

Awareness on resonance frequency analysis in dental implantology among dental practitioners and dental students

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ABSTRACT

In a partial or entirely independent jaw, oral implantology is a technique in dentistry used to enhance the function of mastication, esthetics, and phonation. An important diagnostic aspect for the effectiveness of implant therapy is the stability of the implants. This study aims to measure dental professionals' and dental students' knowledge of resonance frequency analysis (RFA) in dental implantology. This study aims to measure dental professionals' and dental students' knowledge of RFA in dental implantology. One hundred ninety-nine dentists and dental students participated in an online survey study that was delivered through Google Forms. For statistical analysis, tabulated data from the Excel sheets were transferred into the SPSS program. The Chi-square test is also used to examine clinical relevance. According to the study's findings, 60% of the respondents were male and 46% of those who responded were dental professionals. The respondents were primarily between the ages of 18 and 22 (36%). The majority of dental undergraduates and graduates were found to be knowledgeable about the various techniques used to gauge implant stability ($P = 0.04 < 0.05$). Within the limitations of this study, it was found that most of the dental students and dental practitioners participating in this study were aware of implant stability. The majority of the respondents were aware that RFA was used to measure primary and secondary stability and osseointegration.

Key words: Implant, innovative, osseointegration, primary stability, resonance frequency analysis

INTRODUCTION

Oral implantology is a branch of dentistry that focuses on improving chewing performance, esthetics, and phonation

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in patients with a partial or totally missing jaw.^[1-4] The success of osseointegration is thought to be influenced by implant stability.^[5,6] Because undermining interfacial changes may be slow and not visible at the radiographic resolution level, at least in the short term, an implant may only be evaluated osseointegrated in the context of continuous surveillance.^[7] Primary implant placement stability is a mechanical phenomenon influenced by local bone quality and quantity, implant type, and placement technique.^[8,9]

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Tapered implant root forms frequently have a geometry that provides a strong stop and sometimes a misleading sense of great stability.^[10] When torque is applied, implants that rotate are declared ineffective and are removed.^[11] For this, a variety of diagnostic procedures, both invasive and noninvasive, have been used. In the clinical scenario, noninvasive tests such as percussion testing and resonance frequency analysis (RFA) are used.^[3,12]

RFA is based on the idea of a vibrating fork, which claims that when an implant repeatedly vibrates at a frequency in the audible range, resonance may develop depending on the bone-implant interface.^[13,14]

Our staff has a wealth of knowledge and research experience, which has resulted in publications of the highest caliber.^[15-38] The purpose of this study is to evaluate dental professionals' and dental students' knowledge of RFA in dental implantology.

MATERIALS AND METHODS

The participants in this study were dental students and practitioners. The institutional ethical committee gave its approval to this investigation (IHEC/SDC/PROSTHO/21/117). The inclusion criteria for the study were all students studying BDS and working as a dentist. The

study only included participants who gave their consent to participate in it. Students who declined to take part in the study met the requirements for exclusion. An online questionnaire containing 14 questions which included the students' proforma and questions regarding awareness on implant stability and RFA. The validity of the questionnaire was purely based on logical reasoning. The responses were collected during 1-week period, and the data were tabulated.

Oral consent from the participants had been obtained after explaining the need for the study. The pros of the study are that it was done through online Google Forms and it was less time-consuming than offline surveys. The cons of the survey are that it took place in only one geographical area (Chennai city). The software SPSS v23.0 (IBM Corp. Released 2015. IBM SPSS Statistics for Windows, Version 23.0. Armonk, NY: IBM Corp) was used to collect and analyze data. The responses of the students and practitioners were reported using descriptive and inferential statistics.

RESULTS

In this present study, out of the total 199 subjects, 60% of them were males and 40% of them were females. Forty-six percentage of them were between the ages of 18 and 22, 44% were between the ages of 23 and 35, and 10% were over the age of 45. Thirty-one percentage were dental students, 33%

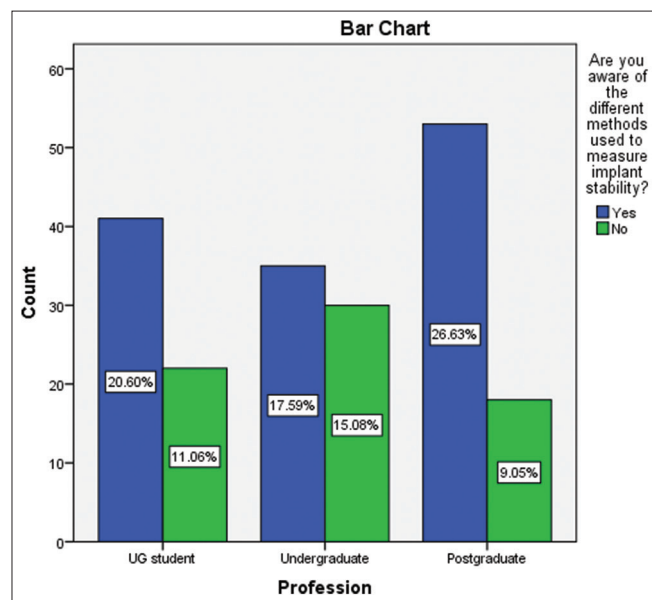


Figure 1: Bar graph representing the comparison of profession of the participants and the response for the question “Are you aware of the different methods used to measure implant stability?” where the colors blue and green indicate a yes or no response, respectively. A profession is indicated on the X-axis, while responses to the question are indicated on the Y-axis. As a result, postgraduate participants were most knowledgeable about the various techniques used to gauge implant stability. (Pearson’s Chi-square test, statistically significant $P = 0.040 > 0.05$)

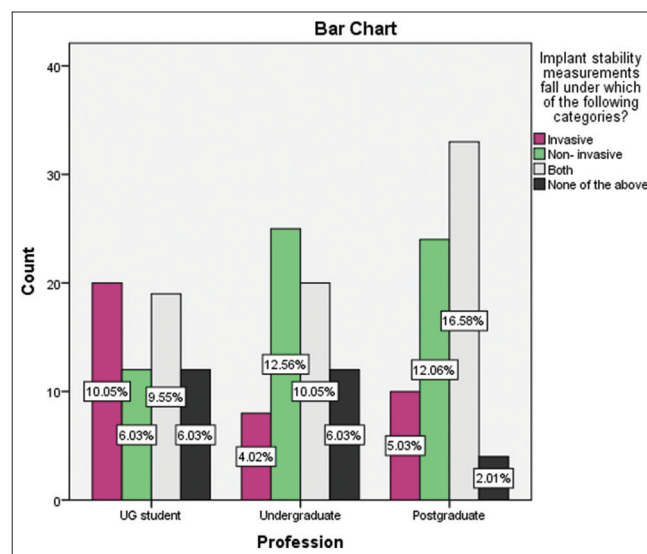


Figure 2: A bar graph comparing the participants' professions with their answers to the question “Implant stability measurements fall under which of the following categories?” where pink color denotes invasive, green color denotes noninvasive, white color denotes both invasive and noninvasive, and black denotes none of the options. The profession is indicated on the X-axis, while responses to the question are indicated on the Y-axis. Hence, postgraduate participants were the best knowledgeable on how to determine implant stability using invasive and non-invasive techniques. (Pearson’s Chi-square test, statistically significant $P = 0.002 > 0.05$)

were undergraduates, and 36% were practicing dentists out of the total sample size. About 70% of the total participants were aware of the term “implant stability,” whereas 30% of them were not aware. According to the findings, 65% of all participants were aware of the various techniques used to gauge implant stability, whereas 35% were not.

Most participants across all occupations were familiar with the various techniques used to assess implant stability, according to Chi-square correlation. This relationship was discovered to be statistically significant ($P = 0.040 < 0.05$) [Figure 1]. On doing the Chi-square test, it was also found that the majority of the undergraduate students thought that implant stability measurements fall under invasive methods, and the majority of the undergraduates agreed that it was only a noninvasive method, whereas postgraduates thought that it was both invasive and noninvasive methods. A statistically significant association was discovered ($P = 0.002 < 0.05$) [Figure 2].

A Chi-square test revealed that the majority of undergraduate students believed that RFA is only used to determine primary stability, and the majority of the undergraduates agreed that it was used to measure osseointegration of the implant, whereas postgraduates thought that it was used to measure both stability and osseointegration. The statistical significance of this link was determined to be insignificant ($P = 0.068 < 0.05$) [Figure 3]. It was also noted

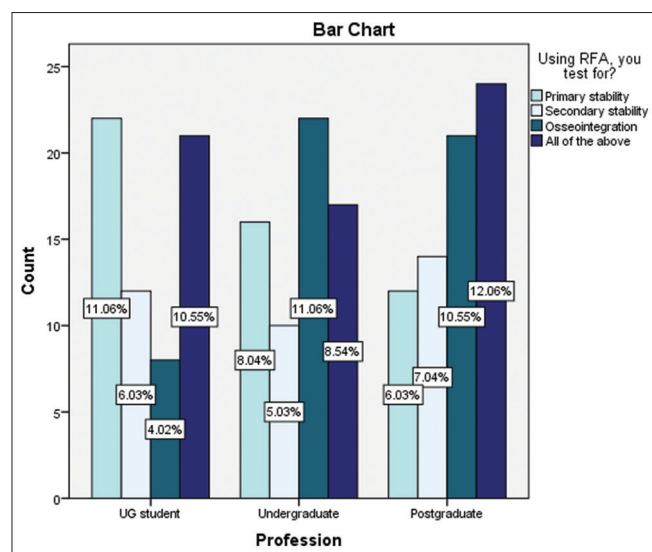


Figure 3: Bar graph representing the comparison of profession of the participants and the response for the question “Using RFA you test for?” where light blue denotes primary stability, white denotes secondary stability, blue color denotes osseointegration and dark blue denotes all of the above. The profession is indicated on the X-axis, while responses to the question are indicated on the Y-axis. Therefore, postgraduate participants were best knowledgeable on how to assess for osseointegration and primary and secondary stability using implant stability. (Pearson’s Chi-square test, $P = 0.068 > 0.05$, not statistically significant)

that the majority of the individuals in all age groups were aware of the various approaches utilized to assess implant stability, and this link was shown to be statistically significant ($P = 0.045 < 0.05$) [Figure 4].

DISCUSSION

In this present study, among 199 dental students and practitioners, 60% of them were males and 40% of them were females. About 36% of them were postgraduate practitioners, 32% of them were undergraduate practitioners, and 31% of them were undergraduate students. A comparable study on dental implant awareness and knowledge in Riyadh found that a sample of dental patients in Riyadh had an appropriate degree of implant awareness.^[39]

RFA has also shown to be sensitive enough to detect variations in implant stability based on bone density at the implant recipient site and dependable for detecting changes in implant stability during early healing.^[40] When it comes to implant treatment, implant stability is a critical clinical element to consider.^[41] A stable mechanical link between dental implants and bone is required for early and/or immediate loading regimens.^[42]

Although there are several approaches to test implant stability, for the past 20 years, the RFA technique has been frequently used in clinical trials.^[43] Nonetheless,

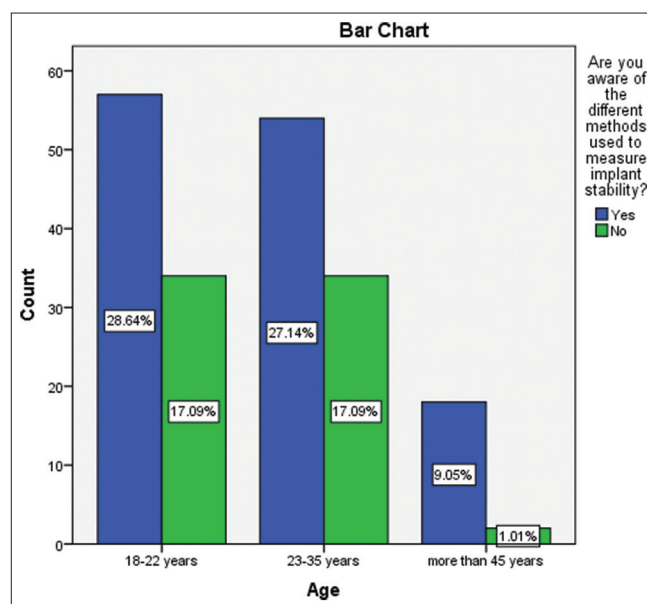


Figure 4: A bar graph comparing the participants’ ages and their answers to the question “Are you aware of the different methods used to measure implant stability?” where “yes” is represented by the color blue and “no” by the color green. Age groups are indicated on the X axis, and replies to the question are indicated on the Y axis. As a result, participants from all age groups were aware of the various techniques for determining implant stability. (Pearson’s Chi-square test, $P = 0.045 > 0.05$, not statistically significant)

based on the current literature, there is still a dearth of knowledge on implant stability measurement and its many methodologies.

CONCLUSION

According to the findings of this investigation, the majority of dental students and dental professionals participating in this study were aware of implant stability. The majority of the respondents were aware that RFA was utilized to gauge osseointegration and primary and secondary stability.

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Conflicts of interest

There are no conflicts of interest.

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