OCCLUSAL TRAITS AND ORTHODONTIC TREATMENT NEED AMONG SCHOOLCHILDREN IN MISURATA, LIBYA

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ABSTRACT

The aim of this study is to determine the orthodontic treatment need of Libyan schoolchildren using the Index of Orthodontic Treatment Need (IOTN) and the amount of contribution of the various occlusal traits in rating of the children in IOTN scale. This data provides solid information for planning of orthodontic care and give hard base about the most occlusal traits in producing malocclusion in Libyan schoolchildren. In this cross-sectional study of School-going children aged 14-15 years, their parents consented to an intra-oral examination. A total of seventeen schools in Misurata were selected and a total of 1,050 children were entered into the study. Five children (0.5%) had previously received orthodontic treatment and these children were excluded from the study. The gender of the sample population was remarkably even and comprised 522 males (49.7%) and 528 females (50.3%). The mean age of male students was 15.3 years old, while that of female students 15.5 years old. However, the age range was slightly larger with the youngest students 13 and 17 years old. The study found that 27 percent of children were in Dental Health Component grade 5 and 4 and therefore in definite need for orthodontic treatment. Less than 24 percent of children (grade 3) were in borderline need and 49% (grade 2and 1) had little or no need for treatment. The contribution of the main occlusal features responsible for definite need respectively as follow; severe contact displacement (4d) 34.3 per cent, overjet greater than 6 mm but less than or equal 9 mm (4a) 17.3 per cent, crossbite with displacement greater than 2 mm (4c) 14.1 per cent, impeded eruption (5i) 14.1 per cent, less extensive hypodontia (4h) 7.1 per cent, overjet greater than 9 mm (5a) 6 per cent, partially erupted, tipped and impacted against adjacent teeth (4t) 4.6 per cent, submerged deciduous teeth (5s) 1.1 per cent, reverse overjet greater than 3.5 mm with reported masticatory and speech difficulties (5m) 0.7 per cent and 0.4 percent for both extreme lateral or anterior open bite greater than 4 mm (4e) and presence of supernumerary teeth (4x).

KEYWORDS: Schoolchildren, IOTN, Dental Health Component (DHC), Malocclusion and Occlusal Traits.

INTRODUCTION

Malocclusions prevalence is second only to tooth decay and periodontal disease, and therefore rank third among all worldwide public health dental disease priorities [World Health Organization, 1997]. Therefore, rational planning of an orthodontic treatment service on a population basis is essential and requires baseline data on the prevalence of different types of malocclusion.

In clinical orthodontics, malocclusion assessment remains problematic because there are no generally accepted criteria to define normal or abnormal occlusal status to date.

One of the previous Libyan studies was investigated by Gardiner (1982) surveyed the prevalence of malocclusion in 479 schoolchildren in Benghazi, Libya. Only Angle's classification was used to assess the antero-posterior dental arch relationship and Crowding was detected in 31 percent of the sample. Another Libyan study was done by Ommar (1994), the occlusal status of 2015 Libyan schoolchildren, aged between 7 – 16 years, who found that 94.5% had Angle's Class I molar relationship. Ninety two percent had an overjet between 2 and 5mm, 4.1% had an overjet of 6mm or greater while 3.8% had an overjet of 1mm or less. Only 13.4% of the sample had crowding.

The other study was done by Iman Bugaighis and Divakar Karanth in 2013 they found that the prevalence of malocclusion in the Benghazi population of Libya is among the highest reported in the literature. These studies are of limited value since they did not use a scientifically validated index of orthodontic treatment need.

The aim of the present survey was to document the prevalence of individual traits of malocclusion in Libyan children aged 14 to 15 years old, and the contribution of these traits in determining the priority of needing for orthodontic treatment by using IOTN index.

The index of orthodontic treatment need (IOTN) developed by Brook and Shaw (1989) is gaining wide acceptance in the UK and other parts of Europe. It has approved to be a valid, reliable and quick index to assess orthodontic treatment need (Burden and Holmes, 1994).

The IOTN is composed of two independent components. One component records the dental health need for orthodontic treatment. The other component records the aesthetic need for orthodontic treatment. In its original form, the Dental Health Component comprises a 5-grade index and the Aesthetic Component consists of a 10-grade standardized ranking scale of dental attractiveness.

The IOTN attempts to rank malocclusion in terms of the impact of various occlusal traits on an individual's dental health or perceived aesthetic impairment. Social research strongly indicates that aesthetic impairment is associated with psycho-social disadvantage.

IOTN is also quick and reliable when used to assess treatment need at a community level, as it only

records the most severe occlusal traits (Burden and Holmes).

In this article only DHC is used and its relation with the most common occlusal traits which are affecting directly to rate the subject on IOTN.

MATERIALS AND METHODS

The present study was carried out in school-going children aged 14 – 15 years. The children parents were consented to an intra-oral examination. A total of seventeen schools from different parts of Misurata were selected and a total of 1,050 children were entered into the study. Five children (0.5%) had previously received orthodontic treatment and these children were excluded from the study.

Prior to carrying out the study the investigator was calibrated in the use of both components of the Index of Orthodontic Treatment Need.

A data collection sheet (Appendix) listing all clinical data to be collected was prepared beforehand. At examination the subject was seated and under artificial lighting conditions an intra-oral examination was carried out.

Clinical examination was completed within the school with the subject seated and using a portable dental light, a dental mirror and an orthodontic stainless-steel ruler.

Each student's occlusion was assessed using IOTN. The DHC of the IOTN records the various occlusal traits into five grades according to the severity and the need for orthodontic treatment. Grades 1 and 2 represent no need for treatment, grade 3 borderline, and grades 4 and 5 are considered to be a definite need for orthodontic treatment.

To record the dental health component, score a disposable IOTN ruler was used.

The overjet was measured by selecting the largest overjet measurement of the four upper incisors. The relationship of the upper to lower centerline was recorded in relation to midfacial plane. The result was recorded on a reference grid. The overbite recording zone was all four incisors and overbite recorded as either normal, increased or decreased. The overbite was classified as complete or incomplete or traumatic. Anterior posterior or lateral open bites were recorded and the maximum opening recorded in millimeters. The molar relationship on the left and right sides according to Angle's classification was recorded as was the canine relationship. A visual assessment of crowding was made in both arches and the largest contact point displacement, measured in mil-

3.e Lateral or anterior open bite greater than 2 mm but less than or equal to 4 mm.

3.f Deep overbite complete on gingival or palatal tissues but no trauma.

limeters, was made in each arch. Anterior and or posterior crossbite, if present and the magnitude of any associated displacement was recorded.

The original dental health component of IOTN:
Grade 5 *(Need treatment)*

5.h Extensive hypodontia with restorative implications (more than1 tooth missing in any quadrant) requiring pre-restorative orthodontics.

5.i Impeded eruption of teeth (except for third molars) due to crowding, displacement, the presence of supernumerary teeth, retained deciduous teeth and any pathological cause.

5.a Increased overjet greater than 9 mm.

5.m Reverse overjet greater than 3.5 mm with reported masticatory and speech difficulties.

5.p Defects of cleft lip and palate and other craniofacial anomalies.

5.s Submerged deciduous teeth.

Grade 4 *(Need treatment)*

4.h Less extensive hypodontia requiring pre-restorative orthodontics or orthodontic space closure to obviate the need for a prosthesis.

4.a Increased overjet greater than 6 mm but less than or equal to 9 mm.

4.b Reverse overjet greater than 3.5 mm with no masticatory or speech difficulties.

4.m Reverse overjet greater than 1 mm but less than 3.5 mm with recorded masticatory and speech difficulties.

4.c Anterior or posterior crossbites with greater than 2 mm discrepancy between retruded contact position and intercuspal position.

4.l Posterior lingual crossbite with no functional occlusal contact in one or both buccal segments.

4.d Severe contact point displacements greater than 4 mm.

4.e Extreme lateral or anterior open bites greater than 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 Presence of supernumerary teeth.

Grade 3 *(Borderline need)*

3.a Increased overjet greater than 3.5 mm but less than or equal to 6 mm with incompetent lips.

3.b Reverse overjet greater than 1 mm but less than or equal to 3.5 mm.

3.c Anterior or posterior crossbites with greater than 1 mm but less than or equal to 2 mm discrepancy between retruded contact position and intercuspal position.

3.d Contact point displacements greater than 2 mm but less than or equal to 4 mm.

Grade 2 (Little need)

2.a Increased overjet greater than 3.5 mm but less than or equal to 6 mm with competent lips.

2.b Reverse overjet greater than 0 mm but less than or equal to 1 mm.

2.c Anterior or posterior crossbite with less than or equal to 1 mm discrepancy between retruded contact position and intercuspal position.

2.d Contact point displacements greater than 1 mm but less than or equal to 2 mm.

2.e Anterior or posterior open bite greater than 1 mm but less than or equal to 2 mm.

2.f Increased overbite greater than or equal 3.5 mm without gingival contact.

2.g Prenormal or postnormal occlusions with no other anomalies includes up to half a unit discrepancy.

Grade 1 (No Need)

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

RESULTS

The distribution ratings for the DHC of IOTN in the Libyan school population were found as follows; 27.1 per cent in definite need for treatment, 23.8 per cent in borderline need for treatment and 49.1 per cent little or no need for treatment (figure 1).
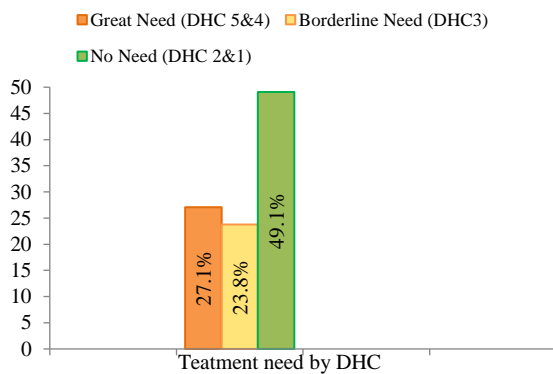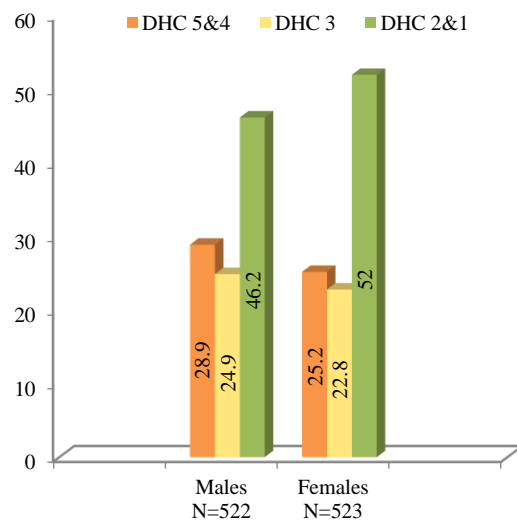

(Figure 1) Distribution of DHC treatment need categories.

(Figure 2) shows the percentage distribution of treatment need among the sample according to the five dental health components grades of the IOTN. The largest proportion of subjects (34.3%) felt into grade two followed by grade three (24%), grade four (21.2%), grade one (14.8%) and grade five (5.9%).
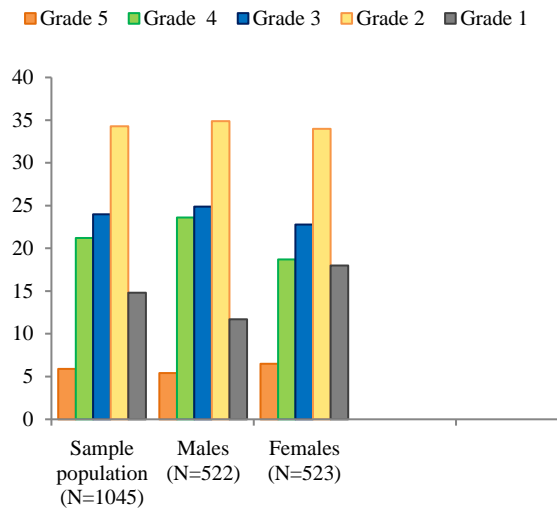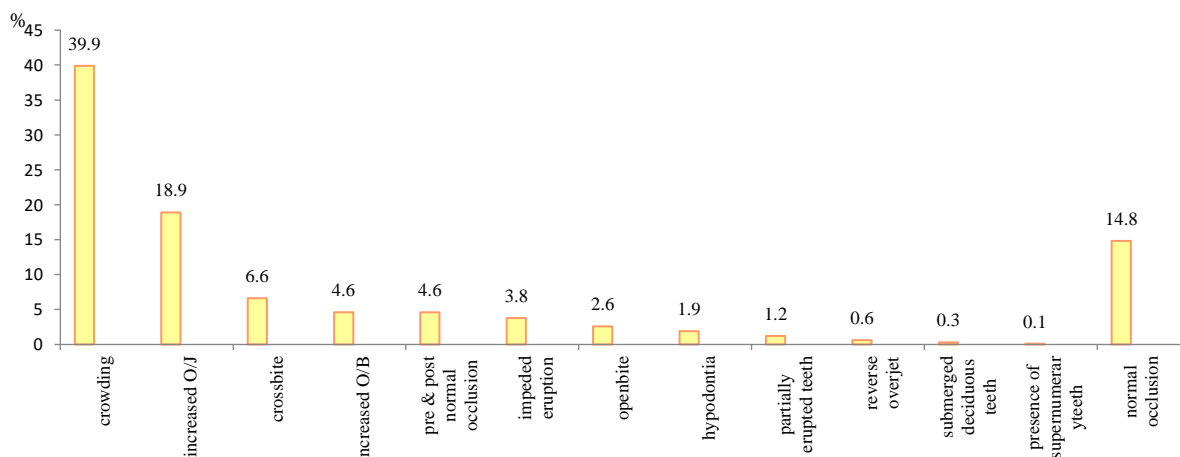

(Figure 2) The distribution percentage of the sample according to DHC categories of IOTN.

(Figure 3) shows the distribution of DHC treatment need categories according to the gender.
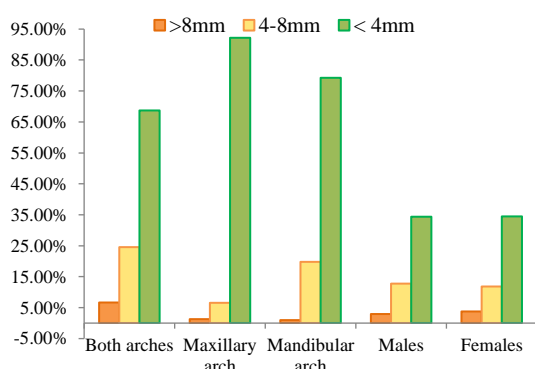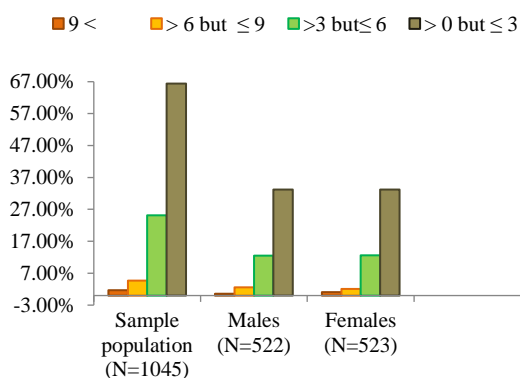

(Figure 3) Distribution of DHC treatment need categories according to the gender.

(Figure 4) Distribution of traits within the DHC scores.

(Table 1) Percentage distribution of DHC scores for subjects with a definite need for treatment (DHC 4 and 5).

IOTN component	Percentage Distribution
4.d	34.3
4.a	17.3
4.c	14.1
5.i	14.1
4.h	7.1
5.a	6.0
4.t	4.6
5.s	1.1
5.m	0.7
4.e	0.4
4.x	0.4
TOTAL	**100**

(Figure 5) Distribution of estimated crowding.

(Figure 6) Distribution of overjet for all subjects.

DISCUSSION

The use of an occlusal index to determine treatment need is an objective and effective way to screen patients for orthodontic treatment (Otuyemi OD, Jones SP. and Shaw WC, Richmond S, O'Brien KD, Brook P). It is a safeguard against over-treatment and a meaningful basis for an objective discussion between children, parents, referring general dental practitioners and orthodontists about the need for treatment.

The schoolchildren in the present study are older than those examined in previous studies (Brook and Shaw, 1989; Burden and Holmes, 1994; Richmond et al.,1994). The choice of age was to avoid recording unerupted teeth as impacted teeth or as missing teeth where the teeth in question will erupt uneventfully and also the unexpected residual growth which could affect in the rating of the child in DHC.

Orthodontic treatment need as determined by IOTN has not been previously investigated in Libya. However, the previous studies relied upon subjective criteria to determine whether the subject was within the normal range of occlusal traits or was in need of orthodontic treatment.

IOTN has now gained wide acceptance and is increasingly used to ascertain treatment need in populations. The validity of the use of IOTN index has been verified by several researchers (Richmond et al., 1993; Burden et al., 1994; Burden and Holmes,1994; Shaw et al., 1995).

The current study revealed the most occlusal traits the children have to rate them in IOTN and then their responsibility in putting children in need of orthodontic treatment.

This will provide baseline data on treatment need in the Libyan 13 – 17-years-old school-going population and allows comparison to be made with studies in other countries for a similar population group. Additionally, the information may be used to plan orthodontic manpower and in the planning of future service provision in the Libyan school-going population. The main occlusal features responsible for allocating children in great need of orthodontic treatment were severe contact displacement (4d) 34.3 per cent, overjet greater than 6 mm but less than or equal 9 mm (4a) 17.3 per cent, crossbite with displacement greater than 2 mm (4c) 14.1 per cent, impeded eruption (5i) 14.1 per cent, less extensive hypodontia (4h) 7.1 per cent, overjet greater than 9 mm (5a) 6 per cent, partially erupted, tipped and impacted against adjacent teeth (4t) 4.6 per cent, submerged deciduous teeth (5s) 1.1 per cent, reverse overjet greater than 3.5 mm with reported masticatory and speech difficulties (5m) 0.7 per cent and 0.4 percent for both extreme lateral or anterior open bite greater than 4 mm (4e) and presence of supernumerary teeth (4x) (figure 4) and (table 1).

CONCLUSION

The most common occlusal traits respectively found; contact point displacement, increased overjet, crossbite with displacement, impeded eruption and less extensive hypodontia.

Orthodontic treatment need in Libyan children, as determined by DHC, is less than that reported in other populations.

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