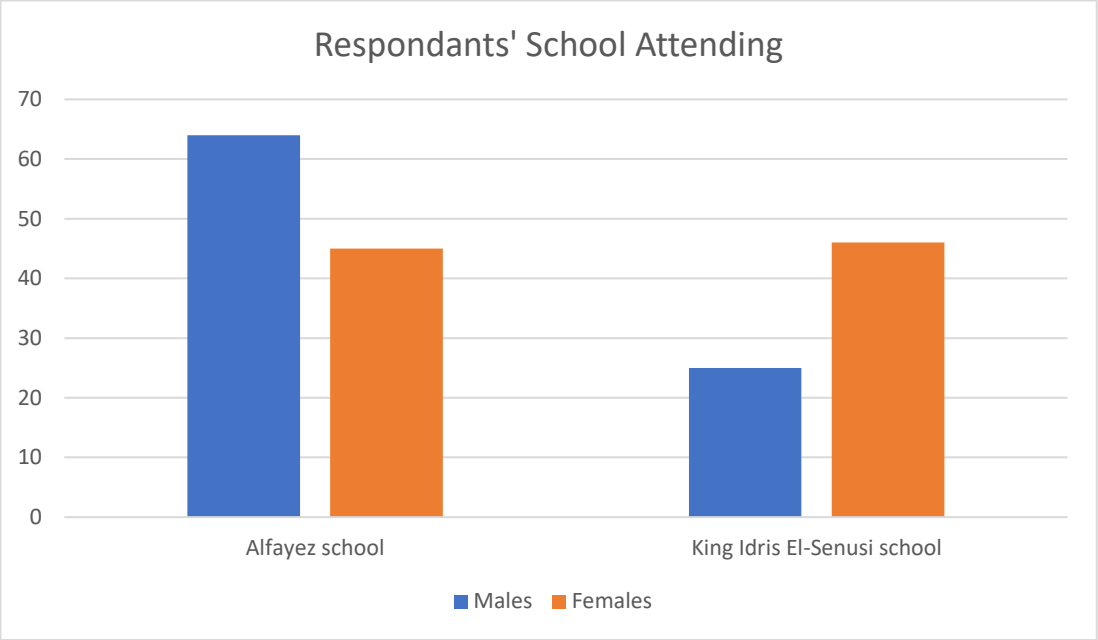

Figure 4: Respondents' school attending

109 children (60.56%) were selected from Al Fayez International School with a sexual distribution of 64 males and 45 females. 71 child (39.44%) were selected from King Idris El-Senusi School with a gender-based distribution of 25 males and 46 females.

3.2. The Prevalence of Malocclusion

After finishing the data gathering process all data were sent to statistical analysis to determine the prevalence of malocclusion between Syrians and Libyans. Factors such as study design, subjects' age, sample size, and diagnostic criteria considered when assessing malocclusion and comparing results (44).

3.2.1. Features of DHC of IOTN

Orthodontic Treatment Need Index is simple, quick and can gives sufficient data.

The Dental Health Component utilizes an acronym - MOCDO - to help the researcher to make a decision about the single worst feature of the malocclusion. MOCDO represents missing teeth, overjet; crossbite, displacement of contact points, overbite and openbite. Patients in Grade 5 would include those with clef lip and palate, multiple missing teeth or a destructive malocclusion.

The statistical analysis was conducted to determine MOCDO parameters as follows:

3.2.1.1. Overjet

Overjet whether positive or negative was measured by using a ruler. For example, an increased overjet in the range 6-9 mm is scored 4th grade on IOTN (Table 6 and Figure 5).

Table 6: Overjet

Nationality	Overjet	Frequency	Percentage	Overall Perc.	Cumulative Perc.
Syria	Normal	56	62.22	31.11	31.11
	4.a	9	10	5	36.11
	3.a	4	4.44	2.22	38.33
	2.a	19	21.11	10.55	48.88
	4.m	0	0	0	48.88
	4.b	0	0	0	48.88
	3.b	1	1.11	0.55	49.43
	2.b	1	1.11	0.55	50
Libya	Normal	68	75.55	37.77	87.77
	4.a	7	7.77	3.88	91.65
	3.a	0	0	0	91.65
	2.a	9	10	5	96.65
	4.m	2	2.22	1.11	97.76
	4.b	2	2.22	1.11	98.9
	3.b	2	2.22	1.11	100
	2.b	0	0	0	100
	Total	**180**	**200**	**100**	**100**

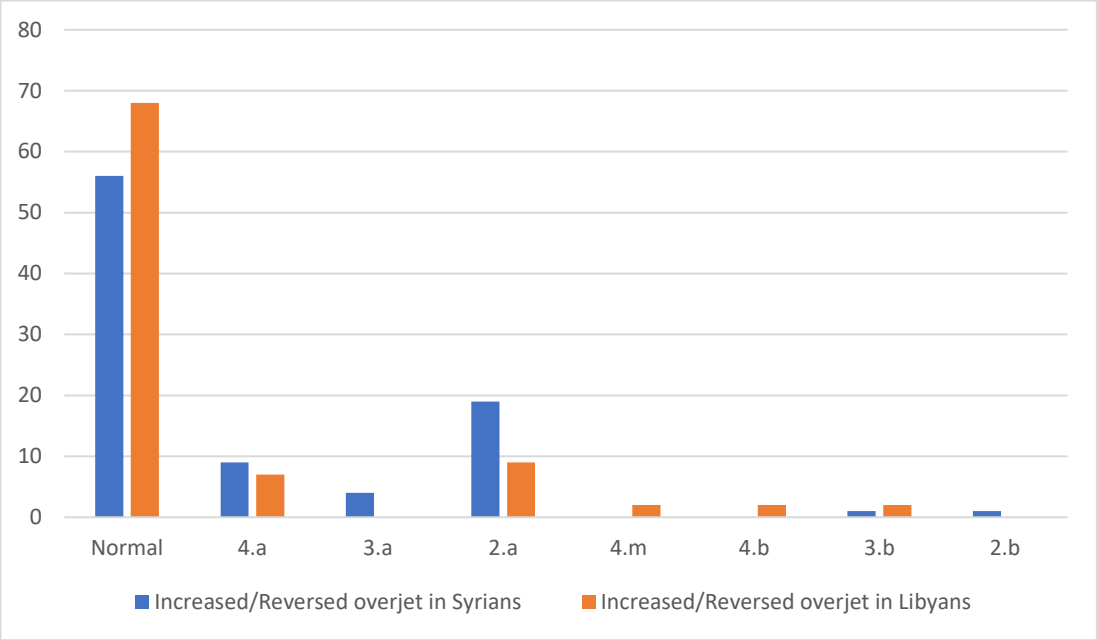

Figure 5: Overjet

The statistical analysis indicated the highest number of overjet is “normal” which means a normal value of overjet (1-3) mm. at a frequency of 56 Syrian and 68 Libyan at a percentage of 31.11% in Syrians and 37.77% in Libyans. Followed by 2.a which means (bigger than 3.5 mm. and less than 6 mm. with enough lip support) and has a frequency of 19 Syrian and 9 Libyan at a percentage of 10.22% in Syrians and 5% in Libyans.

3.2.1.2. Crossbite

Based on the amount of this occlusal trait, the patient can be scored in grade 2, grade 3 or grade 4 and it can be in one or both buccal segments.

Table 7: Crossbite

Nationality	Crossbite	Frequency	Percentage	Overall Perc.	Cumulative Perc.
Syria	Normal	77	85.55	42.77	42.77
	4.c	0	0	0	42.77
	3.c	2	2.22	1.11	43.88
	2.c	3	3.33	1.67	45.55
	4.i	8	8.88	4.44	50
Libya	Normal	85	94.44	47.23	97.23
	4.c	1	1.11	0.55	97.78
	3.c	1	1.11	0.55	98.34
	2.c	2	2.22	1.11	99.45
	4.i	1	1.11	0.55	100
	Total	**180**	**200**	**100**	**100**

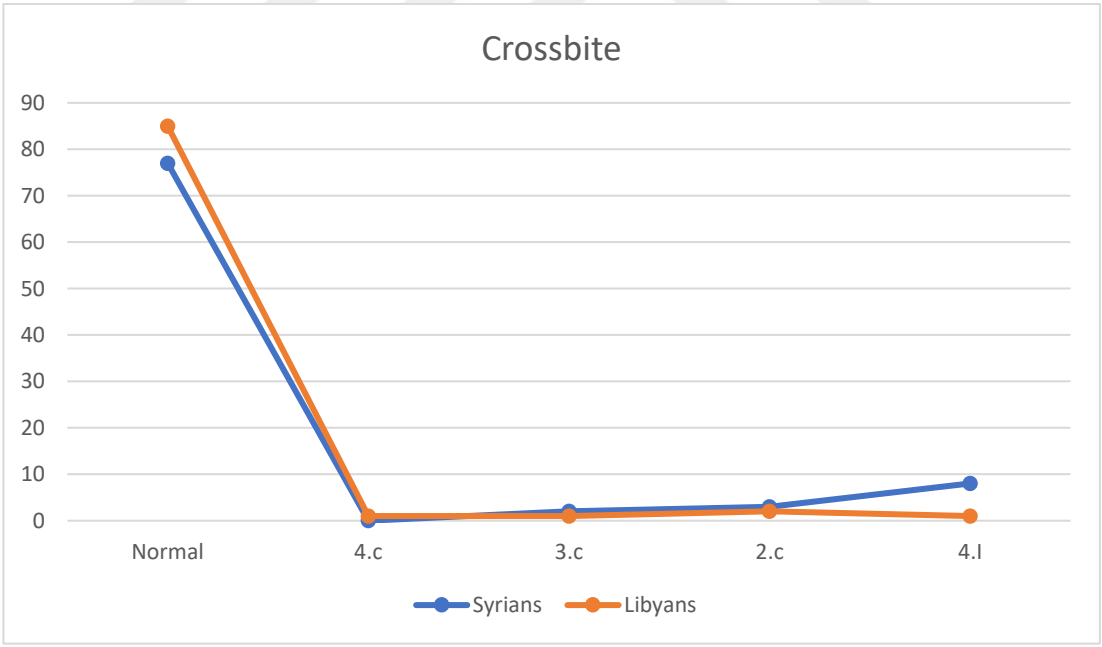

Figure 6: Crossbite

From the results we got we see that 85.55% of Syrians and 94.44 of Libyans do not suffer from crossbite, while Posterior lingual crossbites were more observed in Syrians than in Libyans. (Table 7 and figure 6).

3.2.1.3. Overbite

Described as type of malocclusion when the upper anterior teeth cover up most or all of lower anteriors. The overbite values were measured using a millimetric probe from the lower incisors to the upper incisors horizontally.

Table 8: Overbite

Nationality	Overbite	Frequency	Percentage	Overall Perc.	Cumulative Perc.
Syria	Normal	62	68.88	34.44	34.44
	4.f	2	2.22	1.11	35.55
	3.f	9	10	5	40.55
	2.f	17	18.88	9.45	50
Libya	Normal	75	83.33	41.66	91.66
	4.f	2	2.22	1.11	92.77
	3.f	4	4.44	2.22	95
	2.f	9	10	5	100
	Total	**180**	**200**	**100**	**100**

Highest percentage on overbite is the lack of the abnormal one, followed by 2.f which means (overbite equal to or bigger than 3.5 mm. without gingival

occlusion) with a percentage of 18.88% in Syrians and 10% in Libyans. 10% of Syrians and 4.44% of Libyans had 3.f score which means (complete gingival or palatal occlusion without trauma). (Table 8 and Figure 7).

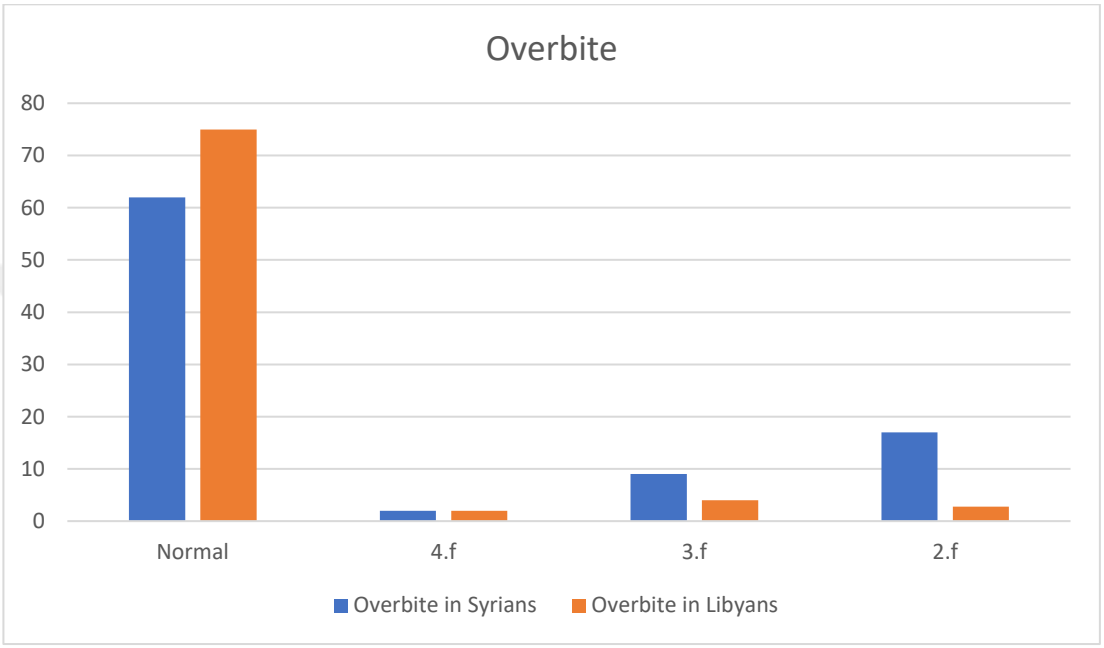

Figure 7: Overbite

3.2.1.4. Openbite

An open bite is characterized by a vertical gap between the front upper and front lower teeth when a person is completely biting down. Openbite was measured using a millimetric probe between the tips of upper and lower incisors in the vertical dimension.

Table 9: Openbite

Nationality	Crossbite	Frequency	Percentage	Overall Perc.	Cumulative Perc.
Syria	Normal	85	94.44	47.22	47.22
	3.e	1	1.11	0.55	47.77
	2.e	4	4.44	2.23	50
Libya	Normal	85	94.44	47.22	97.22
	3.e	2	2.22	1.11	98.33
	2.e	3	3.33	1.67	100
	Total	**180**	**200**	**100**	**100**

Not Syrian nor Libyans showed a high recurrence of openbite as 85 persons (94.44%) of each group do not have any openbite problem. 4.44% of Syrians have it at 2.e degree and 3.33% of Libyans have it at the same degree (2.e) (Table 9 and Figure 8).

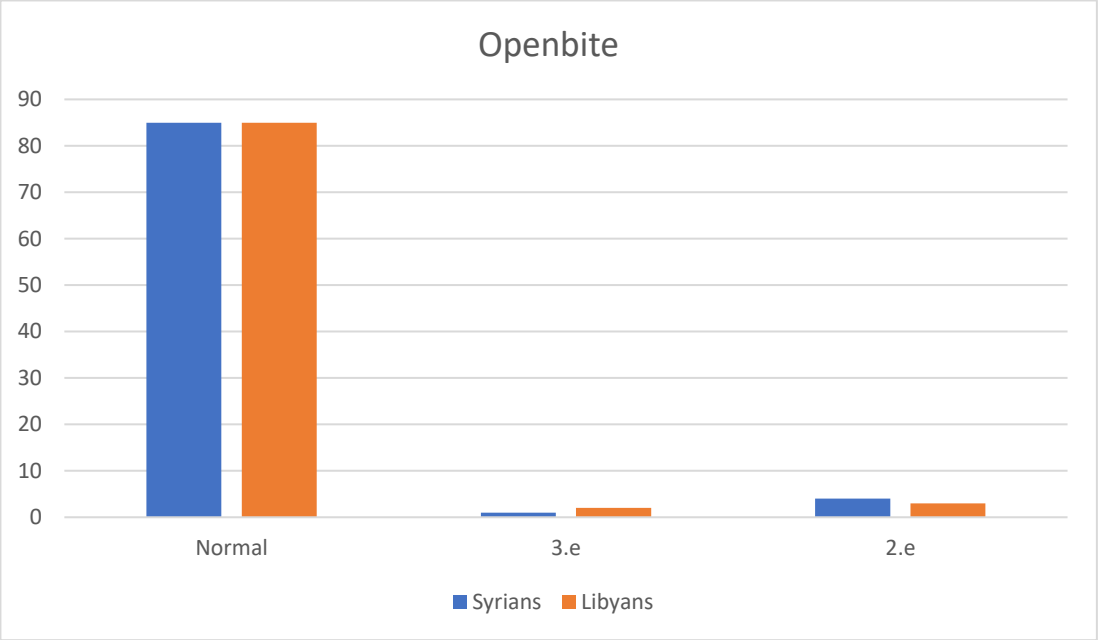

Figure 8: Openbite

3.2.2. Analysis of normative need based on DHC of IOTN

It was observed that 42.22% of Syrians and 65.56% of Libyans, which is the major percentage among the two groups 53.89% don't need to get orthodontic care. 23.33% of Syrians and 13.33% of Libyans have a little need for treatment. 14.44% of Syrians' group and 7.77% of Libyans' are border line case. While, 18.88% of Syrians and 12.22% of Libyans need orthodontic treatment in a high degree and finally only 1 individual from each group shows a very big need of orthodontic treatment (Table 10).

Table 10: Percentage of Dental Health Component of IOTN of students (N=180)

		Libya		Syria		
Grade of need of treatment	**No Need**	59	65,56%	38	42,22%	
	Moderate need	7	7,78%	13	14,44%	
	Little need	12	13,33%	21	23,33%	
	High	11	12,22%	17	18,89%	
	Very High	1	1,11%	1	1,11%	0,064

***Unpaired t test**

As shown in (table 10) there was no statistically significant difference between the grade of need of treatment distributions of the Syrian and Libyan groups (p = 0.064). On the other hand, when looking at (figure 9) we can distinguish a slight difference with more Syrians need orthodontic treatment.

To decide the prevalence of malocclusion in Syrian and Libyan children and compare them with each other, participants were tested in the clinic and were separated into 5 grades according to DHC of IOTN index. This index is supposed to provide the precise estimation of the participants' need for orthodontic treatment based on malocclusion severity. Therefore, from grade 1 it can be understood that the child is with no need for treatment, and from grade 5 it can be understood that the child has a very great need to be treated orthodontically. The results of this study are shown in Figure 9.

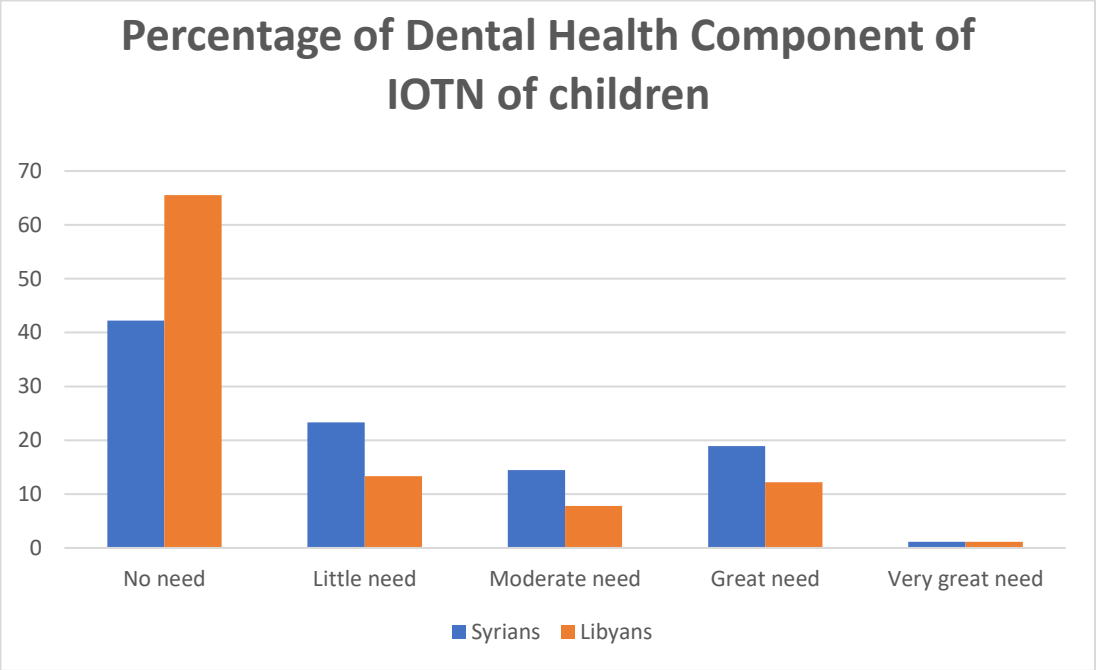

Figure 9: Percentage of Dental Health Component of IOTN of students

Malocclusion occurrence is more observed in Syrian group, but no statistically significant difference. the majority of the two groups fall into the "no need" zone, and only 1 out of 90 persons has a very high need of treatment (Figure 9).

3.2.3. Analysis of the perceived need based on AC of IOTN

AC of IOTN is built up of 10-point scaling system illustrated by 10 photographs which were chosen on attractiveness basis. The chosen photo to be the most similar photo to the patients' mouth or how a patient feels about the look of his teeth reflects the treatment need on the basis of aesthetic impairment and by implication the psychological need for orthodontic treatment. It is an easy way to assess malocclusion as the parents and their children can understand it delicately by looking at the photos and choosing one. Additionally, this index has won a high level of agreement between the scores obtained by dentists, parents, and children. There is a general agreement that a DHC of less than 4 and an AC score of below 7 do not mention precise need of treatment.

The pictures below are used to assess the Aesthetic Component (Figure 10).

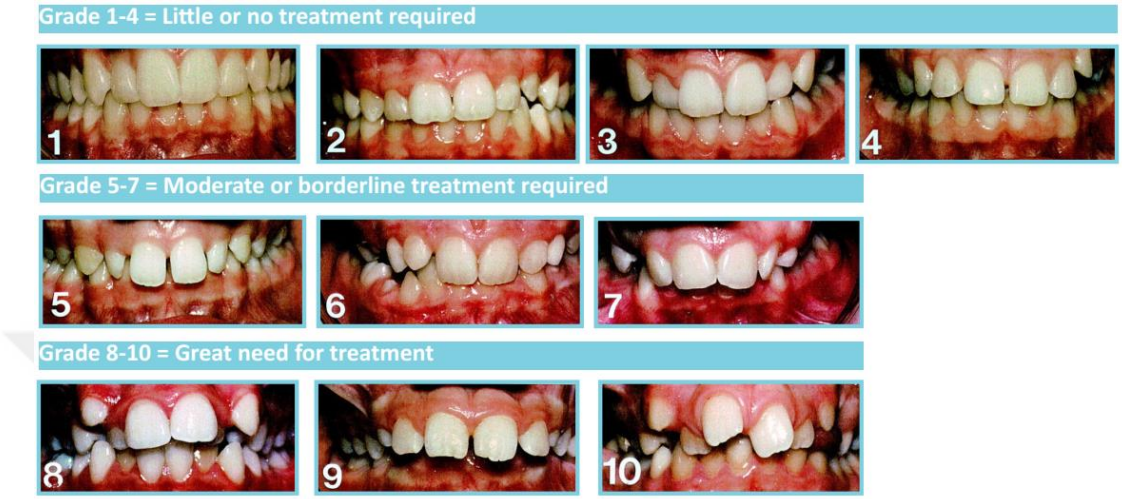

Figure 10: The Aesthetic Component

The evaluation need was picture-selection based. Then, the results were compared to the grades of orthodontic treatment. Table 11 provides the distribution of the detected need of treatment on a scale of 1 to 10 when 1 means “no need” and 10 means “high need”.

Table 11: Distribution of Perceived Needs

Source: SPSS Statistical Calculation

Nationality	Degree	Frequency	Percentage	Cumulative Percentage
Syria	1	31	34.45	34.45
	2	16	17.78	52.23
	3	15	16.67	68.9
	4	12	13.34	82.24
	5	2	2.22	84.46
	6	5	5.55	90.01
	7	4	4.44	94.45
	8	3	3.33	97.78
	9	2	2.22	100
	10	0	0	100
Libya	1	41	45.56	45.56
	2	12	13.34	58.9
	3	12	13.34	72.24
	4	8	8.89	81.13
	5	5	5.55	86.68
	6	3	3.33	90.01
	7	4	4.44	94.45
	8	3	3.33	97.78
	9	2	2.22	100
	10	0	0	100

As can be understood from Table 11, the majority of Syrians 82% and Libyans 81% categorized them self as grade 1 to 4 (No need for treatment, photographs 1 to 4). When we look at the moderate or borderline need of

treatment's group, we find out that 12.22% of Syrians and 13.33% of Libyans chose one of the photographs 5 to 7.

5.5% of each country chose a photograph that indicated a great need of treatment (photographs 8 to 10).

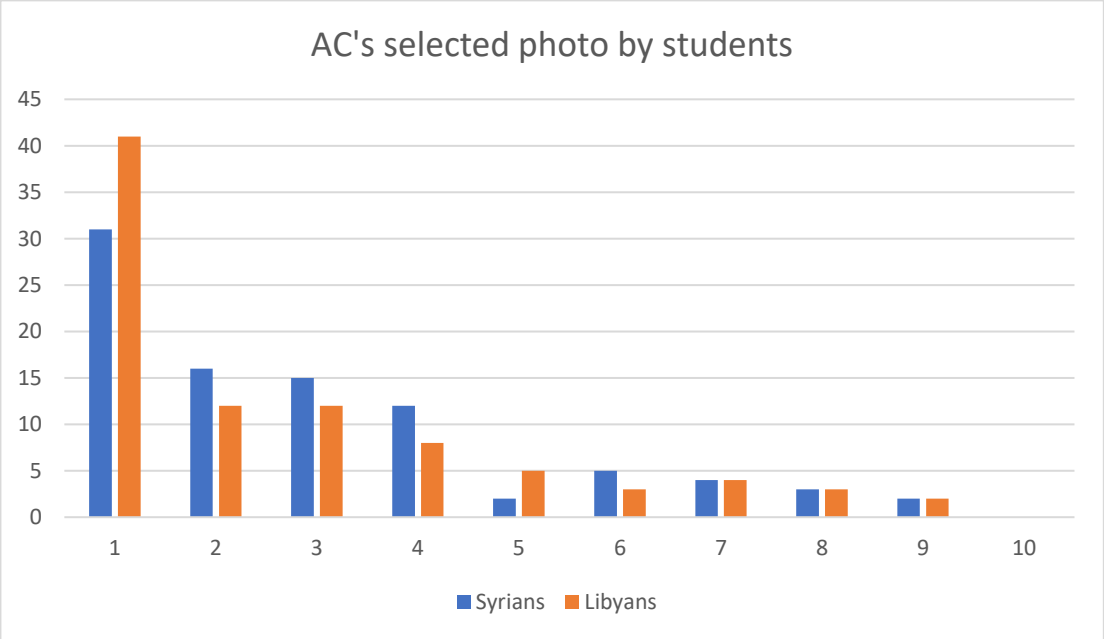

Figure 11: Distribution of Perceived Needs

(Figure 11) shows a clear visual presentation of the observed need for orthodontic treatment. Most of the children have seen them self as they have no need for treatment, Syrians are more aware of their need for orthodontic treatment.

No body have chosen the worst photograph (number 10). The first photo was the most selected one by both Syrians and Libyans 34.45% and 45.56% respectively, followed by 2, 3 and 4.

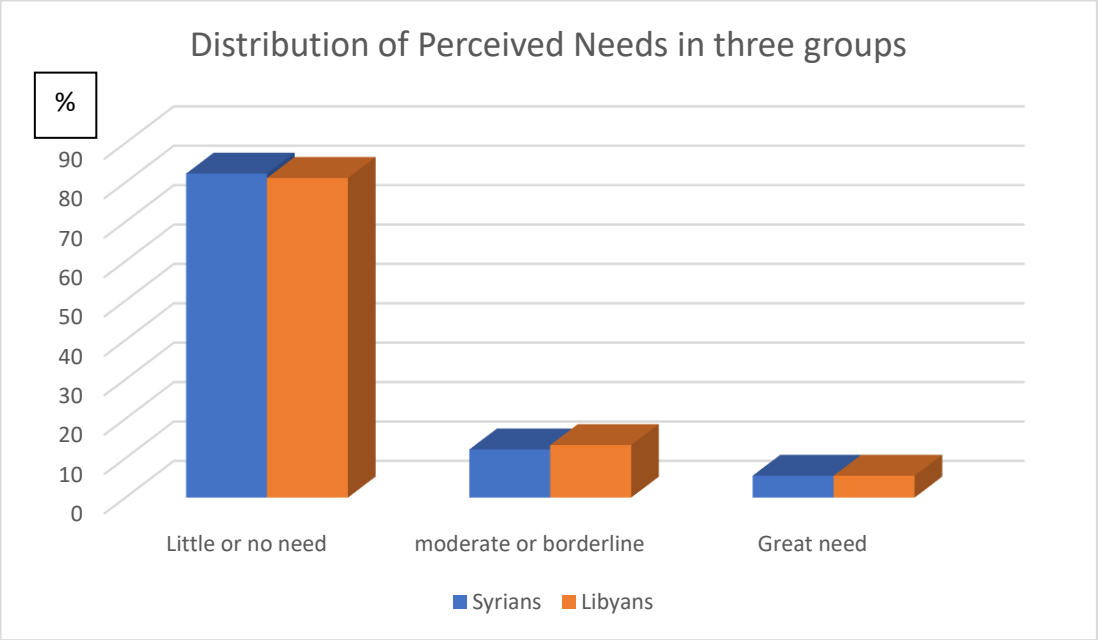

Figure 12: Distribution of Perceived Needs in three groups

(Figure 12) collets the photos selected by children in 3 groups, little or no need (1-4), moderate or borderline (5-7), and great need (8-10). Most of the students have seen them self as they do not need or have little need to orthodontic treatment (82.24% of Syrians and 81.13% of Libyans). Interestingly only 5.55% of each group have chosen 8 or 9 which gives a sign of great need to treatment. Finally, 12.21% of Syrians and 13.32% of Libyans found themselves in moderate need of treatment or borderline.

3.2.4. Correlation between Normative and Perceived Needs

The data gathered further analyzed to determine the correlation between the normative and perceived needs and the statistical analysis results are shown in the (Table 12).

Table 12: Result of the paired two-sample t-test

	Photo Selected by Student	Grade of need of treatment								
		No need		Limit case		Moderate or Little		High or very high		p
Syria	**1**	21	55,26%	1	7,69%	5	23,81%	4	22,22%	**0,003**
	2	7	18,42%	0	0,00%	7	33,33%	2	11,11%	0,077
	3	5	13,16%	3	23,08%	3	14,29%	4	22,22%	0,751
	4	3	7,89%	6	46,15%	2	9,52%	1	5,56%	**0,002**
	5	0	0,00%	0	0,00%	0	0,00%	2	11,11%	**0,042**
	6	0	0,00%	2	15,38%	1	4,76%	2	11,11%	0,126
	7	0	0,00%	1	7,69%	1	4,76%	2	11,11%	0,263
	8	2	5,26%	0	0,00%	1	4,76%	0	0,00%	0,651
	9	0	0,00%	0	0,00%	1	4,76%	1	5,56%	0,439
	Photo Selected by Student	**Grade of need of treatment**								
		No Need		**Limit Case**		**Moderate or Little**		**High or Very High**		**p**
Lybia	**1**	37	62,71%	0	0,00%	3	25,00%	1	8,33%	**0,0001**
	2	9	15,25%	0	0,00%	2	16,67%	1	8,33%	0,650
	3	7	11,86%	0	0,00%	1	8,33%	4	33,33%	0,132
	4	4	6,78%	1	14,29%	1	8,33%	2	16,67%	0,688
	5	0	0,00%	2	28,57%	2	16,67%	1	8,33%	**0,004**
	6	1	1,69%	1	14,29%	0	0,00%	1	8,33%	0,217
	7	1	1,69%	0	0,00%	1	8,33%	2	16,67%	0,110
	8	0	0,00%	2	28,57%	1	8,33%	0	0,00%	**0,006**
	9	0	0,00%	1	14,29%	1	8,33%	0	0,00%	**0,039**

	Photo Selected by Student	Grade of need of treatment								
		No need		Limit case		Moderate or Little		High or very high		p
All Group	**1**	58	59,79%	1	5,00%	8	24,24%	5	16,67%	**0,0001**
	2	16	16,49%	0	0,00%	9	27,27%	3	10,00%	**0,029**
	3	12	12,37%	3	15,00%	4	12,12%	8	26,67%	0,229
	4	7	7,22%	7	35,00%	3	9,09%	3	10,00%	**0,004**
	5	0	0,00%	2	10,00%	2	6,06%	3	10,00%	**0,023**
	6	1	1,03%	3	15,00%	1	3,03%	3	10,00%	**0,016**
	7	1	1,03%	1	5,00%	2	6,06%	4	13,33%	**0,032**
	8	2	2,06%	2	10,00%	2	6,06%	0	0,00%	0,173
	9	0	0,00%	1	5,00%	2	6,06%	1	3,33%	0,149

Source: SPSS Statistical Calculation

Syrians' group

Statistically significant difference was observed between photo selected by student distributions of grade of need of treatment (No Need, Limit Case, Moderate or Little, High or Very High) groups (p = 0.0001).

The value of (photo selected by student 1) was significantly higher in (No need) group (p = 0.003).

No significant difference was observed between the (photo selected by student 2) distributions of Grade of need of treatment (No Need, Limit Case, Moderate or Little, High or Very High) groups (p = 0.077).

No significant difference was observed between the (photo selected by student 3) distributions of grade of need of treatment (No Need, Limit Case, Moderate or Little, High or Very High) groups (p = 0.751).

The value of (photo selected by student 4) was significantly higher in the (Limit Case) group (p = 0.002).

In the (High or Very High) group, (Photo selected by student 5) was found to be significantly higher (p = 0.042).

There was no statistically significant difference between (photo selected by student 6) distributions of grade of need of treatment (No Need, Limit Case, Moderate or Little, High or Very High) groups (p = 0.126).

No statistically significant difference was observed between (photo selected by student 7) distributions of grade of need of treatment (No Need, Limit Case, Moderate or Little, High or Very High) groups (p = 0.263).

No significant difference was observed between (photo selected by student 8) distributions of grade of need of treatment (No Need, Limit Case, Moderate or Little, High or Very High) groups (p = 0.651).

No significant difference was observed between (photo selected by student 9) distributions of grade of need of treatment (No Need, Limit Case, Moderate or Little, High or Very High) groups (p = 0.439).

Libyans' group

Statistically significant difference was observed between photo selected by student distributions of grade of need of treatment (No Need, Limit Case, Moderate or Little, High or Very High) groups (p = 0.0001).

The value of between (photo selected by student 1) was significantly higher in (No Need) group (p = 0.0001).

No significant difference was observed between the (photo selected by student 2) distributions of grade of need of treatment (No Need, Limit Case, Moderate or Little, High or Very High) groups (p = 0.650).

There was no statistically significant difference between (photo selected by student 3) distributions of grade of need of treatment (No Need, Limit Case, Moderate or Little, High or Very High) groups (p = 0.132).

No significant difference was observed between the between (photo selected by student 4) distributions of grade of need of treatment (No Need, Limit Case, Moderate or Little, High or Very High) groups (p = 0.688).

The values of the (Limit Case) and (Moderate or Little) groups were found to be statistically significantly higher for between (photo selected by student 5) (P = 0.004).

No significant difference was observed between (photo selected by student 6) distributions of grade of need of treatment (No Need, Limit Case, Moderate or Little, High or Very High) groups (p = 0.217).

There was no statistically significant difference between (photo selected by student 7) distributions of grade of need of treatment (No Need, Limit Case, Moderate or Little, High or Very High) groups (p = 0.110).

The value of (photo selected by student 8) was significantly higher in the (Limit Case) group (p = 0.006).

The value (photo selected by student 9) was significantly higher in the (Limit Case) group (p = 0.039).

Syrian and Libyan groups

Statistically significant difference was observed between photo selected by student distributions of grade of need of treatment (No Need, Limit Case, Moderate or Little, High or Very High) groups (p = 0.0001).

The value of (photo selected by student 1) was significantly higher in (No Need) group (p = 0.0001).

In the (Moderate or Little) group, the presence of (photo selected by student 2) was found significantly higher (p = 0.029).

No significant difference was observed between (photo selected by student 3) distributions of grade of need of treatment (No Need, Limit Case, Moderate or Little, High or Very High) groups (p = 0.229).

The value of (photo selected by student 4) was significantly higher in the (Limit Case) group (p = 0.004).

The values of the (Limit Case) and (High or Very High) groups were found to be statistically significantly higher for (photo selected by student 5) (p = 0.023).

The values of the (Limit Case) and (High or Very High) groups were found to be significantly higher for (photo selected by student 6) (p = 0.016).

The presence of (photo selected by student 7) of the (High or Very High) group was found to be statistically significant (p = 0.032).

No significant difference was observed between the (photo selected by student 8) distributions of grade of need of treatment (No Need, Limit Case, Moderate or Little, High or Very High) groups (p = 0.173).

No significant difference was observed between the (photo selected by student 9) distributions of grade of need of treatment (No Need, Limit Case, Moderate or Little, High or Very High) groups (p = 0.149).

3.2.5. Sagittal relation of occlusion

The anteroposterior relationship based on Angle's system for categorizing the posterior and canine relationship. The distributions of Class I, Class II and Class III molar relationships are shown in the Table 13. Greatest percentage of participants from both groups had CIass I molar relationship (68.89% of Syrians and 72.23% of Libyans).

Table 13: Frequency distribution for each parameter

Nationality	**skeletal discrepancy**	%
Syria	Class 1	68.89
	Class 2	25.56
	Class 3	5.55
	Total	**100**
Libya	Class I	72.23
	Class II	17.77
	Class III	10
	Total	**100**

3.2.6. Further Statistical Analysis

3.2.6.1. Feelings, attitudes, and conducts about teeth conditions

The need for orthodontic treatment amongst the Syrian and Libyan school children was also evaluated by collecting and analyzing data about their perceptions and feelings. The participants were asked questions that

The sample schoolchildren were asked questions that uncovered their feelings, attitudes, emotions, and personal need for the orthodontic treatment. specifically, they were asked how they feel about the appearance of their teeth, comments about their teeth, as well teasing about their teeth was also determined.

Table 14: Feelings, Attitudes, and Conducts about Teeth Conditions

Nationality	Status	Feeling about teeth appearance	Comments about teeth appearance	Teasing about teeth appearance	Avoid smiling due to teeth appearance	Cover mouth due to teeth appearance
Syria	Not concerned	1.11%	81.11%	86.67%	72.22%	100%
	Very concerned	84.44%	1.11%	3.33%	26.0%	0%
	Somewhat concerned	14.45%	17.78%	10%	1.11%	0%
	Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100%**
Libya	Not concerned	1.11%	91.11%	90%	77.78%	93..34%
	Very concerned	86.67%	2.22%	1.11%	2.22%	2.22%
	Somewhat concerned	12.22%	6.67%	8.89%	20%	4.44%
	Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100%**

Table 14 provides a summary of the responses relating to feelings and attitudes towards teeth conditions. Most of Syrians and Libyans are very concerned about the look of their teeth, and most of them are not concerned about the comments about other people about their teeth (Libyans are more confident than Syrians by 10%). Nine out of ten persons of both groups don't hear any teasing about their teeth and how they look. Approximately 3 out of 4 of both study group individuals do not avoid smiling due to their teeth appearance. On the other hand, all of Syrians do not cover their mouth to hide their smile while only 6 Libyans do that.

3.2.6.2. Satisfaction with the Dental Aesthetics

The study measured the participants' perception of the role of healthy and well-arranged teeth. About 85% of the participants reported well arranged teeth to be very important to them. Children whose teeth are healthy and arranged properly do not cover their mouth while smiling. The study also determined whether the participants were satisfied with their dental aesthetics. The analysis shows that 81% (in both groups) of the children in this study are feeling good with their dental aesthetics. However, 17 Syrian and 18 Libyans think that they need to change something about their smile (color, arrangement, shape…etc.). Interestingly the dominant percentage in this study see their smiles cool enough.

3.2.6.3. Changes in Dental Aesthetics

Further analysis was conducted to determine particular areas about the dental aesthetic that the respondents need to change. A number of factors were considered including color, size, and arrangement among others. Just as indicated above, the majority of the respondents expressed satisfaction about their smile attractiveness, the clinical assessment agrees with the feeling of the children. Figure 13 presents Need for Changes in the Dental Esthetics.

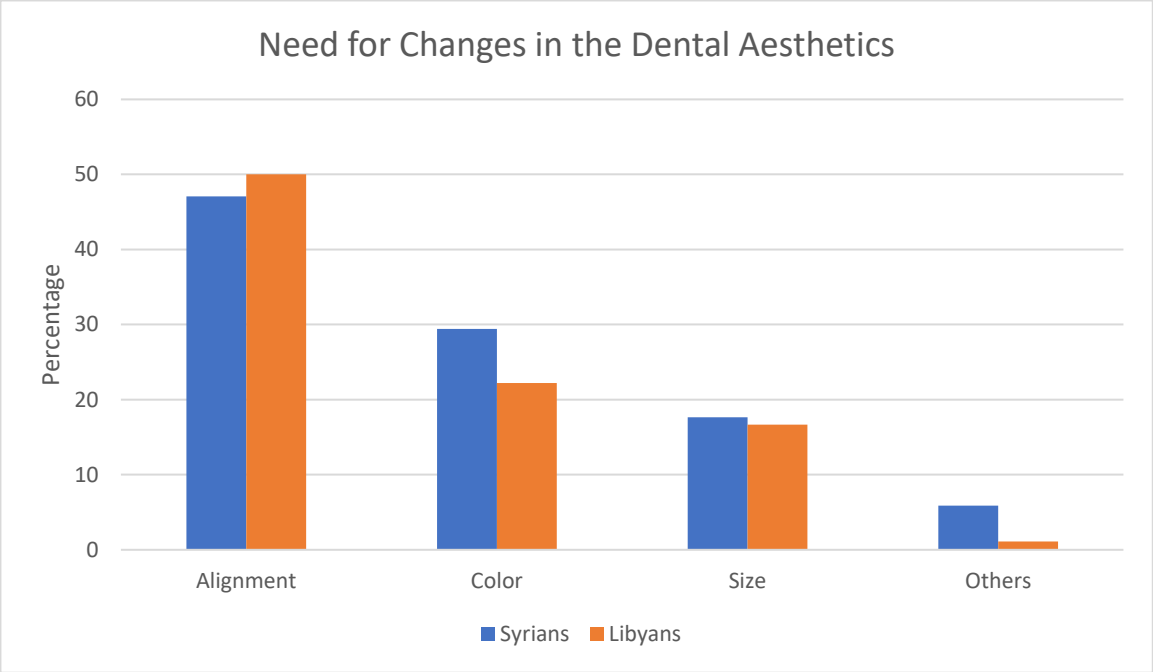

Figure 13: Need for Changes in the Dental Aesthetics

When looking at the children who think about changing something about their teeth, we find out that 47% of Syrians and 50% of Libyans hope to change the alignment of their teeth. 29.41% of Syrians and 22.22% of Libyans hope to change the color of their teeth. Fewer population hope to change the size of their teeth (Figure 13).

4. DISCUSSION

4.1. Introduction

The research was done on 9 to 12-year-old Syrian and Libyan children attending international schools in Istanbul/Turkey aiming to increase the level of awareness on the orthodontic care need for the both populations and to measure the distribution, severity, prevalence of malocclusion, and to measure the association between the normative and perceived orthodontic treatment needs, and also to compare those between the two populations (Syrians and Libyans). This information will help the oral health management teams with the knowledge that will give them ability to set up priorities with regards to malocclusion hence effectively plan for orthodontic services in regarding facilities.

Orthodontic treatment implies the proper dental care, treatment and the addressing of irregularities and deformities in the human dental structure. It's important in ensuring adequate dental care and hygiene which has a big influence on a person's life both health-wise and in terms of aesthetics.

4.2. Material and methodological considerations

The material included two samples, one of the is from Syria and the other if from Libya. Each group consisted of 90 participants living and studying in Istanbul, totally there was 180 participants. The age group selected as a goal for this study was from 9 to 12 as the participants will be in mixed dentition stage so we can measure their health care and awareness about their occlusion and the importance of their new erupting teeth. The researcher and the parents have helped the children by providing a simple explanation of the questionnaire of the OASIS.

An investigation about dental history was done and anyone who has passed any kind of orthodontic care was excluded from the sample gathering stage.

180 face to face interviews were done successfully by the help of colleagues and the school dentist, and thanks to the easiness of the short questionnaire.

The environment in the schools have helped the clinical examination. All the examination process was done in Al Fayez International School's dental clinic using disposable instruments and in a well-lit room.

4.3. Reasons for seeking occlusion care

Kim Yoonji states the need and rate of acquiring orthodontic treatment is not only influenced by the extent of malocclusion but also other influencing factors including gender and social structure (45), the existence of the other factors is indicative of further research to determine the need and level of orthodontic treatment among Libyan children.

The importance of well aligned teeth and self-perception of psychosocial impact of malocclusion were the same two main factors influencing subjective orthodontic treatment need in foreign inhabitants and Chinese natives ($P<0.05$). Subjective orthodontic treatment need between the two target groups was significantly different ($P<0.05$).

Furthermore, Li et al. mentioned that there are various factors that affect personal perception and need for orthodontic treatment. These factors as stated by the author "Chinese natives put improving appearance as the top priority (55.9%) for seeking orthodontic treatment; however, in foreign inhabitants, the main reason for seeking treatment was to improve masticatory function (44.1%), followed by" to be pretty "(35.2%).

4.4. The IOTN as a standardized tool

As the Orthodontic Treatment Need Index is simple, quick and can give sufficient data it was reasonable to use for this research (43).

4.5. How malocclusion prevalence influences the quality of life:

There are uncountable reasons to malocclusion, for example, early loss of deciduous tooth can case drifting of permanent teeth mesially leading to crowding, malalignment and other demonstrations of malocclusion which in turn impairs aesthetics and function at the same time, and thus, reduce the quality of life and harms the general health (47). Severity and prevalence refer to the range and scope to which the dental problem affect the children. It is beneficial to identify the most spread type of malocclusion in a society to manage and invest the best out of the associations and government efforts to provide the most efficient health service. It is important to correct malocclusion problems as they can cause discomfort and other symptoms that can diminish the quality of life for the child (48). Patients that suffer from Down syndrome (DS) and cerebral palsy (CP) are particularly prone to orofacial disorders.

Moreover, Ana Cristina Oliveira et al. (49) mention the great impact (of malocclusion on quality of life of an individual.

Distortion and poor dental attention are also related to malalignment which would result in the need for orthodontic care. In this study, Syrian and Libyan children were examined to determine the level of distortion and malalignment and then compared to determine which ethnicity has bigger occurrences of malocclusion and which one of them has more awareness about this problem.

From the results of our statistical analysis, the biggest percentage are in the little or no need of orthodontic treatment in both groups. This is because most people do not have any deformities or issues that highly require treatment to be corrected. Liu et al. (50) have made a systematic review and found out

that, there is an association between recurrence of malocclusion and need of occlusion care, (which supports the results of this study).

4.6. Similar articles support the idea behind the research done

Other articles from other areas and regions are approved and supported the idea of this study (9,66,67).

The discussion, therefore, seeks to identify the level of malocclusion, its influence on the level of orthodontic care required, and how this treatment has an impact on how the children in Syria and Libya comprehended their dental appearance and health. Additionally, the discussion seeks establishing the casual relations between the two.

4.7. The research sample and design:

The statistical analysis of the research based on data collected from two groups each group was built up of 90 persons selected randomly. Extraneous variables were accounted for and eliminated showing the internal validity of the research design and the viability of the results obtained from the research and how they speak towards the external validity of the research design. The validity of the study is crucial in determining whether the results are indeed trust-worthy (51). In a simple explanation, the research design is well-crafted to provide a thorough overview of the dental health and perception among Syrian and Libyan schoolchildren and their orthodontic treatment need and compare those between the two ethnicities.

Collecting samples from Istanbul made the groups more reliable as every group of students comes from a different city from Syria or Libya. It was a hard mission with some children letting them express their feelings about their smiles, especially they are still young and in mixed dentition period.

Anyway, children were asked about their opinions regarding their dental appearance and if they think about changing it.

4.8. Normative orthodontic care needs for Syrian children

The biggest percentage of Syrians (63.55%) had little or no need for treatment. (14.44%) are categorized under borderline cases, and interestingly fifth of the Syrian population (20%) have a great or very great need for orthodontic treatment. It worthful to tell that only one child had a very great need for treatment.

4.9. *Normative orthodontic care needs for Libyan children*

A bigger percentage of Libyans fall in the little or no need for treatment zone (almost 79%) which is much better than the Syrian group. Thus, it is very logical to find out that smaller percentage need great or very great need for orthodontic care.

(13.34%) of Libyans have a great or very great need for orthodontic treatment, and (7.77%) of them are borderline cases. Similarly, to Syrian group, only one child had a very great need of treatment.

Orthodontic treatment is very important and can affect general health. It is not a complimentary but a necessity as it allows individuals to take care of his dental structure properly, orthodontic treatment also affects psychosocially on a human's life.

Adequately extensive statistical analysis was held using unique statistical parameters in the research to detect the actual need for orthodontic treatment within our two ethnicity-based groups. These parameters have provided a vast and detailed explanation of specific needed care to be taken of dental or skeletal deformities. The parameters used in this study are overjet, overbite, crossbite, and openbite.

Normative orthodontic care needs constitute the actual proven need. By establishing the actual need, then it shall be used to create programs that meet these needs.

From the DHC of the IOTN and its dynamics, that has formed the basis of our study methods, it is obvious that the children in this study have minimal degree of general need for orthodontic treatment.

4.9.1. Features of DHC of IOTN

The Dental Health Component utilizes an acronym - MOCDO - to make it easier for the clinician to choose the single worst feature of the malocclusion. MOCDO represents: Missing teeth; Over jets; Cross bites; Displacement of contact points; Overbite and openbite. Patients in Grade 5 would include those with clef lip and palate, multiple missing teeth or a destructive malocclusion.

The statistical analysis was conducted to determine MOCDO parameters as follows:

4.9.1.1. Overjet:

The overjet measurement was done using a millimetric ruler specialized for this use. Positive and negative measurements were measured, for example, increased overjet between 6-9 mm. mentions IOTN 4th degree.

For Syrians:

The majority of Syrian schoolchildren had normal overjet at a frequency of 56 out of 90 and percentage of (62.22%) followed by 2.a (21.11%) of this group. Other values: 4.a = 10% (greater than 6mm. but less than 9mm.), 3.a = 4.4%, and 3.b had the same value with 2.b = 1.11%.

For Libyans:

A bigger dominating percentage of normal overjet manifested (75.55%), followed by (2.a = 10%).

Syrian shows more tendency to increased overjet demonstration. Despite the fact that the biggest percentage of each group have normal overjet values, but Libyans had a ratio of ¾ for normal overjet.

4.9.1.2. Crossbite:

For Syrians:

85.55% of Syrians did not show any kind of crossbite, 8.88% scored 4.I (Posterior lingual crossbite with no functional occlusal contact in one or both buccal segments.

Only Three children scored (2.e), and 2 children scored (3.e).

For Libyans:

Higher percentage 94.44% did not have any sort of crossbite. Thus, crossbite was a rare manifestation of crossbite in Libyans' group.

4.9.1.3. Overbites

For Syrians:

68.66% of Syrians did not suffer from deepbite. Followed by 18.88% scored 2.f (greater than or equal to 3.5mm.), and 10% scored 3.f (Complete deepbite without gingival or palatal trauma).

For Libyans:

83.33% did not have any overbite discrepancy. 10% scored 2.f (greater than or equal to 3.25mm.).

One third of Syrians and 17% of Libyans had different degrees of overbite discrepancy.

4.9.1.4. Openbite

The majority of the research population did not suffer openbite

4.9.1.5. Perceived orthodontic care needs for children

The examination of personal perception would allow for a proper identification of the level of knowledge regarding dental health and orthodontic intervention the children had. In this study, it was obtained by asking the students to choose the most similar photo to their smiles based on AC of the IOTN component.

For Syrians:

82.2% of the group see themselves to be in little or no need for orthodontic treatment area. On the other hand, 12.21% of them see themselves to be in moderate need for treatment or on the borderline. Finally, 5.55% chose (8-10) which indicates great need for treatment.

For Libyans:

81.13% of this group perceived themselves as having little or no need for treatment. 12.32% have selected photos that indicate moderate of borderline cases.

4.10. A measure of OASIS and the subjective assessment of orthodontic treatment aesthetics and attitude to orthodontic treatment:

A group of questions which are formulated to detect the degree of perception of dental aesthetics, the students answered on a 7-point scale for the OASIS. Furthermore, they were asked to accomplish the yes-no questionnaire (The subjective assessment of orthodontic treatment aesthetics and attitude to orthodontic treatment).

Each question investigated how the pupils feel or what they feel about their smiles and whether they think about changing something in their oral view.

From the data collected in this research we could understand that majority of pupils were very satisfied and confident about their teeth and their oral appearance. However, a majority think about making some changes to the appearance of their teeth just to improve the aesthetics and have an attractive smile, this can indicate a high need of treatment. It was noticeable that Libyans show a bigger demand for orthodontic treatment when compared to Syrians.

4.11. Correlation between normative and perceived needs:

In this research, there was a good relation between the need and demand of orthodontic treatment.

A study held by de Palma and coworkers (52). identified the relationship between self-perception of dental health and actual dental care and hygiene. The study aimed at measuring how self-opinion and perception have a noticeable effect on how a society took care of their teeth and gums. Self-consciousness on dental look affects how people interact in dental hygiene regimens. The authors state that they wanted to identify how self-perceived oral health status influenced personal oral health practices such as dental visits and tooth brushing.

In our research, we found that the two had obvious relation between each other. Self-aware or dentally well-educated persons paid attention toward dental hygiene regiments while unaware persons did not express such attitude. It is true to say orthodontic treatment is directly associated with dental hygiene awareness and malocclusion prevalence (52).

Normative and perceived orthodontic care needs constitute the personal or demographic recognition of the need for orthodontic and It is quite essential to separate both as at times the subjects may be biased depending on their age, the area of residence, way of life and such. According to the analysis most of children from both countries (Syria and Libya) need orthodontic treatment with statistically no significant difference but a slightly bigger need in Syrians. In other words, in this study we found out that Syrian society in the first stage and Libyan one in the second, need more concentration on orthodontic health policies.

Negative perceptions and barriers should be understood for better improvement towards dental and orthodontic care. In this study most of the children were not shy or ashamed of their smiles. Libyans are more concerned about their teeth and think about making changes. This indicates

that Libyans, despite having less tendency to malocclusion when compared to Syrians, they have better self-awareness and concern about their smiles. On the other hand, we can't ignore that Syrians show a good attitude toward dental health but still they need more improvement.

The majority of children in this study chose to change the order of their teeth.

Farishta indicated that most people undergo orthodontic treatment after receiving advice from their doctor (53).

According to the author most of people seek advice from professional medical practitioner and then act according to this advice. In this case, the practitioner plays a big role in enhancing the self-dental awareness. He mentioned that the main complaint of these patient is about problem in the dentition then the doctor takes the responsibility to explain the specific dental and orthodontic problem and give the patient an advice about the treatment needs (54).

This shows how orthodontic treatment need is affected by the opinion of a patient regarding his/her dental condition. The previous information emphasizes the influence of malocclusion on quality of life of children and teenagers.

Many people live in fear of smiling or of visiting their dentist and have real big problems in their social life because they don't have adequate self-awareness about their dental problem, it is a result of their unawareness about the fact that these problems can be solved by the help of a professional easier than just facing the problem.

From this corner we can say that it is very important to put up for awareness campaigns to maintain a high-level awareness on people's dental problems.

As mentioned in Guidelines for Referrals for Orthodontic Treatment, "Malocclusion is not a disease state but a variation from what is considered the ideal (55).

From this, it will be good teaching people that they can get help to give up their discomfort.

additionally, Zhifei Zhou et al. (55) mention the need to identify dental deformities early. They stated “The prevalence of malocclusion among pre-school children in Xi’an is higher compared to that in other geographical parts of China. Therefore, early attention to the development of occlusion and necessary interventions toward the associated factors are important to reduce its prevalence and further stop negative effects”.

4.12. In summary

This discussion was done to build up a better understanding the results obtained from the scan. These results can be used to compare malocclusion spread and distribution between Syria and Libya, by other words, it can be used to compare malocclusion distribution between African and Asian Arabs.

Anyway, the most important goal of this research is to offer evidence-based medical interventions and changes with close to the certain surety of the outcome expected.

5. CONCLUSIONS

The data statistical analysis was done to determine the correlation between orthodontic care need and demand. The analysis also showed the related differences between Syrian and Libyan populations. The results have revealed numerous facts, we concluded that:

According to DHC’s IOTN index, the prevalence of malocclusion among both Libyans and Syrians is low. But, when comparing between each other, Syrians had more prevalence of malocclusion and thus more need of treatment (20% of Syrians showed big or very big need for treatment compared to 13.33% of Libyans with the same need). Syrians have recorded bigger positive overjet values with 10% of them recording (4.a) compared

with 7.77% for the same measurement in Libyans. Syrians have more deepbite incidences (31% of them had a kind of overbite discrepancy compared to 16.66% for Libyans). Only one anterior crossbite was detected in Syrians while two of them was detected in Libyans; 4 posterior crossbites were detected in Syrians 4.44% compared to 3 (3.33%) in Libyans. It was obvious that CIII malocclusion happened more in Libyans than in Syrians (10% and 5.55%) respectively, while CII malocclusion is more spread between Syrians 25.56%.

There was no statistically significant difference between the grade of need of treatment distributions of the Syrian and Libyan.

Finally, there is a positive relationship between orthodontic treatment need and the perception, awareness, and satisfaction of the dental aesthetics in both groups. However, a good portion of the sample is willing to make some changes about their oral view.

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7. APPENDICES

8.1. Appendix I: Clinical examination form

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HEALTH SCIENCES INSTITUTE
DEPARTMENT OF ORTHODONTICS

CLINICAL EXAMINATION CHARTING FORM

Part 1) GEOGRAPHİC İNFORMATİON :

File number : _____
Date : _____
Student Name : _____
School Name : _____
Age : _____
Gender : _____
Date of birth : _____
Country : _____
Education Level : _____

Part 2) 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 ◯

Part 3) TMJ examination :

- ✓ History of trauma: …….
- ✓ Other signs or symptoms: ……..

***Part 4) Bad habits examination* :**

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

Part 5) 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 ◯

İncisor display: (VALUE) ……..

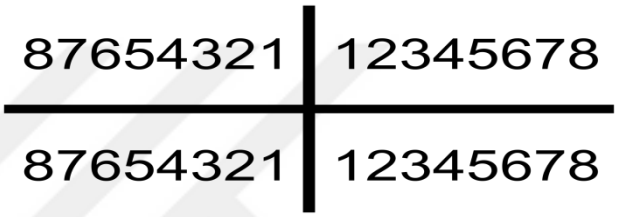
The transverse cant of the occlusal plane:

Smile and buccal corridor:

The smile arc: ■ consonant ■ non-consonant

Part 6) 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 pre-restorative orthodontics.
- 4.h Less extensive hypodontia requiring pre-restorative 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 3.5 mm.
- 2.b reverse over jet 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 the 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 the retruded contact position and intercuspal position.
- 2.c Anterior or posterior crossbite with less than or equal to 1 mm discrepancy between the retruded contact position and intercuspal position.
- 4.l Posterior lingual crossbite with no functional occlusal contact in one or both buccal segments.

Openbites

- 4. e Extreme lateral or anterior openbites greater than 4 mm.
- 3.e Lateral or anterior openbite greater than 2 mm but less than or equal to 4 mm.

- 2.e Anterior or posterior openbite 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.

Extremely minor malocclusions

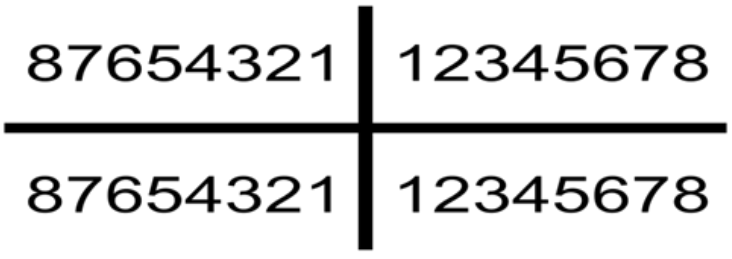
1.a Extremely minor malocclusions including contact point displacements less than 1 mm.

Periodontal conditions

- ✓ healthy gums
- ✓ good
- ✓ bad

Dentition

- ✓ Number
- ✓ Shape
- ✓ Size
- ✓ Restoration
- ✓ Caries
- ✓ Extraction
- ✓ İmpaction
- ✓ Attrition



Tongue

- ✓ Size …….
- ✓ Lingual frenum ……..

Sagittal Occlusal Relationship

Molar relation

- ✓ Right …….
- ✓ Left ……

Premolar relation

- ✓ Right …….
- ✓ Left …….

Canine relation

- ✓ Right …….
- ✓ Left …….

Part 7) *Index of Orthodontic Treatment Need (IOTN)*

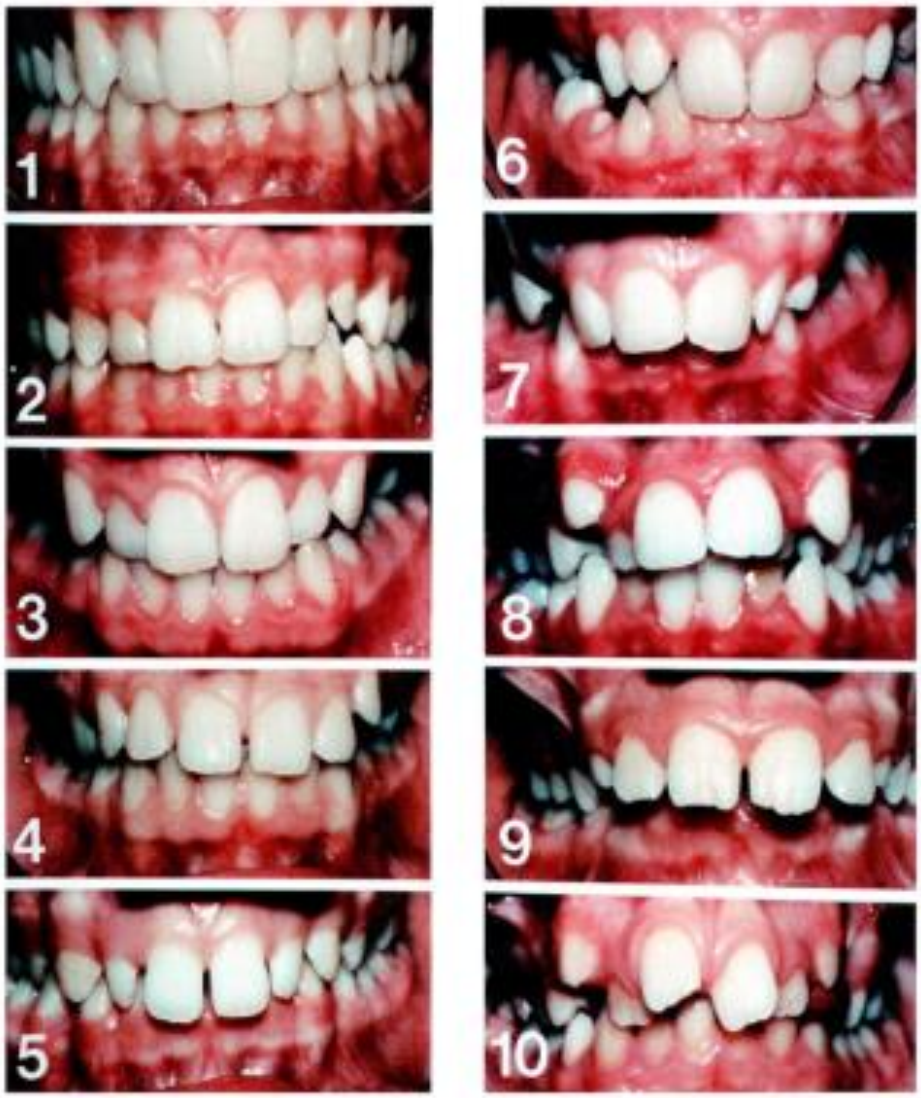
□ **1 (None)**
□ **2 (Little)** ____
□ **3 (Moderate)** ____
□ **4 (Great)** ____
□ **5 (Very Great)** ____

Completed by:_____

8.2. Appendix II: The aesthetic component (AC) of the IOTN

- Photo number 1 is the most attractive arrangements
- Photo number 10 the least attractive arrangements.
- Grades 1–4 indicate no/ slight need for treatment
- Grades 5–7 a moderate/borderline need for treatment
- Grades 8–10 a definite need for orthodontic treatment.

The number of the photo selected by the student: ☐



8.3. Appendix III: Questionnaire (OASIS) (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	4	5
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	4	5
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	4	5
Not at all		sometimes		all the time

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

1	2	3	4	5
Not at all		sometimes		all the time

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

1	2	3	4	5
Not at all		sometimes		all the time

8.4. Appendix IV: Questionnaire (OASIS) (Arabic version)

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

1. **كيف تشعر بخصوص مظهر اسنانك ؟**

1	2	3	4	5
ليس مهم		احيانا	ا	اهتم جد

2. **هل يعلق الناس على مظهر اسنانك ؟**

1	2	3	4	5
لا ابدا		احيانا يعلقون		دائما يعلقون

3. **هل يسخر بعض الناس من مظهر اسنانك ؟**

1	2	3	4	5
لا ابدا		احيانا		دائما

4. **هل تحاول اخفاء ابتسامتك بسبب مظهر اسنانك ؟**

1	2	3	4	5
لا ابدا		احيانا		دائما

5. **هل تغطي فمك لاخفاء مظهر اسنانك ؟**

1	2	3	4	5
لا ابدا		احيانا		دائما

8.5. Appendix V: Questionnaire (2) (English version)

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 anything you would like to change 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 suggested 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

   Social factors

8.6. Appendix VI: Questionnaire (2) (Arabic version):

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

1. **هل تعتقد ان الاسنان المرتبة تؤثر على مظهر الاسنان ؟**

لا **نعم**

2. **هل انت راض عن جمال اسنانك ؟**

لا **نعم**

3. **هل هناك شئ ترغب بتغييره باسنانك ؟**

لا **نعم**

4. **لو اجبت بنعم ، ما الشئ الذي تود تغييره ؟**

اللون **الحجم** **الترتيب** **غير ذلك**

5. **هل تواجه مشاكل في الكلام ام مضغ الطعام بسبب سوء ترتيب اسنانك؟**

لا **نعم**

6. **هل تعتقد انك بحاجة لتبدا علاج وتقويم لاسنانك ؟**

لا **نعم**

7. **هل نصحك احد بان تبدا علاج تقويم لاسنانك ؟**

لا **نعم**

8. **لو انت بحاجة لتقويم اسنانك ، مالذي يمنعك من ذلك :**

Traditional factors	**اسباب تقاليد واعراف**
financial factors	**اسباب مادية**
Social factors	**اسباب اجتماعية**
Others	**اسباب اخرى**

8.7. Appendix VII: List of materials used in the study

Non-disposable items

Laminated IOTN photos (5 sets)

Disposable items

Gauze (2 packs)

Caps (1 box)

Masks (1 box)

Latex gloves (4 boxes)

Paper towels (4 rolls)

Questionnaires (300)

Charting forms (150)

Stationery

Clipboards (5)

Pens (5)

8.8. Appendix VIII: Ethical approval co

T.C.
İstanbul
YENİ YÜZYIL
ÜNİVERSİTESİ

FEN, SOSYAL VE GİRİŞİMSEL OLMAYAN SAĞLIK BİLİMLERİ ARAŞTIRMALARI ETİK KURULU

03.12. 2018

Sayı: 2018/10

İlgi: Etik Kurul Onayı,

Sayın Alper BAYRAKTAR

İstanbul Yeni Yüzyıl Üniversitesi Etik Kurulunun 03.12.2018 tarih ve 2018/10 sayılı toplantı sonucunda "Libya'lı ve Suriyeli Okul Öğrencilerinde Ortodontik Tedavi İhtiyacı Algılama ve Farkındalığı Arasındaki İlişkinin Araştırılması''başlıklı çalışmanız Fen, Sosyal ve Girişimsel Olmayan Sağlık Bilimleri Araştırmaları Etik Kurulumuzca oy birliği ile **UYGUN** bulunmuştur.

Araştırmanız süresince çalışmanızda özellikle konu başlığı, gereç ve yöntemler konusu ile ilgili olarak değişiklikler söz konusu olursa tekrar değerlendirilmesi önerilir.

Not: İşbu belge İstanbul Yeni Yüzyıl Üniversitesi Fen, Sosyal Ve Girişimsel Olmayan Sağlık Bilimleri Araştırmaları Etik Kurul Yönergesi temelinde kaleme alınmıştır.

İş bu belge kurum onayı dahilinde geçerlidir.

Prof. Dr. Emir TAN

İstanbul Yeni Yüzyıl Üniversitesi
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