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Awareness Regarding Digitalization of Maxillofacial Prosthesis among Dental Students and Dental Practitioners in India–A Survey

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ABSTRACT

Background: Most maxillofacial prostheses are created from impressions taken with dental impression material. It is quite a long and tedious job additionally it requires a lot of technical skills. With the advent of CAD CAM, the fabrication and designing of maxillofacial prosthesis has become quite faster and efficient. The aim of this survey was to evaluate the awareness regarding digitalisation of maxillofacial prosthesis among the dental students and clinicians

Methods: An online questionnaire was prepared and was sent to 200 dental students and 100 practitioners. A total of 171 responses were received. The questionnaire was designed in a way wherein the responses would reflect the amount of awareness the study population would have regarding digitalisation of maxillofacial prosthesis. Chi square test and Pearson correlation analysis were used

Results: It was found that among the 171 dental professionals who participated in the survey 66% were postgraduate including staff while 34% were undergraduate clinicians. Among these participants 28% of the postgraduate population and 14% of undergraduate clinicians were aware of digitised maxillofacial prosthesis with barely 8% practicing it.

Conclusions: There was a general lack of awareness regarding digitalization of maxillofacial prosthesis among all the groups. The undergraduates and postgraduates were comparatively more aware regarding the same. Routine seminars and workshops should be conducted for the students and clinicians wherein they are taught about the newest techniques and various methods to practice digital maxillofacial dentistry.

Key words: Maxillofacial prosthesis, CAD, CAM, Awareness, Digitalization, Survey

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INTRODUCTION

The branch of prosthodontics concerned with the restoration and replacement of both stomatognathic and associated facial structures by artificial substitutes that may or may not be removed is known as maxillofacial prosthetics [1]. It is a branch of prosthodontics that focuses on the rehabilitation of patients who have defects or disabilities that were present at birth (such as cleft palate) or developed because of disease (cancer) or trauma (burns and car accidents) or while serving in the military (wounded war veterans). According to recent studies, the use of digital technologies in maxillofacial prosthetics has increased significantly [2]. With the goal of improving current conventional methods, digital technologies are used as adjuncts, and in some cases, complete replacement steps in the fabrication of facial prostheses. By restoring patients' physical and psychological well - being, these prostheses play a critical role in comprehensive rehabilitation. When maxillofacial defects cannot be corrected surgically, maxillofacial prosthetists and technologists construct maxillofacial prostheses as an alternative treatment [3,4].

The demand for prosthetic rehabilitation of patients with facial defects has increased because of recent advancements in maxillofacial dentistry. Quick, reversible, and medically uncomplicated rehabilitation is a benefit of prosthetics. Furthermore, the restoration can be easily removed to assess the health of the underlying tissue [5]. With the help of an anaplastological team, prosthetic reconstruction of maxillofacial defects has become simple. Rehabilitation of maxillofacial deformities is a difficult task because it necessitates not only a wide range of skills and expertise, but also the collaboration of many disciplines for the best possible outcome. However, a prosthodontist is frequently not a member of the tumor board and is only consulted after surgery, negatively impacting the rehabilitation prognosis [6].

The use of maxillofacial prosthesis to treat severe facial defects necessitates an impression of the entire face, including the decision. This is typically done with dental

impression materials. Interference with regular breathing and distortion of the facial soft tissues are two potential drawbacks of this process. Face morphology measurements can now be obtained using noncontact 3D laser morphological measurement devices [7,8] thanks to recent advancements in computerised three-dimensional data processing. Various facial scanning systems and maxillofacial prosthesis modelling systems are currently being implemented into clinical dentistry recently [9,3]. These systems being quite technique sensitive and expensive they are rarely used. Hence the aim of this survey was to evaluate the awareness among the practitioners and dental students regarding digitalized maxillofacial prosthesis.

METHODS

A cross - sectional prospective epidemiological study was circulated among dental students and practitioners across Tamil Nadu, India and University ethical clearance was obtained prior to the initiation of the study. (IHEC/SCD/PROS-SDC 1803/06).

A questionnaire was created by (HK) and validated by (SM) with 12 questions and was circulated online for ease of accessibility and distribution. The survey was created using Google Forms and distributed via social media to 200 dental students and 100 dental practitioners of various ages. A total of 171 responses were received. Dental students who had begun clinical procedures, practicing dentists, and teaching faculty from various dental colleges were all included in the study. Dental students who had not yet begun clinical procedures were among those who were excluded.

There were 12 multiple - choice questions in the survey. The questionnaire was created in such a way that the responses would reflect the study population's level of understanding of case documentation. The practitioners were not compelled to complete the questionnaire.

The questionnaire was written in English and consisted of questions which had to be answered in yes, no, or maybe and some requiring descriptive answers. All of the collected data was analysed, and visual representations of the extracted data were plotted. Data analysis was carried out using descriptive statistics methods.

All data included in the present study was expressed as whole numbers and percentages as mean and standard deviation cannot be computed in the present study given its epidemiologic nature. SPSS version 23 software was used to carry out the statistical analysis where Chi Square test with a p value less than 0.05 was considered statistically significant.

RESULTS

A total of 171 people took part in the survey. Dental students and practitioners ranging in age from 18 to 60 years responded to the survey. Approximately 36.8 % of the responses were received from post graduate students 12.8 % responders were undergraduate students. 12.3 % responders were dental college staff members, and 28.1 % responders were dental practitioners. Around 15.8 % of the under graduates, 17.8 % of the postgraduates 3.5% of the dental college staff members and 12.3 % of dental clinicians treated maxillofacial cases in their institute and clinics. Around 12.3 % of the under graduates, 21.1 % of the postgraduates 8.8% of the dental college staff members and 10.5 % of dental clinicians were aware of the various materials used to fabricate maxillofacial prosthesis. Close to 30.8 % of the under graduates, 42.9% of the postgraduates 57.9 % of the dental college staff members and 25 % of dental clinicians were aware of the various materials used to fabricate maxillofacial prosthesis. Around 8.8 % of the under graduates, 24.6 % of the postgraduates 1.8 % of the dental college staff members and 17.5% of dental clinicians were not aware of the different craniofacial imaging Softwares. Most known craniofacial imaging software was the 3D slicer software among the survey population. Around 7 % of the under graduates, 17.5 % of the postgraduates 5.3 % of the dental college staff members and 17.5 % of dental clinicians were not aware of the different craniofacial designing softwares. Most known craniofacial designing software was Geomagics studio. Approximately 8.8 % of the under graduates, 15.8 % of the postgraduates 5.3 % of the dental college staff members and 15.8 % of dental clinicians believed that silicone printing could be used to fabricate maxillofacial prosthesis. Out of the total study population 3.5 % of the undergraduates 14 % of the postgraduate and 17.5 % of the staff members believed that silicone was the most used material for the fabricating maxillofacial prosthesis. 15.8 % of the undergraduates 5.8 % of the postgraduates and 5.3 % of the clinicians and 8.8 % of the clinicians believed that PMMA was the most used material for the fabricating maxillofacial prosthesis. Approximately 3.5 % of the college staff members and 108 % of the clinicians believed that latex was the most used material for the fabricating maxillofacial prosthesis. Finally, 3.5 % of the undergraduates 7 % of the postgraduate and 3.5 % of the college staff members believed that polyurethane was the most commonly used material for the fabricating maxillofacial prosthesis. 5.3 % of undergraduate, 10.5 % of postgraduates and 3.5 % of the clinicians out of the entire population chose digitalized workflow for maxillofacial prosthesis over the conventional one. 8.8 % of undergrates,19.3 % of the postgraduates, 5.3 % of the dental college staff members and 17.5 % of the dental clinicians believed that they would try to treat maxillofacial prosthesis cases by themselves whereas the rest believed that they would consult a specialist or rather not treat them at all. Most of the postgraduates 28 % of the total population were keen to learn and practice digitalized maxillofacial dentistry in the future.

The Chi square association test was used to examine the relationship between qualifications of the dentist with the awareness among the dentists regarding various craniofacial digital imaging Softwares a statistically significant difference was found (P value 0.0). Based on the relationship between qualifications of the dentist with the awareness among the dentists regarding various craniofacial digital designing Softwares again a

statistically significant difference was found (P value 0.0) (Table 1 and Figures 1 to 2).

Table 1: Table showing the association between questions of relevance and qualification of thequalification of the participants using Chi square statistical test in SPSS version 23.

Feature	Value	Statistical significance
Age	Chi Square found no statistical significance	P>0.05
gender		
Association between qualification and (Q1) What would you do if you get a maxillofacial defect case in your institution ?	66.296	P<0.05
Association between qualification (Q2) Which of the following craniofacial designing software's are you aware of?	83.769	P<0.05
Association between qualification (Q3) Which technique do you feel would provide a more accurate impression?	24.872	P<0.05
Association between qualification (Q4) Can silicone printing be applied in case of maxillofacial prosthesis fabrication?	18.903	P<0.05
Association between qualification (Q5) Which of the following digital craniofacial imaging software is you aware of?	104.662	P<0.05
Association between qualification (Q6) Are you aware of the various materials used for fabricating maxillofacial prosthesis?	19.41	P<0.05

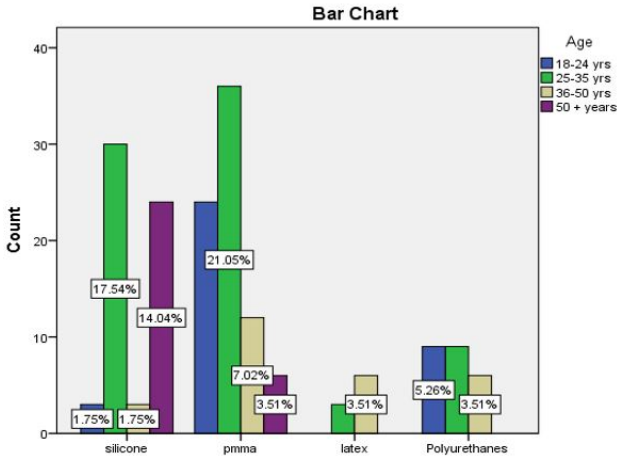

Figure 1: Figure depicting the awareness of the dental practitioners and clinicians regarding the various maxillofacial prosthesis fabricating materials. The post graduate students showed the maximum awareness among the study population.

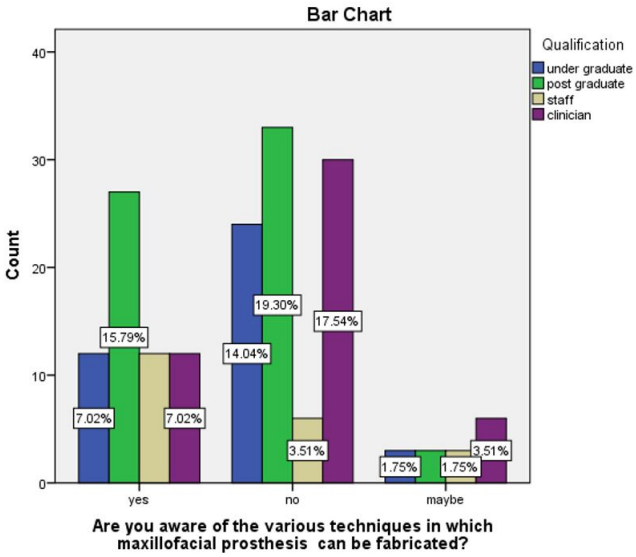

Figure 2: Figure depicting the awareness of the dental students and practitioners regarding the various techniques in which maxillofacial prosthesis can be fabricated. The post graduate students showed the maximum awareness among the study population.

DISCUSSION

Digital maxillofacial prosthesis is a comparatively novel technique and is still undergoing various developments [4]. Only 15.8 % of the under graduates, 17.8 % of the postgraduates 3.5 % of the dental college staff members and 12.3 % of dental clinicians treated maxillofacial cases in their institute and clinics. This suggests that the maxillofacial prosthesis are quite infrequently and rarely

treated by the dental practitioners and students among the study population. Similar results were obtained in previously done studies wherein the study population did not treat a lot of maxillofacial prosthesis cases on an average per year [10]. This suggests that there is a general lag in awareness as well as confidence among the dental practitioners and students in treating maxillofacial prosthesis cases. Based on the type of material used for fabricating maxillofacial prosthesis most of the population preferred silicone and pmma to be the most used material. There was again a general lack of knowledge regarding the same among the study population.

There have been various materials that can be used to fabricate maxillofacial prosthesis that consist of PEEK, silicone, latex, PMMA etc. [11,12]. The results obtained in this study were in line with previously done studies wherein the study population was not aware regarding the different maxillofacial prosthesis and the materials used to fabricate them [1,13].

To the authors knowledge there haven't been a lot of studies wherein the awareness regarding digital maxillofacial prosthesis designing and scanning have been carried out. Most of the studies done are review articles [9,14] and case reposts [3,4] as it is comparatively a new method of fabricating facial prosthesis and not that commonly practiced. When the population was asked weather

When the population was asked if they would like to learn and practice digital maxillofacial prosthesis in the future, most of the undergraduates and postgraduates agreed to the fact. This displayed the willingness of the newer population to practice digital dentistry. Based on the chi - square test analysis there was a statistically significant difference in the awareness levels regarding digitalization of maxillofacial prosthesis among all the qualification and age groups. The undergraduates and postgraduates being the most aware based on statistical analysis. This suggests that the younger age group especially the ones who are in their educational period are inclined towards the new and improved digital protocol to fabricate dental prosthesis.

With the whole dental world currently turning towards digital dentistry it is mandatory for the maxillofacial prosthetic specialist two also adopt the digital workflow [9]. Most of the studies done on digital maxillofacial prosthesis are case reports [15,16]. It is necessary to carry out more clinical trials and long-term follow-up of the same.

With the current advancements in digital maxillofacial prosthesis, the use of CAD CAM is soon going to be the basic protocol for any kind of facial prosthesis.

CONCLUSION

There was a general lack of awareness regarding digitalization of maxillofacial prosthesis among all the groups. The undergraduates and postgraduates were comparatively more aware regarding the same.

Based on the responses acquired and the evidence available on awareness regarding digitalization of maxillofacial prosthesis among dental students and practitioners, it can be concluded that the awareness among the dental students is on a rise but is not very religiously followed. There is a serious need to carry out more studies and clinical trials in terms of digital maxillofacial prosthesis. Routine seminars and workshops should be conducted for the students and clinicians wherein they are taught about the newest techniques and various methods to practice digital maxillofacial dentistry.

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