Assessment of Esthetic Zone for Dental Implant Treatment
Elective Project Study Course No.703
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Abstract

Objectives: Nowadays, esthetics is considered to be as important to the success of the final restoration as tissue health and occlusion. For that reason, the esthetic assessment of an anterior implant site is very critical, and this assessment differs between different specialties. Therefore, the aim of the current study is to evaluate the differences in assessment of an implant site in the esthetic zone between dental specialists and general practitioners in Kuwait.

Methods: 250 self-administered questionnaires were distributed randomly to dentists of both the private and governmental sectors in Kuwait, over a three-month period. The questionnaires were composed of short-ended and open-ended questions. A premade key, composed of multiple indices, was made in order to assess and grade the dentist’s knowledge in the open-ended section. The questionnaires were only given to general practitioners and dental specialists, including periodontists, oral and maxillofacial surgeons, prosthodontists, and orthodontists. Out of the 250 questionnaires only 177 were returned and 157 were filled out completely.

Results: Our study showed a significant difference with regards to the knowledge during the extra-oral examination between general practitioners and dental specialists, with higher scores for dental specialists. As for the intra-oral examination, no significant difference was noted between the two groups except for the alveolar ridge assessment, where general practitioners scored higher. In addition, no significant difference was found regarding the diagnostic information. The majority of our study sample had sufficient knowledge and only a small percentage had proficient knowledge.

Conclusion: Only a small percentage of our sample showed proficient knowledge and the majority had sufficient knowledge. However, with esthetic dentistry complete, proficient knowledge is required to achieve optimal results. Further studies are therefore required to obtain a standardized esthetic form in order to achieve this.
**Key Words:** dental implants; esthetics; knowledge; general dentists; dental specialists

**Introduction**

Implantology has been a highly successful therapy in the treatment of complete, partial and single edentulism (1). The use of implants was reported since the 17th century; however, it was until 1950 when Branemark introduced the concept of osteo-integration of bone with titanium which drastically improved the clinical field of implants. Over the years the surgical and prosthetic component of an implant is under continuous development; therefore, there have been many improvements in the design, types, and sizes of implants. In addition, the improvement in the current ceramics have greatly helped in the improvement of the esthetic result, since they have evolved to a level simulating natural teeth in all their physical and optical properties (2).

The modern era of implantology had shifted the concept of longevity of dental prosthesis from being short-term to longer-lasting. It also helped improve the prosthesis from being removable to being fixed. Apart from the improvement in the prosthetic component, the increase in the awareness of esthetics by both patients and dentists made this field of dentistry even more important.

To further elaborate, a detailed assessment of the edentulous space prior to implant placement is of an extreme necessity; since factors including implant diameter, implant positioning (3,4), age, and time of placement and many other factors will play a crucial role in the esthetic outcome (5).

Although there is a growing interest in esthetics in dentistry, there are still no universally accepted evaluation criteria for esthetic results, therefore more research is needed to establish a common, complete and reproducible index (6). Nevertheless, the treating dentist must try to follow a systematic approach, to ensure that almost all the aspects of the esthetic components are covered. To achieve this, a detailed medical history, extra-oral, intra-oral examinations and additional investigations are essential.
During the extra-oral examination, the treating dentist should look at the following features: facial symmetry, facial profile, smile line, gingival show, incisal show and lip competence (7 & 8). As for the intraoral examination, hard tissue, soft tissue and dentition evaluation are essential. For the soft tissue examination, the papillary fill, gingival contour, gingival color and gingival biotype are important components based on a number of indices including Jemts index and the pink esthetic score (6 & 9). As for the hard tissue, the amount of bone, both buccolingually and mesiodistally, the presence of bone defects, bone level of adjacent teeth, and bone type, based on Lekholm, Zarb et al’s classification (10) are to be assessed. This assessment will enable the dental specialist to know whether or not a bone graft is needed for the sake of obtaining the most favorable esthetic result (6). On the other hand, during the dentition evaluation, the shade, shape, emergence profile, golden proportion, patient habits, and occlusal clearance are significant factors which are not to be overlooked; these are based indices which include the white esthetic score, esthetic index of Chang, and the implant crown esthetic score (3, 11, 12). As for the additional investigations, diagnostic casts, wax-up, mock-ups and radiographs are required. When it comes to the type of radiographs needed, a position paper recently published by the American Academy of Oral and Maxillofacial Radiology (AAOMR) recommended Cone Beam Computed Tomography as the imaging method of choice for assessing implant sites (13).

Since esthetics and implantology is a paramount in dentistry, the aim of this study was to assess the knowledge and background of general practitioners and specialists who provide treatment in the esthetic zone.

**Materials and Methods**

This cross-sectional survey study was entailed to assess the general knowledge of dentists in determining the factors required to be assessed for the placement of implants in the esthetic zone. The Ethical Review Committee of the Faculty of
Dentistry of Kuwait University approved the study protocol before commencing with the study (Appendix 1). The data was collected over a period of three months during 2013. A self-administered questionnaire (Appendix 4) was distributed to dentists of both the private and governmental sectors. The questionnaires were distributed to ten private dental clinics. As for the governmental sectors, the questionnaires were randomly distributed to the polyclinics and selectively to five dental specialty centers, which were: Bneid Al Gar, Al Amiri, Al Jahra, Al Adan, and Al Farwaniya Specialty Dental Centers. The questionnaire was only to be filled out by general dentists, periodontists, oral and maxillofacial surgeons, prosthodontists, and orthodontists after signing a written consent form (Appendix 2 and 3). The self-administered questionnaires were distributed during the working hours of the dentists in their clinics. They were given time till the end of their working hours to fill out the questionnaires since they had patients. Some questionnaires had to be picked up on another day since some dentists did not have spare time to fill them out. The majority of the dentists complained about filling out the open-ended part of the questionnaire. Private sectors were uncooperative and refused to fill out the questionnaire; therefore, more questionnaires were distributed to the governmental sector.

The questionnaire consisted of two parts. The first part recorded the dentist’s demographic data including age, sex, and country of which they had received their bachelor degree and clinical experience in terms of years and their post-graduate training. The second part consisted of open-ended questions regarding a clinical case of a 25-year old medically healthy patient with a missing upper left central incisor. This section mainly focused on the dentist’s knowledge in determining the main factors that should be assessed for the placement of an implant in the esthetic zone in terms of the extra-oral features, intra-oral features, and special diagnostic tests.
A total of 250 questionnaires were distributed of which 54 (21.6%) were never returned either because they could not be found in the clinic or they were not filled out. Therefore, 196 (78.4%) questionnaires were collected of which 19 (7.6%) dentists did not wish to participate making it only 177 questionnaires filled out. Therefore, the general response rate was 70.8%. However, for the open-ended section only 157 dentists answered it completely, resulting in another response rate of 62.8%. Once the questionnaires were collected the open-ended questions were graded using a pre-made key (Appendix 5). Then the data was entered and analyzed using the Statistical Package for the Social Sciences (SPSS).

Statistical Analyses

Data were entered and analyzed using software\(^1\). Frequency distributions and descriptive statistics were generated for all study variables. A \(\chi^2\) test was performed to detect significant associations among categorical variables, and the Student \(t\) test was used for continuous variables.

Results

In this study, 90 (50.8%) general practitioners and 86 (48.6%) dental specialists completed the questionnaire. Table 1 presents the sociodemographic characteristics of the dentists. When it comes to gender, 79.5% of the dental specialists were males, whereas 70% of the general practitioners were females. Unlike the dental specialists whose age ranged from 30-39 years old (51.1%), 65.9% of the general practitioners were found to be at the younger age group, which was 22-29 years old. As for the clinical experience, 66.7% of the general practitioners had only 0-5 years of clinical experience whereas 34.5% of the dental specialists had 10-15 years of clinical experience.

\(^1\) SPSS v. 21, IBM, Chicago IL.
Table 2.1 presents the dental education history among the general practitioners. Of the general practitioners, 53.3% did not receive any post-graduate education. Those who did receive post-graduate education mostly received it for one year (38.1%). Where as only 11.9% of the general practitioners had three years of post-graduate education. Most of the post-graduate education received was from Kuwait followed by the United Kingdom/Ireland. Some general practitioners received their post-graduate education from the United States of America (7.1%) and others from Egypt (2.4%). The rest of the general practitioners (9.5%) received their education from other countries such as Lebanon and Bahrain.

Table 2.2 presents the dental education history among the dental specialists. Unlike the general practitioners who mostly received their post-graduate education for one year, the dental specialists mostly received their post-graduate education for more than three years (50%). Only 2.4% of the dental specialists received one year of post-graduate education. Most of the dental specialists did their post-graduate training in India (32.5%) and in the United States of America (31.3%). Unlike the general practitioners who mostly received their post-graduate education in Kuwait, Kuwait had one of the least percentages of 2.4%. Those who studied in Egypt were only 9.6% and the other dental specialists (6%) studied in various countries like: Syria, Saudi Arabia, Bosnia, Romania, Germany, and Yugoslavia.

Further investigation was done in terms of the education received by the dentists. Table 3 summarizes the number of dental specialists and general practitioners who have taken extra courses in implant and esthetics. 66.7% of the general practitioners have not received any implant course whether it was didactic, hands on training in a lab or workshop, or hands on training on real patients or clinical training. On the other hand, 62.4% of the dental specialists have taken an implant course. As for the esthetic course, 36.7% of the general practitioners and 50.6% of the
dental specialists have taken such a course. The participants were asked the number of times they encounter a case that requires esthetic demands. 45.6% of the general practitioners and 32.1% of the dental specialists encounter such cases daily.

Tables 4, 5, and 6 represent the dentist’s knowledge in terms of the extra-oral features, intra-oral features, and diagnostic information, respectively, that need to be assessed for the placement of an implant in the esthetic zone. As shown in Table 4, the extra-oral part of the open-ended questionnaire was graded out of five points. A dentist could have mentioned any of the following factors: facial symmetry, facial profile, smile line, incisal show, gingival show, or lip prominence or anything similar to them and get one mark for each. However, the lip prominence was considered to be a bonus if mentioned. A grade of three out of five was found to have the highest percentages for both the general practitioners and dental specialists, 27.5% and 26.7% respectively. Only 5.8% of the dental specialists received a total mark of five out of five where as 0% of general practitioners received a total mark. The category of the intra-oral features was divided into three parts: soft tissue, alveolar ridge, and the dentition as seen in Table 5. For the soft tissue one point was given for each of the following: interdental papilla, gingival biotype, gingival margin, and the amount of keratinized tissue and an extra point was given if the periodontal status of the adjacent teeth was mentioned. Therefore, the score was out of four. As for the hard tissue, the alveolar ridge dimension, alveolar ridge defects, and bone height of the adjacent teeth each received one point and the bone type received an extra mark making the total out of three. Lastly, for the dentition, the tooth size, shape, and shade, inter-occlusal space, and proximity to anatomical structures each received one point as well. However, for the dentition if the golden proportion was mentioned or oral habits, such as bruxism, only one point was given. A bonus was given for the golden proportion since a recent study published that the golden proportion is not a common factor in
esthetic smiles so it was not considered as a primary answer (14). Therefore the total was out of three as well. In terms of the soft tissue, a score of three out of four had the highest percentage for both the general practitioners (28.6%) and dental specialists (32.6%). 24.2% of general practitioners and 12.8% of the dental specialists received a full mark of four out of four. Only one dentist who was a general practitioner got a score of five out of four. 14.3% of general practitioners and 8.1% of dental specialists got a full mark of three out of three for the factors mentioned under the assessment of the alveolar ridge, whereas most of the dentists received one mark out three in that same category. Finally, 36% of the dental specialists got two out of three and 36.3% of general practitioners got one out of three in terms of the factors assessed for the dentition. Only one general practitioner and two dental specialists received four out of three.

Table 6 represents the scores of both the general practitioners and the dental specialists for the diagnostic information. A study model or wax-up and radiographs were each given one mark and a bonus was given if a dentist mentioned the need of a radiographic stent or bone mapping. Therefore this category was out of two. Almost half of the general practitioners (44%) and the dental specialists (51.2%) got zero marks for this category. Those who received the extra bonus point, getting a total of three out of two, were five general practitioners and seven dental specialists.

In order to see the distribution of the knowledge of our study population about the factors required to be assessed for the placement of an implant in the esthetic zone, the knowledge was classified into four categories as shown in Table 7 according to Clarke University of Iowa. These four categories were: deficient, borderline, sufficient, and proficient knowledge. Anyone with a percentage of >75% was considered to have proficient knowledge, 50 to 75% was sufficient knowledge, 25≤50% was borderline knowledge, and lastly <25% was deficient knowledge. The
The majority of the study population was in the sufficient knowledge category with 56% general practitioners and 51.2% dental specialists. 11% of general practitioners and 1.5% of dental specialists had deficient knowledge and 8.8% of general practitioners and 9.3% of the dental specialists had proficient knowledge. The rest of the general practitioners and dental specialists had borderline knowledge.

Table 1. Sociodemographic Characteristics

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>General Practitioners (n[%])</th>
<th>Specialists (n[%])</th>
<th>p*</th>
<th>All Participants (n[%])</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>27 (30)</td>
<td>66 (79.5)</td>
<td>&lt;0.05</td>
<td>93 (53.8)</td>
</tr>
<tr>
<td>Females</td>
<td>63 (70)</td>
<td>17 (20.5)</td>
<td></td>
<td>80 (46.2)</td>
</tr>
<tr>
<td>Age (years)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22-29</td>
<td>60 (65.9)</td>
<td>2 (2.3)</td>
<td>&lt;0.05</td>
<td>62 (35)</td>
</tr>
<tr>
<td>30-39</td>
<td>23 (25.3)</td>
<td>44 (51.2)</td>
<td></td>
<td>67 (37.9)</td>
</tr>
<tr>
<td>&gt;40</td>
<td>8 (8.8)</td>
<td>40 (46.5)</td>
<td></td>
<td>48 (27.1)</td>
</tr>
<tr>
<td>Clinical Experience (years)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-5</td>
<td>60 (66.7)</td>
<td>7 (8.3)</td>
<td>&lt;0.05</td>
<td>67 (38.5)</td>
</tr>
<tr>
<td>5-10</td>
<td>18 (20)</td>
<td>15 (17.9)</td>
<td></td>
<td>33 (19)</td>
</tr>
<tr>
<td>10-15</td>
<td>4 (4.4)</td>
<td>29 (34.5)</td>
<td></td>
<td>33 (19)</td>
</tr>
<tr>
<td>15-20</td>
<td>3 (3.3)</td>
<td>16 (19)</td>
<td></td>
<td>19 (10.9)</td>
</tr>
<tr>
<td>&gt;20</td>
<td>5 (5.6)</td>
<td>17 (20.2)</td>
<td></td>
<td>22 (12.6)</td>
</tr>
</tbody>
</table>

*χ²(P <0.05)

Table 2.1. Dental Education History Among General Practitioners

<table>
<thead>
<tr>
<th>Dental Education History Among General Practitioners</th>
<th>Frequency</th>
<th>Valid Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post-Graduate Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Received</td>
<td>42</td>
<td>46.7</td>
</tr>
<tr>
<td>Did not Receive</td>
<td>48</td>
<td>53.3</td>
</tr>
<tr>
<td>Years of Post-Graduate Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 year</td>
<td>16</td>
<td>38.1</td>
</tr>
<tr>
<td>2 years</td>
<td>13</td>
<td>31</td>
</tr>
<tr>
<td>3 years</td>
<td>5</td>
<td>11.9</td>
</tr>
<tr>
<td>&gt;3 years</td>
<td>8</td>
<td>19</td>
</tr>
<tr>
<td>Place of Post-Graduate Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UK/Ireland</td>
<td>6</td>
<td>14.3</td>
</tr>
<tr>
<td>USA</td>
<td>3</td>
<td>7.1</td>
</tr>
<tr>
<td>Kuwait</td>
<td>28</td>
<td>66.7</td>
</tr>
<tr>
<td>Egypt</td>
<td>1</td>
<td>2.4</td>
</tr>
<tr>
<td>Others</td>
<td>4</td>
<td>9.5</td>
</tr>
<tr>
<td>Total General Practitioners</td>
<td>90</td>
<td>51.1</td>
</tr>
</tbody>
</table>

Table 2.2. Dental Education History Among General Practitioners

<table>
<thead>
<tr>
<th>Dental Education History Among Dental Specialists</th>
<th>Frequency</th>
<th>Valid Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dental Specialty</td>
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<tr>
<td>Periodontist</td>
<td>14</td>
<td>16.5</td>
</tr>
<tr>
<td>Prosthodontist</td>
<td>28</td>
<td>32.9</td>
</tr>
<tr>
<td>Oral surgeon</td>
<td>19</td>
<td>22.4</td>
</tr>
<tr>
<td>Orthodontist</td>
<td>23</td>
<td>27.1</td>
</tr>
<tr>
<td>Others</td>
<td>1</td>
<td>1.2</td>
</tr>
<tr>
<td>Years of post Graduate Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 year</td>
<td>2</td>
<td>2.4</td>
</tr>
<tr>
<td>2 years</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>3 years</td>
<td>35</td>
<td>41.7</td>
</tr>
<tr>
<td>&gt;3 years</td>
<td>42</td>
<td>50</td>
</tr>
<tr>
<td>Place of Post Graduate Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UK/Ireland</td>
<td>15</td>
<td>18.1</td>
</tr>
<tr>
<td>USA</td>
<td>26</td>
<td>31.3</td>
</tr>
<tr>
<td>Kuwait</td>
<td>2</td>
<td>2.4</td>
</tr>
<tr>
<td>Egypt</td>
<td>8</td>
<td>9.6</td>
</tr>
<tr>
<td>India</td>
<td>27</td>
<td>32.5</td>
</tr>
<tr>
<td>Others</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Total Specialists</td>
<td>86</td>
<td>48.9</td>
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Table 3. Implant and Esthetic Course

<table>
<thead>
<tr>
<th>Courses</th>
<th>General Practitioners (n[%])</th>
<th>Specialists (n[%])</th>
<th>p*</th>
<th>All Participants (n[%])</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implant Course</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>30 (33.3)</td>
<td>53 (52.4)</td>
<td>&lt;0.05</td>
<td>83 (47.4)</td>
</tr>
<tr>
<td>No</td>
<td>60 (66.7)</td>
<td>32 (37.6)</td>
<td></td>
<td>92 (52.6)</td>
</tr>
<tr>
<td>Esthetic Course</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>33 (36.7)</td>
<td>43 (50.6)</td>
<td>&lt;0.05</td>
<td>76 (43.4)</td>
</tr>
<tr>
<td>No</td>
<td>57 (63.3)</td>
<td>42 (49.4)</td>
<td></td>
<td>99 (56.6)</td>
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<tr>
<td>Cases Encountered</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Daily</td>
<td>41 (45.6)</td>
<td>26 (32.1)</td>
<td></td>
<td>67 (39.2)</td>
</tr>
<tr>
<td>2-3 x Week</td>
<td>39 (43.3)</td>
<td>28 (34.6)</td>
<td>&lt;0.05</td>
<td>67 (39.2)</td>
</tr>
<tr>
<td>Every other Week</td>
<td>6 (6.7)</td>
<td>16 (19.8)</td>
<td></td>
<td>22 (12.9)</td>
</tr>
<tr>
<td>2-4 x Month</td>
<td>4 (4.4)</td>
<td>11 (13.6)</td>
<td></td>
<td>15 (8.8)</td>
</tr>
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</table>

*χ² (P <0.05)

** Bonus of one mark

Table 4. Knowledge on Extra-oral Examination

<table>
<thead>
<tr>
<th>Extra-oral:</th>
<th>General Practitioners (n[%])</th>
<th>Specialists (n[%])</th>
<th>p*</th>
<th>All Participants (n[%])</th>
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</thead>
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<tr>
<td>Facial Symmetry</td>
<td></td>
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<td></td>
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<td>0/5</td>
<td>16 (17.6)</td>
<td>13 (15.1)</td>
<td></td>
<td>29 (16.4)</td>
</tr>
<tr>
<td>1/5</td>
<td>23 (25.3)</td>
<td>12 (14)</td>
<td></td>
<td>35 (19.8)</td>
</tr>
<tr>
<td>2/5</td>
<td>17 (18.7)</td>
<td>18 (20.9)</td>
<td>&lt;0.05</td>
<td>35 (19.8)</td>
</tr>
<tr>
<td>3/5</td>
<td>25 (27.5)</td>
<td>23 (26.7)</td>
<td></td>
<td>48 (27.1)</td>
</tr>
<tr>
<td>4/5</td>
<td>10 (11)</td>
<td>15 (17.4)</td>
<td></td>
<td>25 (14.1)</td>
</tr>
<tr>
<td>5/5</td>
<td>0 (0)</td>
<td>5 (5.8)</td>
<td></td>
<td>5 (2.8)</td>
</tr>
</tbody>
</table>

*χ² (P <0.05)

** Bonus of one mark

Table 5. Knowledge on Intra-oral Examination

<table>
<thead>
<tr>
<th>Knowledge on Intra-oral Examination</th>
<th>General Practitioners (n[%])</th>
<th>Specialists (n[%])</th>
<th>p*</th>
<th>All Participants (n[%])</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soft Tissue:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercanine papilla</td>
<td>1/4</td>
<td>13 (14.3)</td>
<td></td>
<td>14 (16.3)</td>
</tr>
<tr>
<td>Gingival type</td>
<td>2/4</td>
<td>19 (20.9)</td>
<td></td>
<td>19 (22.1)</td>
</tr>
<tr>
<td>Gingival margin</td>
<td>3/4</td>
<td>26 (28.6)</td>
<td></td>
<td>28 (32.6)</td>
</tr>
<tr>
<td>Periodontal status**</td>
<td>3/4</td>
<td>22 (24.2)</td>
<td></td>
<td>22 (25.6)</td>
</tr>
<tr>
<td>Periodontal status**</td>
<td>4/4</td>
<td>11 (12.8)</td>
<td></td>
<td>11 (12.8)</td>
</tr>
<tr>
<td>Alveolar Ridge:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dimension</td>
<td>5/4</td>
<td>1 (1.1)</td>
<td></td>
<td>1 (0.6)</td>
</tr>
<tr>
<td>Defects</td>
<td>1/3</td>
<td>40 (44)</td>
<td></td>
<td>42 (48.8)</td>
</tr>
<tr>
<td>Bone height of adjacent teeth</td>
<td>2/3</td>
<td>31 (34.1)</td>
<td></td>
<td>31 (35.6)</td>
</tr>
<tr>
<td>Bone type**</td>
<td>3/3</td>
<td>13 (14.3)</td>
<td></td>
<td>14 (16.3)</td>
</tr>
<tr>
<td>Distortion</td>
<td>0/3</td>
<td>10 (11)</td>
<td></td>
<td>10 (11)</td>
</tr>
<tr>
<td>Tooth size, shape, shade</td>
<td>3/3</td>
<td>33 (36.3)</td>
<td>&lt;0.05</td>
<td>34 (37.2)</td>
</tr>
<tr>
<td>Interocclusal space</td>
<td>2/3</td>
<td>32 (35.2)</td>
<td></td>
<td>32 (35.6)</td>
</tr>
<tr>
<td>Proximity to anatomical structures</td>
<td>3/3</td>
<td>15 (16.5)</td>
<td></td>
<td>15 (17.4)</td>
</tr>
<tr>
<td>Golden Proportion**</td>
<td>4/3</td>
<td>1 (1.1)</td>
<td></td>
<td>2 (2.3)</td>
</tr>
<tr>
<td>Habits**</td>
<td>4/3</td>
<td>1 (1.1)</td>
<td></td>
<td>3 (1.7)</td>
</tr>
</tbody>
</table>

*χ² (P <0.05)

** Bonus of one mark
Table 6. Knowledge on Diagnostic Information

<table>
<thead>
<tr>
<th>Knowledge on Diagnostic Information</th>
<th>General Practitioners (n[%])</th>
<th>Specialists (n[%])</th>
<th>p*</th>
<th>All Participants (n[%])</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnostic: Study model/wax-up</td>
<td>0/2 40 (44)</td>
<td>44 (51.2)</td>
<td>0.51</td>
<td>84 (47.5)</td>
</tr>
<tr>
<td>Radiographs</td>
<td>1/2 23 (25.3)</td>
<td>20 (23.3)</td>
<td></td>
<td>43 (24.3)</td>
</tr>
<tr>
<td>Radiographic Stent**</td>
<td>2/2 23 (25.3)</td>
<td>15 (17.4)</td>
<td></td>
<td>38 (21.5)</td>
</tr>
<tr>
<td></td>
<td>3/2 5 (5.5)</td>
<td>7 (8.1)</td>
<td></td>
<td>12 (6.8)</td>
</tr>
</tbody>
</table>

*χ² (P <0.05)
** Bonus of one mark

Table 7. Knowledge Classification

<table>
<thead>
<tr>
<th>Knowledge Classification</th>
<th>General Practitioners (n[%])</th>
<th>Specialists (n[%])</th>
<th>p*</th>
<th>All Participants (n[%])</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deficient</td>
<td>10 (11)</td>
<td>9 (1.5)</td>
<td></td>
<td>19 (10.7)</td>
</tr>
<tr>
<td>Borderline</td>
<td>22 (24.2)</td>
<td>25 (29.1)</td>
<td>0.78</td>
<td>47 (26.6)</td>
</tr>
<tr>
<td>Sufficient</td>
<td>51 (56)</td>
<td>44 (51.2)</td>
<td></td>
<td>95 (53.7)</td>
</tr>
<tr>
<td>Proficient</td>
<td>8 (8.8)</td>
<td>8 (9.3)</td>
<td></td>
<td>16 (9)</td>
</tr>
</tbody>
</table>

*χ² (P <0.05)
Discussion

To the best of our knowledge, no study was found that assessed the esthetic knowledge of dentists for implant placement. However, there was a study by Omar et al. (15), which assessed the type of information that clinician’s obtained before making a clinical decision in general, hence reflecting their own knowledge. The results of the study by Omar et al. showed that prosthodontists targeted the crucial information when it came to treatment planning as opposed to general practitioners and interns.

Our study showed that there was a statistically significant difference between general practitioners and dental specialists regarding esthetic and implant courses taken and the number of esthetic cases encountered. Unlike the dental specialists who had a higher percentage in taking esthetic and implant courses, a lower percentage of general practitioners were found to take such courses. It can be said that the younger age of the general practitioners have not yet figured out there interests in a certain specialty of dentistry. However, 71.8% of the dental specialists were periodontists, prosthodontists, and oral and maxillofacial surgeons, which are directly involved in implant treatment. Therefore, this could explain the higher percentage (62.4%) of implant course attendance among dental specialists. As for the number of esthetic cases encountered, general practitioners have shown to encounter more cases daily (45.6%) when compared to dental specialists (32.1%). This could be attributed to the fact that general practitioners tend to provide less complex treatment in the esthetic zone such as anterior restorations, stain removal, etc. On the other hand, dental specialists provide more complex treatment including implant supported crowns, single unit crowns, fixed partial dentures, removable partial dentures, crown lengthening procedure, bone grafts, etc. in the esthetic zone. This may be explained by the fact that more complex cases are encountered less often than simple anterior restoration on a daily basis.

As for the assessment of knowledge between general practitioners and specialists,
a statistically significant difference was found between both groups with regards to extra-oral investigations. Regarding this, the results showed that 42.9% of general practitioners had deficient knowledge as opposed to 23.2% of dental specialists; whereas, only 11% of general practitioners had proficient knowledge when compared to 23.3% of dental specialists. This difference could be attributed to the fact that general practitioners have a tendency to address the chief complaint, e.g. tooth pain, as opposed to the general problem the patients has. As a result, they will less likely focus on the extra-oral examination than the intra-oral examination when compared to dental specialists.

As for the intra-oral examination, no statistically significant difference was found with the soft tissue and dentition evaluation; however, the majority of the study sample, 30.5% regarding soft tissue and 35.6% regarding dentition, had sufficient knowledge. In a similar aspect, a study was done to assess the influence of posterior maxillary gingival margin position on the smile esthetics, and it showed that dentists appeared to be more perceptive to the alterations of gingival positions than patients, this could explain the sufficient knowledge found among our study population with regards to soft tissue (16).

As for the alveolar ridge, the majority had borderline knowledge with dental specialists (48.8%) scoring less than general practitioners (44%); this could be due to the reason that dental specialists tend to look at the clinically relevant information, alveolar ridge width and height, as opposed to all the theoretical information, bone type, which was used to formulate the key and grade their answers. To support that a study was conducted in Kuwait that showed that clinical decisions appeared to be based mostly on the clinician’s own judgment (73.3%) rather than on evidence based sources (28.3%). Among those who acknowledged the Evidence Based Dentistry (EBD), the majority were female dentists who in our study reflected the majority of general practitioners and newly graduated dentists who have been taught about EBD more extensively than the older dental specialists; therefore, they will have a higher chance to answer those questions.
more thoroughly.

As for the diagnostic information, most of our study population (47.5%) had deficient knowledge, this can be attributed to the fact that a separate question was asked to list the types of radiographs that need to be taken and therefore the dentists did not mention radiographs as one of the diagnostic criteria required; hence, the results might have been underestimated.

A standardized rubric (17) was used to categorize the knowledge of the dentists into the previously mentioned four categories. The results of this study showed that a normal distribution pattern of knowledge existed among our study population. The majority of our study population had sufficient knowledge i.e. general practitioners, 56% and dental specialists, 51.2% and only a few were found to be in the extremes. The extremes being deficient knowledge among 10.7% of the study population and proficient knowledge among 9%. However, when it comes to esthetic dentistry, optimal and complete knowledge is required, so proficient knowledge is essential. As mentioned previously, the small percentage of the study population with proficient knowledge could be related to the fact that most dentists have a tendency to make their treatment decisions based on their own judgment rather than on EBD (18). For that reason this field of dentistry has to be further studied, analyzed and implemented in teaching programs in order to ensure the most favorable esthetic result.

Conclusion

In conclusion, almost half of our study population had sufficient knowledge with regards to the esthetic assessment of the implant zone. However, only a small percentage showed proficient knowledge, and when it comes to esthetic dentistry complete knowledge is essential in order to obtain the optimal esthetic result, so even sufficient is considered suboptimal. After collecting and analyzing the data a form (Appendix 6) was made based on multiple indices for the Faculty of Dentistry of Kuwait University. This
form will help students in assessing the main factors for patients wanting to place an implant in the esthetic zone. However, this form should be tested in future studies in order to assess its reproducibility and accuracy to be used as a standardized esthetic form among all dentists. It is also recommended that esthetics and implantology should be more reinforced in undergraduate and post-graduate programs in order to maximize the esthetic result in all aspects of dentistry.

**Limitations**

The limitations of this study was that the sample size, 177, was not representative of the dentists in Kuwait, which was 1168 according to Al Yahya (19) since the sample size was small; therefore, future studies with a larger sample size are required in order to confirm the results of the current study. Additionally, the open-ended questions made a number of dentists reluctant from answering the questionnaire completely and this reduced the response rate even more; therefore, close-ended questions would have been a better option.
References


لا يُطلب الإحاطة بأن اللجنة الفرعية المفوضة من قبل اللجنة الدائمة لتسوية البحوث الطبية والاستشارية والمشكلة بموجب القرار الوزاري رقم 2012/2007، قد أوصت بانعقادها المنعقد يوم 30/5/2019، بموافقة على إجراء البحث المقدم من طب الأسنان - جامعة الكويت (دور إسماعيل - قاطرة الصفار) بمراكز وعيادات طب الأسنان وذلك تحت Assessment Of Esthetic Zone For Dental Implant Treatment.

ويتم البحث باستخدام استبيانات لجمع البيانات من أطباء الأسنان بمركز وعيادات الأسنان ولا informatie بناءً على إقرار الموافقة من المشاركين بالبحث، يتضمن البحث إجراء فحوصات أو تداخلات للمريض أو الأطعمة على ملتقيهم، وحيث أنه تم الموافقة على إجراء البحث المشار إليه.

لذا يرجى تسهيل مهمة الباحثين مع التزامهم بالمحافظة على حقوق المشاركين بالبحث من حيث الخصوصية وسرية المعلومات وعدم تداولها خارج إطار البحث والحصول على الإقرار المستنير من المشاركين في عيادات ومركز الأسنان.

وتفضلاً بقبول خالص التحية....
Title of the Project: Assessment of Esthetic Zone for Dental Implant Treatment

Aim of this research is:
1) To evaluate the differences in assessment of implant site in an esthetic zone between periodontists, oral surgeons, prosthodontists, operative dentists and general dental practitioners
2) To fabricate a form for Kuwait University Dental Clinic, which aids in the assessment of an implant site in an esthetic zone

The procedures involved in this study include: Self-administered questionnaire

Answering 20 questions on this questionnaire, which should only take you about 15 minutes to be completed.

There are no risks to you if you participate in this research. Your participation will increase knowledge about this important issue. All information collected will remain confidential. Neither your name nor your address will be recorded in any assessment. There is no obligation or compulsion for you to participate, and you have the freedom to agree or not agree to participate this will not have any effect on your right to receive the health care. You may quit from the research on any time.

Please indicate (✓) below if you wish to participate or decline to do so:

☐ I wish to participate
☐ I do not wish to participate

Signature of participant:

Thank You for Your Cooperation

Student name: Fatemah Al-Saffar
Noor Esmaiel

Supervised by: Dr. Areej Al-Khabbaz

Date 5/1/2013
جامعة الكويت
كلية طب الأسنان
قسم اللثة
2013

إقرار مستنير للبالغين (كامل الأهلية) بالموافقة

عنوان الدراسة: تقييم المنطقة الأمامية للقيام بزراعة الأسنان

الهدف من إجراء هذه الدراسة هو:
1. تقييم الاختلافات في المنطقة الأمامية لزراعة الأسنان بين أخصائي اللثة والجراحة والتركيبات والحشوات وطبيب الأسنان العام.
2. لعمل نموذج خاص لعيادات طب الأسنان في جامعة الكويت لتساعد على تقييم المنطقة الأمامية للقيام بزراعة الأسنان.

الإجراءات المتبعة في هذه الدراسة تتضمن التالي:

1. الإجابة على 22-سؤال من خلال هذا الاستبيان المكتوب والذي يستغرق 15 دقيقة تقريبا.

جميع المعلومات التي سيتم الحصول عليها من خلال هذه الدراسة سيتم التعامل معها بسرية تامة، ولن يتم خلال هذه الدراسة إدراج الأسماء، ويتبع الباحث بالمحافظة على سرية المعلومات والخصوصية. المشاركة في هذه الدراسة اختيارية و غير ملزمة. ولك كل الحريّة في التحفظ على الاجابة أو الانسحاب من الدراسة في أي وقت.

الرجاء وضع علامة (✓) في المكان المناسب:

أرغب بالمشاركة
لا أرغب بالمشاركة

نشكر لكم حسن تعاونكم.

اسم الطالبة: فاطمة الصفار / نور إسماعيل
اسم المشرف على الدراسة: د. أريج الخباز

هذا الإقرار من نسختين، نسخة تحفظ لدى الباحث في سجل البحث والنسخة الثانية تسلم إلى المشاركة بالبحث.

أربح في ذلك.
## Appendix 4
Assessment of Esthetic Zone for Dental Implant Treatment

1. **Age:**
   - [ ] 22-29
   - [ ] 30-39
   - [ ] 40-49
   - [ ] ≥ 50

2. **Gender**
   - [ ] Male
   - [ ] Female

3. From which country did you obtained your bachelor dental degree?
   - [ ] UK/Ireland
   - [ ] U.S.
   - [ ] Kuwait
   - [ ] Egypt
   - [ ] India
   - [ ] Others (please specify): __________

4. Are you a general dental practitioner or a dental specialist?
   - [ ] General dental practitioner
   - [ ] Dental specialist

5. **If you are a general dental practitioner:**
   - Did you receive any post-graduate education?
     - [ ] Yes
     - [ ] No
   - If yes, for how many years
     - [ ] 1 year
     - [ ] 2 years
     - [ ] 3 years
     - [ ] >3 years
   - And where
     - [ ] UK/Ireland
     - [ ] U.S.A
     - [ ] Kuwait
     - [ ] Egypt
     - [ ] India
     - [ ] Others (specify):
       __________

6. **If you are a specialist:**
   - What is your specialty?
     - [ ] Periodontist
     - [ ] Prosthodontist
     - [ ] Oral Surgeon
     - [ ] Operative Dentist
     - [ ] Other (specify): __________
   - For how long was your post-graduate training?
     - [ ] 1 year
     - [ ] 2 years
     - [ ] 3 years
     - [ ] >3 years
   - Where did you receive your post-graduate dental training?
     - [ ] UK/Ireland
     - [ ] U.S.A
     - [ ] Kuwait
     - [ ] Egypt
     - [ ] India
     - [ ] Others (specify):
       __________

7. What is the number of years of experience in total following your post-graduate education?
   - [ ] 0-5 years
   - [ ] 5-10 years
   - [ ] 10-20 years
   - [ ] 10-15 years
   - [ ] 15-20 years
   - [ ] >20 years
8. Have you taken any specific course in implantology? Yes  No
   - If yes, how long was the course?
     - 1-3 days  - 1-3 weeks  - 1-4 months  - 6-8 months
     - 1 year  - >1 year

9. What is the nature of the course? (You can choose more than one answer)
   - Covers didactic information
   - Hands on training in the lab/workshop
   - Hands on training on real patients/clinical training

10. Have you taken any specific course in esthetic dentistry? Yes  No
    - If yes, for how long was the course?
      - 1-3 days  - 1-3 weeks  - 1-4 months  - 6-8 months
      - 1 year  - >1 year

11. How often do you encounter a case with esthetic demands?
    - Daily  - 2-3 times a week  - every other week  - 2-4 times a month

12. How often do you provide dental treatment in the esthetic zone?
    - Daily  - 2-3 times a week  - every other week  - 2-4 times a month

13. What type of dental treatment do you provide in the esthetic zone? (You may choose more than one answer)
    - Restorative  - Periodontal surgery  - Implant placement
    - Crown/bridge  - Other (Specify) __________
We will present to you a clinical scenario:

A 25-year-old medically healthy patient presented to your clinic wanting to replace his/her missing upper left central incisor with an implant. Please answer the questions below if you were to provide treatment in the esthetic zone.

1) What should you evaluate during extra-oral examination? (In addition to lymph nodes, muscles of mastication, salivary glands, etc.)
   - __________________________
   - __________________________
   - __________________________
   - __________________________
   - __________________________

2) What are the important features you would consider when examining the lower part of the face?
   - __________________________
   - __________________________
   - __________________________
   - __________________________
   - __________________________
3) During soft tissue assessment in the esthetic zone, what important features do you look for?
   - ___________________________________
   - ___________________________________
   - ___________________________________
   - ___________________________________
   - ___________________________________

4) During assessment of the alveolar ridge in the esthetic zone, what important features do you look for?
   - ___________________________________
   - ___________________________________
   - ___________________________________
   - ___________________________________
   - ___________________________________

5) During assessment of the dentition, what do you look for?
   - ___________________________________
   - ___________________________________
   - ___________________________________
   - ___________________________________
   - ___________________________________

6) What other diagnostic information do you need to collect?
   - ___________________________________
   - ___________________________________
   - ___________________________________

7) Could you please specify the types of radiographs you would take?
   - ___________________________________
   - ___________________________________
   - ___________________________________

Thank you for your time
# Appendix 5

## Key

### 8) What should you evaluate during extra-oral examination? (In addition to lymph nodes, muscles of mastication, salivary glands, etc.)

- Facial symmetry
- Facial profile

### 9) What are the important features you would consider when examining the lower part of the face?

- Smile line
- Incisal show
- Gingival show
- Lip prominence

### 10) During soft tissue assessment in the esthetic zone, what important features do you look for?

- Interdental Papilla
- Gingival Biotype
- Gingival margin
- Periodontal Status
- Amount of Keratinized gingiva

### 11) During assessment of the alveolar ridge in the esthetic zone, what important features do you look for?

- Alveolar ridge dimensions (height and width)
- Alveolar ridge defects
- Bone height of adjacent teeth
- Bone type

### 12) During assessment of the dentition, what do you look for?

- Golden proportion
- Tooth shape, size, shade
- Intereccusal space (occlusal clearance)
- Habits (Bruxism)
- Proximity to anatomical structures
13) What other diagnostic information do you need to collect?
   - Diagnostic wax-up
   - Radiographs
   - Radiographic stent

14) Could you please specify the types of radiographs you would take?
   - OPG
   - PA
   - CBCT

Total 20
# Appendix 6

## Esthetic Evaluation form

<table>
<thead>
<tr>
<th>Patients name :</th>
<th>Patients File number :</th>
<th>Date :</th>
</tr>
</thead>
</table>

### A) Extra-oral examination

1. **Facial Analysis**
   - Facial symmetry:
     - Upper midline
       - coincident
       - non-coincident (shifted): _____ mm
     - Lower midline to upper midline
       - coincident
       - non-coincident (shifted): _____ mm
   - Facial profile:
     - Nasolabial angle
       - < 110°
       - > 110°
     - E plane:
       - normal
       - convex
       - concave
   - Lip prominence
     - normal
     - prominent
     - retruded

2. **Dentofacial Analysis**
   - Smile line
     - consonant
     - Straight
     - Reverse
   - Incisal show at rest
     - Upper: _____ mm
     - Lower: _____ mm
   - Incisal show upon smiling
     - Upper: _____ mm
     - Lower: _____ mm
   - Gingival show
     - At rest: _____ mm
     - upon smiling: _____ mm

### B) Intra-oral examination

1. **Soft tissue analysis**
   - Gingival margin (draw on diagram 1)
   - Keratinized gingiva: _____ mm
   - Dental papilla fill: _____%
   - Bone analysis (if edentulous space)
     - Buccolingual width: _____ mm
     - Mesiodistal width: _____ mm

2. **Dental analysis**
   - Shape
     - Ovoid
     - Square
     - triangular
   - Shade
   - Width to height ratio
     - More than 80%
     - Less than 80%
   - Occlusal clearance (if edentulous)
     - Yes
     - No
   - Bruxism
     - Yes
     - No

### C. Additional investigations

1. **Study models**
   - Yes
   - No
2. **Wax up**
   - Yes
   - No
3. **Radiographic stent**
   - Yes
   - No
4. **Radiographs**
   - OPG
   - Periapical
   - CBCT