

AWARENESS OF ABRASIVE RESISTANCE AMONG DIFFERENT COMPOSITE MATERIALS USED FOR PROVISIONAL CROWNS AMONG DENTAL PRACTITIONERS.

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Abstract

Introduction: Provisional restorations play a prominent role in prosthetic therapy procedures with fixed prostheses which includes crowns and bridges. Provisional restorations serve an important role in fixed restoration from tooth preparation and until fitting, luting the final fixed restoration.

Aim; The aim of the study is to evaluate the knowledge and awareness of abrasive resistance of different composite materials used for provisional crowns among dental practitioners.

Materials And Method: The present study was carried out as a survey among dental practitioners in a university setting (Saveetha dental college and hospitals, Chennai, India). Participants who attended the survey belonged to the same geographic location and had similar ethnicity. The retrospective study was achieved with the help of google forms. A total of 100 dental practitioners in the hospital were included.

Results: 57% of dental practitioners belonged to the age group of 21-30 years, 43% dental practitioners belonged to the age group of 31-40 years. 51 dental practitioners preferred abrasive resistance, 31 dental practitioners felt that composite material appeared to be more aesthetic compared to that of other materials, 18 dental practitioners felt that hardness was better in composite materials.

Conclusion: From the data obtained, the degree of awareness among dental practitioners on abrasive resistance among different composite materials has been significantly raised compared to the reference studies done in previous years.

Keywords: Awareness, abrasives, composites, dental, innovation

INTRODUCTION:

Provisional restorations play a prominent role in prosthetic therapy procedures with fixed prostheses which includes crowns and bridges. Provisional restorations serve an important role in fixed restoration from tooth preparation and until fitting, luting the final fixed restoration. (1) These also include protection of pulpal tissue from physical, chemical and thermal injuries, maintaining the positional stability and occlusal function; and providing the prepared teeth with strength, retention, and aesthetics. These are the factors that contribute to clinical success of provisional restoration. (2)

Therefore these restorations were required to function for a long time in the oral cavity due to orthodontic or endodontic therapies, temporomandibular joint disorders and during the osseointegration periods of implants. (3) Provisional restoration has certain mechanical properties such as flexural strength, hardness and wear resistance to withstand the complex environment of oral cavity. (4) There are several types of interim materials for fixed prostheses. They are classified as methyl methacrylates, ethyl methacrylates, bis-acryl resin composites, and light-cured composites. (5–7)

Abrasive resistance of the interim restorations, during an extended period, provides some problems for clinicians. Over eruption of antagonist teeth occurs, in the absence of occlusal contacts due to abrasiveness. Therefore the definitive restoration interferes with the vertical dimension of occlusion. (8)

In these circumstances either the preparation has to be corrected or a new restoration has to be constructed which is time-consuming for both patient and clinicians. Abrasive resistance can be predicted by hardness which is one of the mechanical characteristics. There are studies with controversy about the association between the hardness of a material and its abrasive resistance. In some instances hardness of the composite material was influenced by food simulating liquids. (9)

Resin material properties depend mostly on the degree of polymerization and concentration of cross-linking agents. The type of resin matrix, an increase in degree of conversion, a high concentration of cross-linking agents influence the resin material properties especially in the oral environment. Our team has extensive knowledge and research experience that has translate into high quality publications. (10–19), (20–34). The aim of the study is to evaluate the knowledge and awareness of abrasive resistance of different composite materials used for provisional crowns among dental practitioners.

MATERIALS AND METHOD:

Study designs and Study setting

The present study was carried out as a survey among dental practitioners in a university setting (Saveetha dental college and hospitals, Chennai, India). Participants who attended the survey belonged to the same geographic location and had similar ethnicity. The retrospective study was achieved with the help of google forms. A total of 100 dental practitioners in the hospital were included.

Sampling

A total of 100 participants (49 males and 51 females) participated in the survey. To reduce sampling bias only relevant data was included in the study. Evaluation on awareness of abrasive resistance on different

composite materials among dental practitioners was done. Simple random sampling method was carried out. Data was cross verified by an additional reviewer. Incomplete data collection was excluded from the study.

Data Collection

A single calibrated examiner evaluated the dental practitioners who attended the survey. The survey mainly focused on knowledge, awareness, properties of abrasive resistance among different composite materials was included. The questionnaire consisted of 10 basic questions. The responses were therefore estimated by collecting the completely filled questionnaire from the 100 dental practitioners.

Statistical analysis

The collected data was tabulated in Microsoft excel. Data analysis was done with Statistical Package for Social Sciences for Windows, version 20.0 (SPSS Inc., Vancouver style) and results were obtained. Categorical variables were expressed in frequency and percentage. Chi-square test was used to associate the categorical variables. Chi square tests were carried out using age, gender as independent variables and dependent variables. Pearson chi square test was used for statistical analysis. P value < 0.05 was considered statistically significant.

RESULTS:

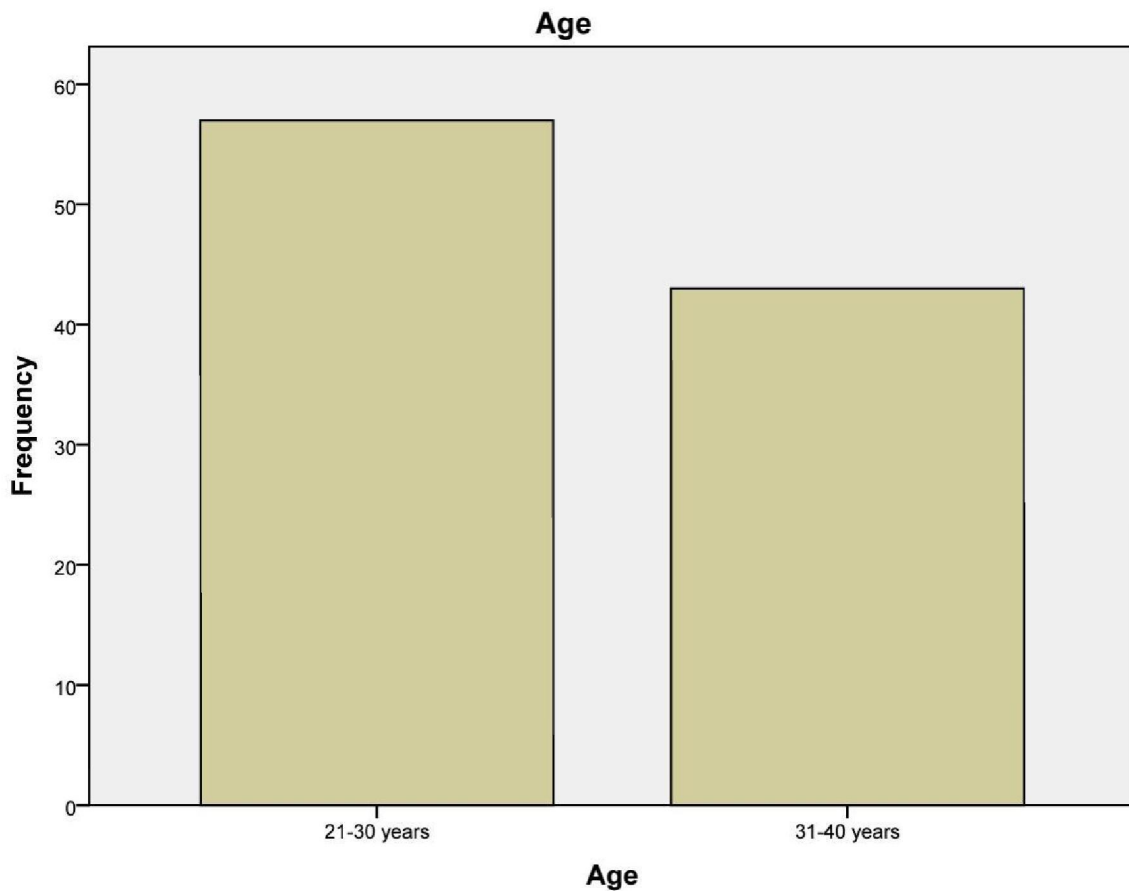


Figure 1 : Among 100 participants, 57% of dental practitioners belonged to the age group of 21-30 years, 43% dental practitioners belonged to the age group of 31-40 years.

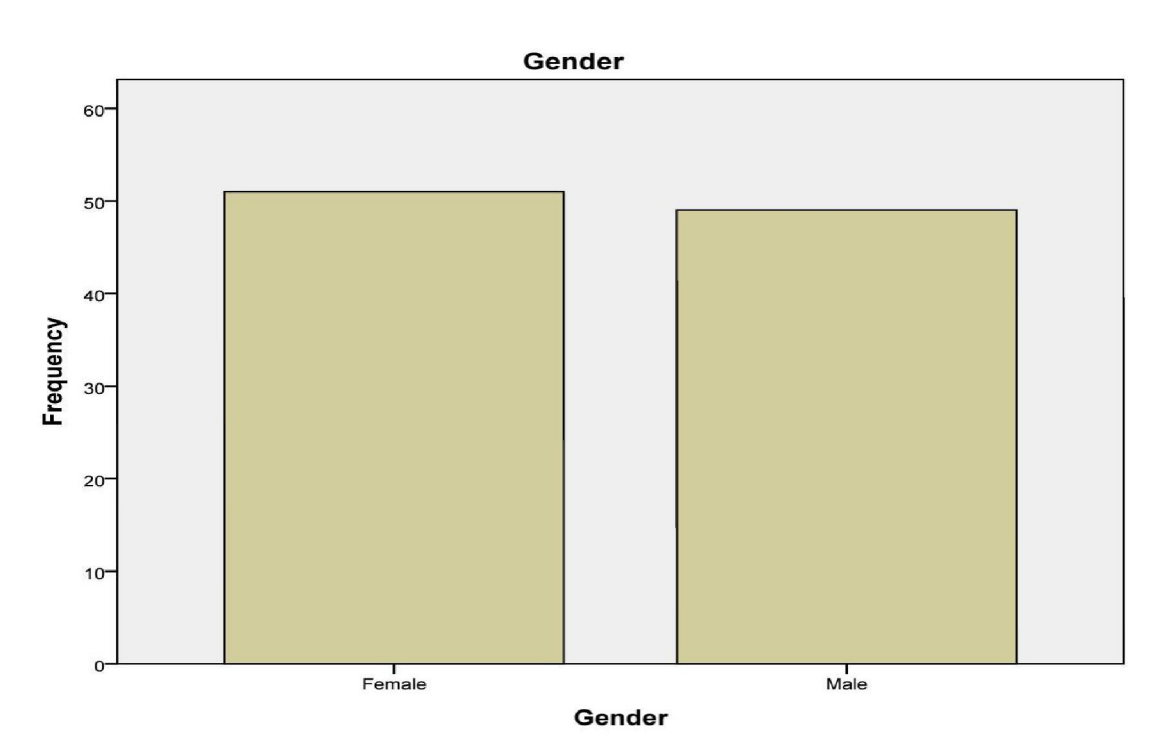


Figure 2: Among 100 participants, 51% dental practitioners were females and 49% dental practitioners were males.

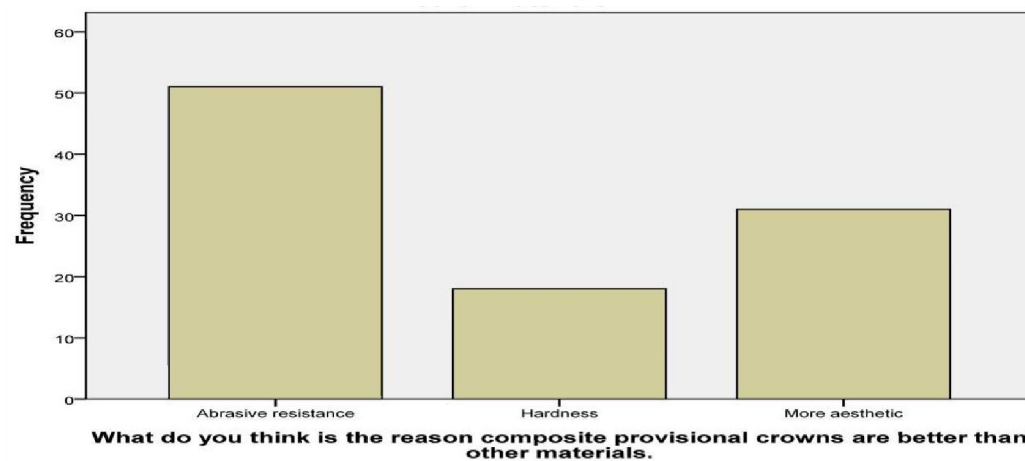


Figure 3: Bar graph shows the responses of the question “What do you think is the reason composite provisional crowns are better than other materials” denotes that 51 dental practitioners preferred abrasive resistance, 31 dental practitioners felt that composite material appeared to be more aesthetic compared to that of other materials, 18 dental practitioners felt that hardness was better in composite materials.

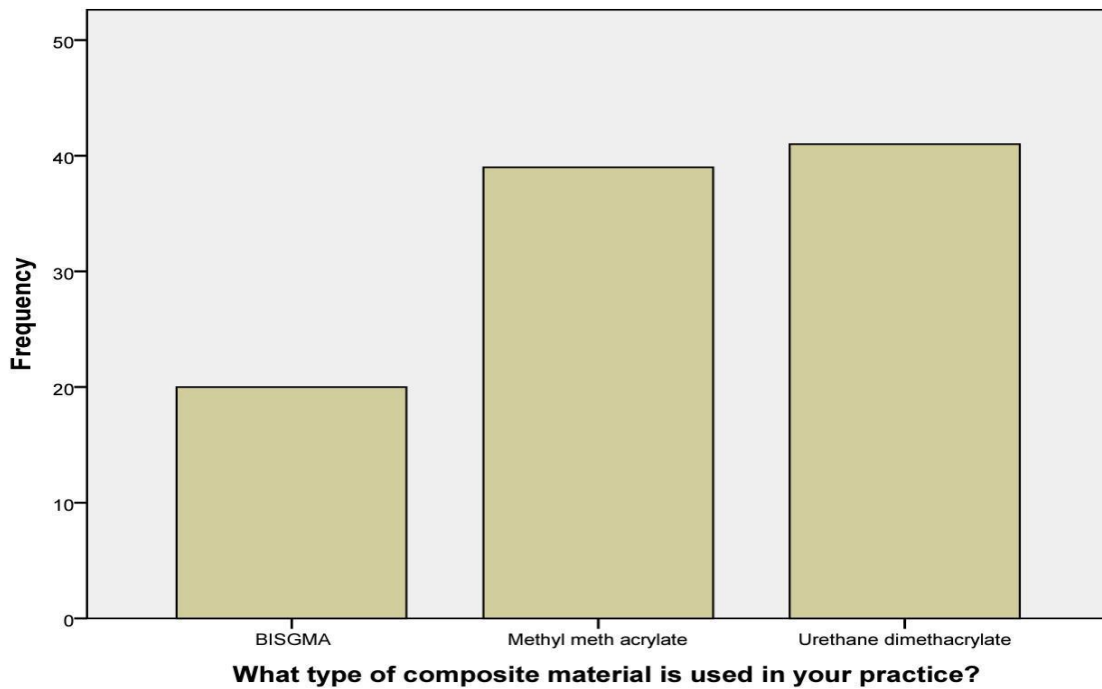


Figure 4: Bar graph shows the responses of the question “ What type of composite material used in their practice?” 41 dental practitioners preferred to use Urethane dimethacrylate followed by 39 dental practitioners who favoured the use of Methyl methacrylate whereas 20 dental practitioners preferred the use of BISGMA.

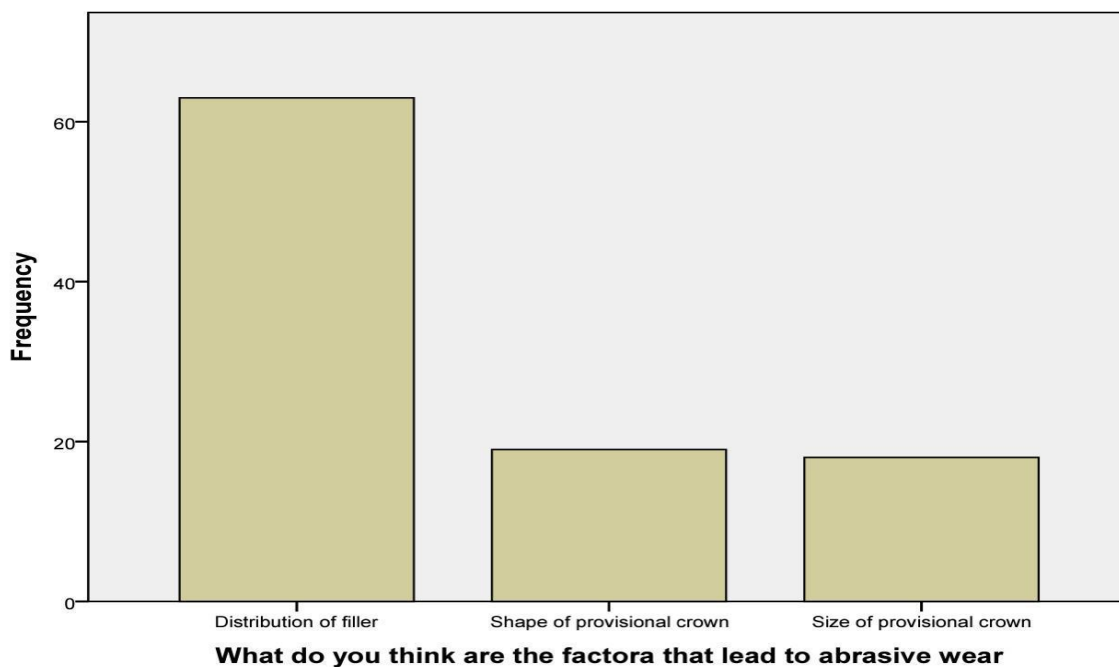


Figure 5: Bar graph shows the responses of the question “ What do you think are the factors that lead to abrasive wear?” 63 dental practitioners felt that distribution of filler in the composite material had a prominent role in abrasive wear of the material. Whereas 19 dental practitioners felt that the shape of the

provisional crown and 18 dental practitioners felt that size of the provisional crown contributed to the abrasive wear of the composite material.

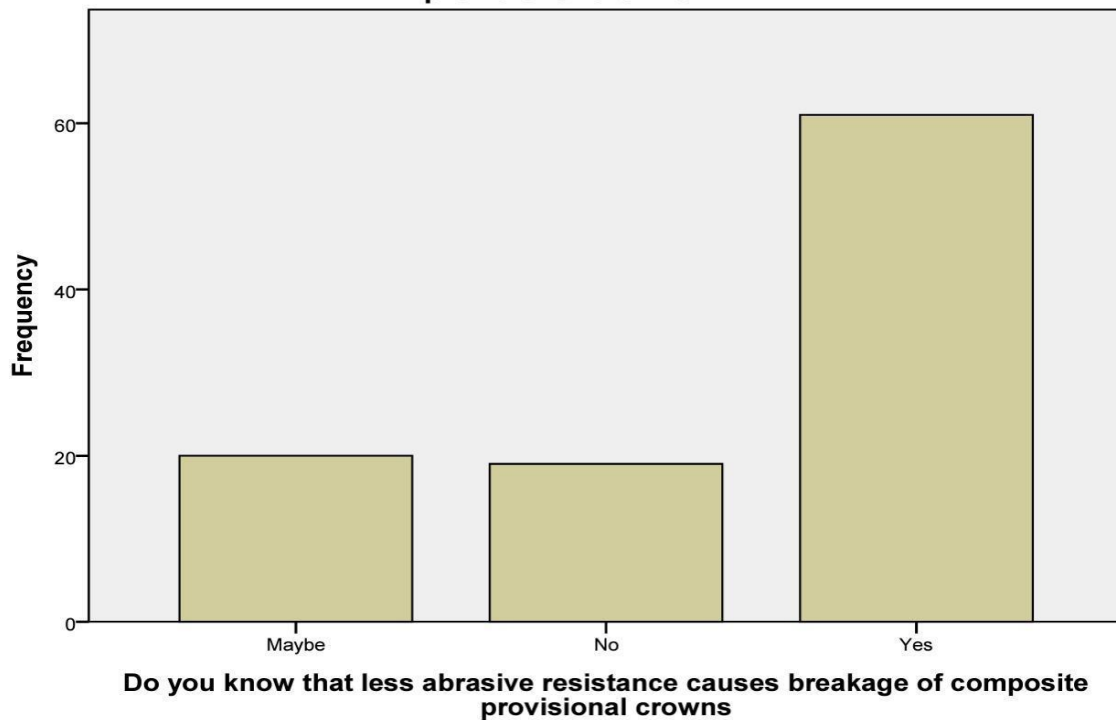


Figure 6 : Bar graph shows the responses of the question “ Do you think that less abrasive resistance causes breakage of composite provisional crowns?” 61 practitioners agreed that less abrasive resistance leads to composite crown breakage whereas 19 practitioners contradicted the fact. 20 practitioners were not sure.

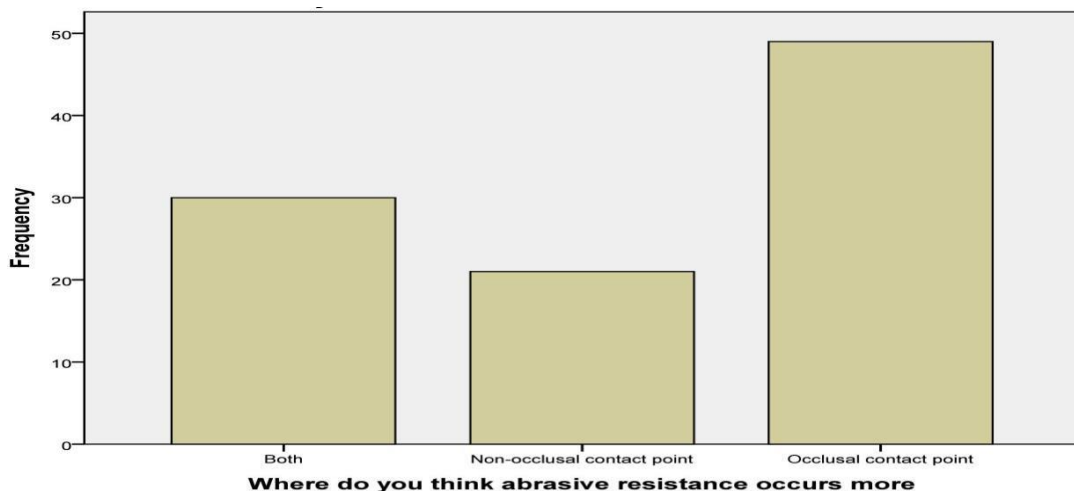


Figure 7: Bar graph shows the responses of the question “ Where do you think abrasive resistance occurs more?” 49 practitioners felt that occlusal point of contact was common. Whereas 21 practitioners felt that abrasiveness occurs at more non-occlusal points and 30 practitioners felt that abrasiveness occurs in both occlusal and non occlusal point of contact.

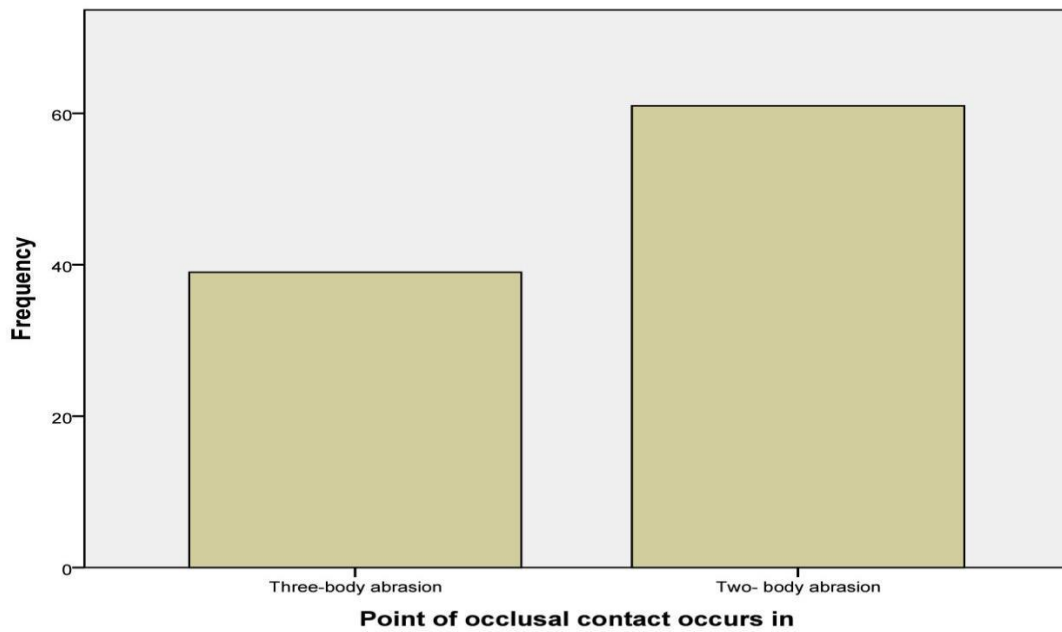


Figure 8: Bar graph shows the responses of the question “ Point of occlusal contact occurs in?” 61 practitioners felt that it was two body abrasions whereas 39 practitioners felt that it was three body abrasion.

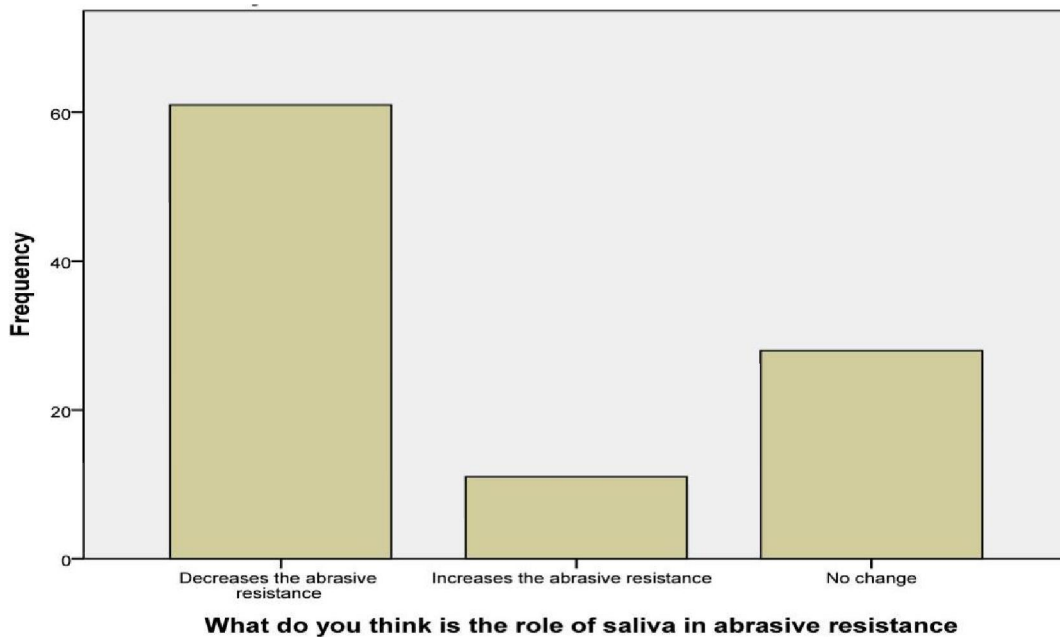


Figure 9: Bar graph shows the responses of the question “ Whatdo you think is the role of saliva in abrasive resistance?” 61 practitioners felt that saliva decreases the abrasive resistance whereas 11 practitioners felt that increased the abrasive resistance. 28 practitioners felt that saliva had no role in abrasive resistance.

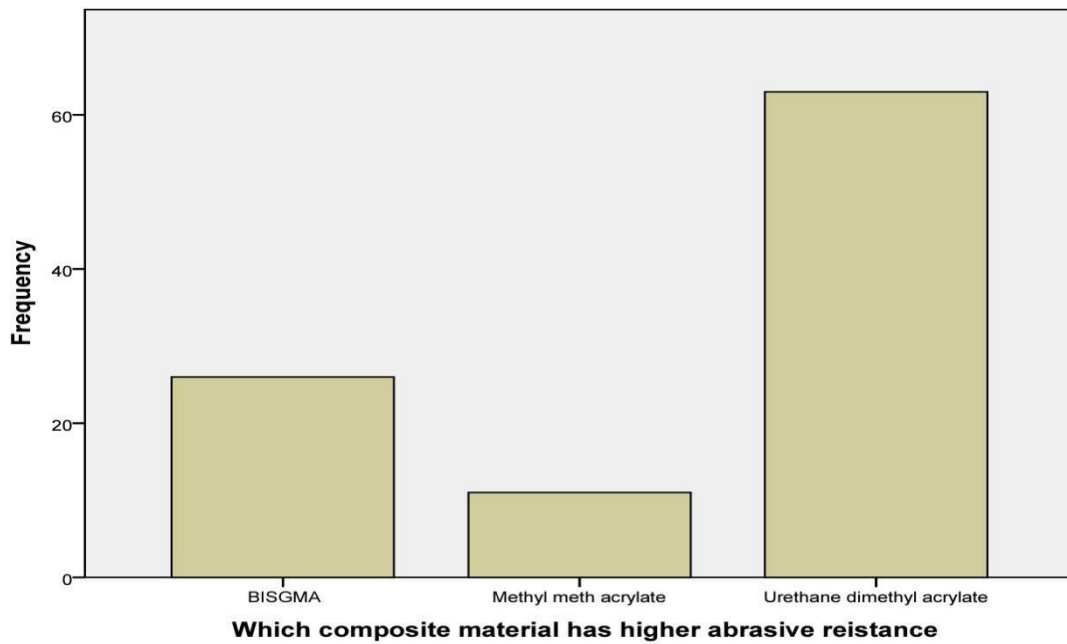


Figure 10: Bar graph shows the responses of the question “Which composite material has higher abrasive resistance?” 63 practitioners voted for Urethane dimethyl acrylate followed by 26 practitioners who voted for BISGMA and 11 practitioners felt that methyl methacrylate.

DISCUSSION:

In response to the question, of what property makes composite materials better compared to that of other materials 51 dental practitioners preferred abrasive resistance, 31 dental practitioners felt that composite material appeared to be more aesthetic compared to that of other materials, 18 dental practitioners felt that hardness was better in composite materials.

When questioned about the composite material they use in their practice, 41 dental practitioners preferred to use Urethane dimethacrylate followed by 39 dental practitioners who favored the use of Methyl methacrylate whereas 20 dental practitioners preferred the use of BISGMA.

In response to the question about the factors that are responsible for abrasive wear, 63 dental practitioners felt that distribution of filler in the composite material had a prominent role in abrasive wear of the material. Whereas 19 dental practitioners felt that the shape of the provisional crown and 18 dental practitioners felt that size of the provisional crown contributed to the abrasive wear of the composite material. When questioned whether they were aware that less abrasive resistance leads to breakage of composite provisional crowns, 61 practitioners agreed that less abrasive resistance leads to composite crown breakage whereas 19 practitioners contradicted the fact. 20 practitioners were not sure. When questioned about where the abrasiveness occurs more, 49 practitioners felt that occlusal point of contact was common. Whereas 21 practitioners felt that abrasiveness occurs at more non-occlusal points and 30 practitioners felt that abrasiveness occurs in both occlusal and non occlusal point of contact. In response to the question about point of occlusal contact, 61 practitioners felt that it was two body abrasion whereas 39 practitioners felt that it was three body abrasion. In response to the question about the role of saliva in abrasive resistance, 61 practitioners felt that saliva decreases the abrasive resistance whereas 11 practitioners felt that increased the abrasive resistance. 28 practitioners felt that saliva had no role in

abrasive resistance. When questioned about the material which had highest abrasive resistance, 63 practitioners voted for Urethane dimethyl acrylate followed by 26 practitioners who voted for BISGMA and 11 practitioners felt that methyl methacrylate.

In this study it is seen that provisional restorations are preferred for the high abrasive resistance. This is in contrast to the study by (35) which states that provisional restorations have become a crucial tool for aesthetic and functional diagnostics in dentistry due to the high desire for good cosmetic results. In this study it is seen that, the majority of the dental practitioners preferred the use of urethane dimethacrylate (UDMA). This correlates with the study by (36) which states that dimethacrylate-based materials have better mechanical responses than monomethacrylate-based materials in terms of flexural strength and hardness. According to their chemical composition, provisional restoration materials can be divided into two groups: those based on monomethacrylates or acrylic resins, such as polymethylmethacrylate (PMMA) and polyethyl/butyl methacrylate (PEMA); and those based on dimethacrylates or bis-acryl/composite resins, such as bisphenol A-glycidyl dimethacrylate (Bis-GMA) and urethane dimethacrylate (UDMA). (1)

In this study it is seen that, many dental practitioners agreed that saliva reduces the abrasiveness in composite materials. This correlates with the study by (37)(38) which states that salivary films affect the friction coefficient and the wear rates due to its lubricating effect. Lubricating role of saliva is attributed to salivary glycoproteins, proline-rich glycoproteins. In this study it is seen that the occlusal point occurs mostly as two body abrasions. This correlates with the study by (39) which states that point of occlusal contact experiences mostly two-body abrasion. Material is scraped off a surface by harsh protuberances on the other surface is referred to as two-body abrasion whereas material scraped off by hard particles at the contact is referred to as three-body abrasion. Occlusal contact areas experience more abrasion than non-contact areas due to their angle contact. In this study it is seen that abrasive resistance depends on the distribution of filler. This correlates with the study by (40) which states that distribution of filler is an important factor in abrasive resistance along with shape, size and orientation of the filler. In this study it is seen that, many practitioners preferred urethane dimethyl acrylate for its higher abrasive resistance. This correlates with the study by (41) which states that urethane dimethyl acrylate has more abrasive resistance compared to that of BISGMA. This is in contrast with the study by (3) which states that BIS GMA had more favorable mechanical properties compared with that of conventional methacrylate resins. As BISGMA contains multi-functional monomers which have the capacity to cross-link with other monomers which increases the strength. Whereas conventional methacrylate resins consist of monofunctional monomers with low molecular weight, linear molecules which decrease strength and rigidity.(42)

CONCLUSION:

This study was carried out to analyze the knowledge and awareness of abrasive resistance among different composite materials used for provisional crown among dental practitioners. From the data obtained, the degree of awareness among dental practitioners on abrasive resistance among different composite materials has been significantly raised compared to the reference studies done in previous years.

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