Original article

Assessment of IOTN application among dental undergraduates-A pilot study

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Abstract

Background: Various oral health problems can be affected with the presence of malocclusion such as compromising on dentofacial esthetics, speech, mandibular function, and psychological wellbeing of the individual. The degree of severity of malocclusion needs to be evaluated beforehand to plan orthodontic treatment accurately. This study was done to assess the application of dental health component and aesthetic component of IOTN among dental undergraduates. **Materials and Methods:** The sample consisted of 40 BDS students (24 females and 16 males) belonging to 2012-13 batch in their final year with a mean age of 24±2 years for grading the study models and photographs from the orthodontic department patient record library. The cast and photographs were examined for the dental health component (DHC) and esthetic component (EC) at faculty of dentistry, SEGi university. **Results:** The mean measurements of overjet, crossbite, displacement and overbite were 3.85mm, 4.09mm, 6.63mm and 4.34mm respectively of the students as against 3.50mm, 4.50mm, 7.00mm and 4.00mm of the control. The mean measurements were almost like the control value in overbite, crossbite and displacement. However, there was some variation with the measurement of overjet. 75% of students were able to get similar results as the control in the dental health component of IOTN while only 25% managed to get similar results with the control with the aesthetic component. **Conclusion:** Therefore, this suggests more emphasis is required in training before the skill demonstration of recording dental

health component parameters and aesthetic component appreciation which can bias the overall grading and referral.

key words: Aesthetic component (AC), Boley Gauge, Dental health component (DHC), Epidemiology, Index of orthodontic treatment need (IOTN), Undergraduates.

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Introduction

Oral health envisions myriad of factors, one among them being structural relation in achieving balance, efficiency, and functional harmony. Patients altered with these relation and occlusion mostly do not realize that they have problem and others feel that they need treatment which they cannot afford it or obtain it.[1,2] The perceived and demand need also varies with social and cultural requirements.[3] The degree of severity of malocclusion needs to be evaluated beforehand to refer and plan the orthodontic treatment accurately.[4] Many orthodontic indices were developed to determine and systematically categorize the degree of malocclusion such as Summers' Occlusal index[5], the Treatment Priority index[6], the Need for Orthodontic index[7], Index of Outcome, Complexity and Need (ICON)[8] and the Index of Orthodontic Treatment Needs (IOTN).

IOTN is a versatile index which is applicable directly, chair side on the patient with tabulated specific individualized incremental progressive parameters to examine, as well as this same can also be done indirectly with study models and clinical photographs for grading. It is also crafted for epidemiological survey purpose with five parameters and utilized in both direct and indirect method with the help of records.[9-13] These methodologies can be applied

for both dental health component (DHC) and esthetic component (EC) by general dental practitioners, specialist, and or by trained personel.[14]

Index of Orthodontic Treatment Need (IOTN) is a method of defining the severity of occlusal traits which may cause a threat to the life expectancy of the dentition, temporomandibular joint and associated function.[15] It is useful as a method for planning, contracting and monitoring NHS orthodontic service as shown in a surveys by UK dental public health consultant.[16] The utility of IOTN is even complimented by the British orthodontists as 'quick', 'simple' and 'easy to use' and, make available the treatment beyond the socioeconomic barriers.[17-19] Therefore the reliability of application among younger generation undergraduates was randomly measured in this study.

Materials and Methods

This study was conducted at faculty of dentistry, SEGi university, Malaysia. The sample consisted of total 40 students in their final year of their BDS program of 2012-13 batch. After the ethical committee approval all the students were introduced to the IOTN module with tutorials and hands-on practical sessions indirectly on patient study models and clinical intraoral photographs at secondary care. The epidemiological module involving missing, overjet, crossbite, displacement and overbite (MOCDO) was selected for the study purpose. The total sample was subdivided into 4 groups each containing 10 students. IOTN grading proforma, one patient study model casts, digital Boley gauge, and intraoral photograph-front view of the same patient were utilized for the study.

One patient pretreatment record was selected randomly from the record library of orthodontic department and duplicated into four similar sets to challenge the skills. This was pre calibrated by two skilled supervisors to alleviate the inter examiner differences to set the accuracy levels which acted as a control for both DHC and AC. These four sets of records were double blinded and were

subjected to student's evaluation with a lottery method for the first time for visual appreciation/ psychological distraction that they were of different patients. The sample was evaluated at two different time points within a 4-week interval between each procedure to assess intra examiner differences for accuracy and reproducibility. First decimal was considered and rounded-off to the nearest whole number for ease in data processing.

Statistical Analysis

Data was analyzed using Chi-Square test and independent t-test SPSS (version 22) software for the mean and standard deviation of the students against the supervisor's (control) values for dental health parameters like missing, overjet, crossbite, displacement, overbite, dental health component grading and the aesthetic component grading. Significance level was set at $p<0.05$.

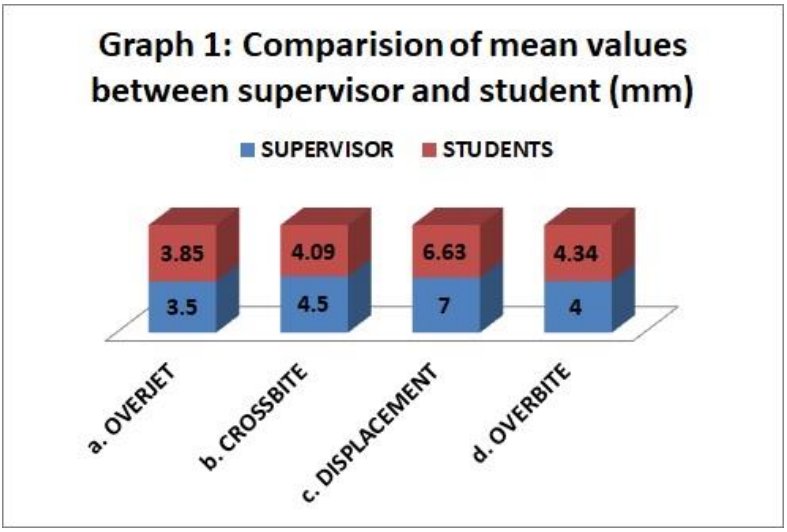
RESULTS

The discrete data (Figure 1 (a-f)) furnished the following details. The intra examiner differences were not as significant as majority reproduced the values with a standard deviation of ±0.2-0.4 mm ($p<0.001$). Missing was identified by 90 percent of students. There were differences among the students with the parameter estimation.

Overjet (Figure 1a) was mapped over a range between 3 to 6 mm with a mean of 3.85 mm (Graph 1a). Most of them, 14 students measured 4 mm with the next highest being 3 mm of overjet by 13 students compared to 3.5 mm of the control. Only 4 students were coinciding with the supervisors. Crossbite was measured between 0 to 6 mm (Figure 1b) ranges with a mean of 4.09 mm (Graph 1b). 18 students measured 4 mm and others deviating between 0 and 6 mm compared to 4.5 mm of the control value marked by only 1 student. The displacement was mapped over a range between 2.5 to 10 mm (Figure 1c) with a mean of 6.63 mm (Graph 1c). Majority (11 students) measured 9 mm with the next highest being 7 mm by 7 students which was also the control value. Overbite was mapped over a range between 2 to 7 mm

(Figure 1d) with a mean of 4.34 mm (Graph 1d). Many (11 students) mapped 11 mm with the next highest being 4 mm by 8 students, the later matching supervisor value.

Dental health component (Figure 1e) was graded at 4 by 30 students making it 75% matching with the supervisor value (Graph 2b) followed by 9 and 1 students respectively at 3 and 1 grades. However, contrasting ratings were picked up against the control value 6. 25% matched (Graph 2a) the aesthetic component (Figure 1f) and the rest varied between 2 and 7 ratings.



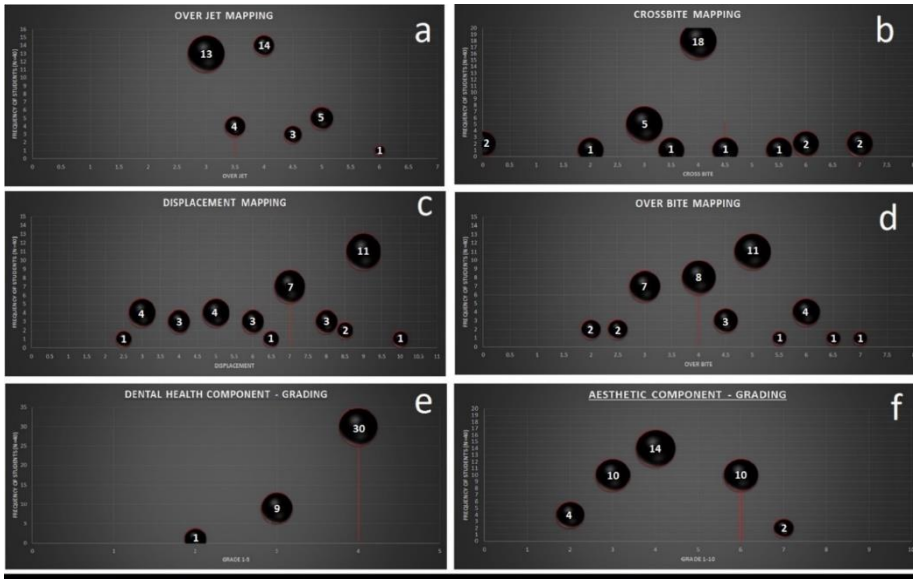
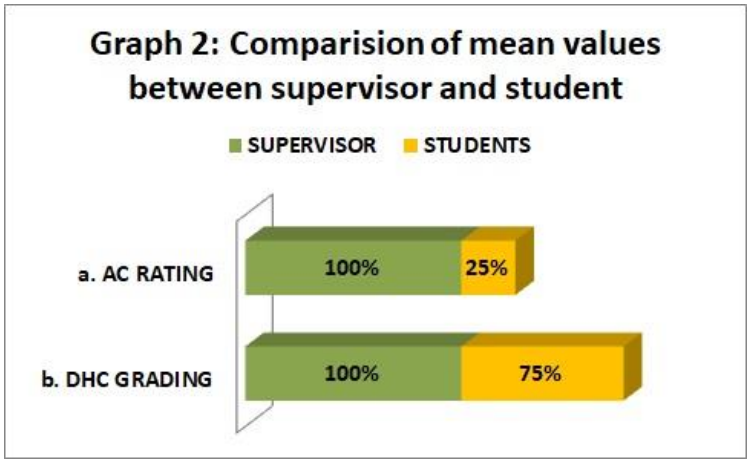


Figure 1 (a-f): Mapping of overjet (a), crossbite (b), displacement (c) overbite (d), DHC grading (e), AC rating (f).



DISCUSSION

This solitary model methodology pilot study is unique with a sample size of 40 and 1 patient record to examine, that was randomly selected and examined to test the specificity horizontally. Jawad Z et al[13] also did similar study with different model including the frequency of IOTN use in primary or secondary care along with training intervals and the accuracy of use. The IOTN components like DHC and AC had significant difference in calibrating and grading in this study which were similar to early studies conducted by Popat H et al[20] and Loke ST[21] in general with 30 models each and 70 and 13 sample size.

Dental health components such as overjet had significant difference ($p \leq 0.005$) with the mean of students being 3.85 compared to that of control i.e. 3.50 and a standard deviation of 0.76. Crossbite, displacement and overbite were insignificant ($p \geq 0.005$) i.e. *p values* were *0.066, 0.29 and 0.09* with mean and standard deviation comparison between student and control being 4.09:4.50±1.40; 6.63:7.00±2.26 and 4.34:4.00±1.24 respectively (Graph 1 a-d). This results were in agreement with Jawad Z et al[13] and Puri A[23] stating the frequency of use of IOTN as an important factor concurrently with registrant group like dental foundation trainees and place of work like primary care, secondary care and both stating weak performance.

Aesthetic component showed significant difference ($p=0.0$) with control value. Only 25% of students rated similar, with 75% (Graph 2a) being unable to subjectively perceive which was quiet different with the analytical dental health component i.e. 75% of students were approximately ($p=0.003$) correlating to the control value with the rest 25% being varied to the normal range (Graph 2b). This result was in accordance with Jawad Z et al[13] where dental foundation trainees and general dental practitioners who completed their training between 1 to 5 years performed weak than other registrants. Gilmour ASM et. al[22] also confirmed in their study that 35.5% did the assessment on their own with limited confidence, slowly followed by 32.4% with own on

following advice. In their study they confirmed only 19% performed IOTN assessment on own with confidence.

Conclusions

This study envisions that more emphasis must be given to enhance students' skills in recording and perceiving the IOTN components which can influence grading decision making, apart from regular clinical examination. Every student is unique and their cognitive and psychomotor skill applications also vary from individual to individual in spite of thorough training. Training in future may need to focus on additional assessment diagnostic and measurement skills in DHC and AC in order to have better objectivity and agreement before subjecting these individuals for epidemiological surveys and individual clinical assessment for quality referral.

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