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KNOWLEDGE, AWARENESS AND PRACTICE ABOUT THE BONDING AGENTS USED DURING ORTHODONTIC BONDING AMONG UNDERGRADUATE STUDENTS

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ABSTRACT
Introduction: *Primers are used to increase the surface energy of dentine and enhance the wettability of the adhesive.The aim of the survey was to evaluate the knowledge of undergraduate students on primers used for orthodontic bonding.*
Materials and Methods:*A questionnaire was distributed through an online Google form link to about 100 dental students.The questionnaire consisted of questions related to recent findings or update to facts on primers used for orthodontic bonding agents.*
Results:*The results were evaluated.75% of respondents are aware about the use of various primers and 56%are clear on its functions.Most respondents have a clear knowledge on primers and its use in orthodontic bonding.*
Conclusion:*Majority of the 1st year and 2nd year students had a clear knowledge on primers and their uses in orthodontic bonding when compared to 3rd years and interns.*
Keywords: awareness; knowledge; orthodontic bonding; Primers; innovative survey

INTRODUCTION

Buonocore in his landmark paper published in 1955 revolutionised dentistry by introducing the concept of acid etching, this coupled with the introduction of Bis-GMA resin by Bowen in 1960 led to paradigm shift in the practice of dentistry. Working independently on the opposite sides of the globe, orthodontist Newman and Miura pioneered the bonding of orthodontic brackets to enamel.A primer is hydrophobic adhesive resin monomer that bonds to the substrate and helps in increasing dentine surface energy and to carry the resin monomer into dentin(1). Based on the mechanism of adhesion and smear layer management the primers are classified into three groups , firstly the total etch and rinse adhesives and secondly self etching primers, and glass ionomer based adhesives.(2)Self-etching primers are increasing in places of phosphoric acid etching for composite resin restorations, and with respect to adhesion to dentin and enamel has been reported.(3) Self-etching primers function both functions as an etching agent and a primer. Rinsing of enamel is not required after application of the self-etching primer.(4) Thus the use of a self-etching primer decreases the clinical steps and saves clinical operation time because the separate acid-etching and water-rinsing steps are eliminated and the application requires simply drying with air.(5)Nano-bonding agents are solutions of nano-fillers, which produce better enamel and dentin bond strength, stress absorption, and longer shelf life . It has been observed that filled bonding agents produced higher in vitro bond strength(6).
Sixth generation has less shear bond strength as compared to 5th generation but has clinically acceptable shear bond strength and it was found that it is of interest to note that there was a tendency to have less residual adhesive remaining on the tooth.(7).There is a need to improve on the bonding procedure by saving time and also minimizing enamel loss during bonding and debondingwith out jeopardizing the ability to maintain a clinically useful bond strength.(8) It is the attachment of one substance to another is also called bonding.Factors determining adhesion are surface energy, wetting, contact angles(9).Solvents are the most important components of bonding agents but often the least considered among orthodontics.Leaving bonding agents bottle open results in evaporation of solvent which decreases bonding effectiveness(10).Primers can cause post operative sensitivity which leads to fluid movement within tubules, it also causes isolation problems .Self etching primers are not technique sensitive , no postoperative sensitivity, and bonds chemically ro dentine(11)..Their application needs the distribution of a thin layer on the previously acidified tooth surface, in order to convert the hydrophilic enamel surface to a hydrophobic surface, permitting the infiltration of hydrophobic adhesive bonding.(12)Moisture Insensitive Primer is a hydrophilic or "moisture friendly" material for bonding in a moist environment without giving up bond strength. Just a single coat of Transbond MIP primer over a water or saliva contaminated, etched tooth surface makes the application technique fast and easy.l(13).Uncured primers were found to be very cytotoxic on three dimensional cell cultures in vitro (14).Primer agent seem to be the most important part in biocompatibility of the adhesive system because they are usually applied in a thin coat directly on the tooth surface without being cured and they may accidentally be in contact with the gingiva of the patient.(15)The etching and primer are

mixed as a single step in bonding procedure where it cause reduction in the number of procedures which results in saving time for the clinician(16)(17). It also results in a smaller possibility of enamel decalcification. Self etching primers function both as an etching agent and a primer. Rinsing of enamel is not required after application of the self-etching primer.(18)(19)The main aim of the survey was to evaluate the knowledge of undergraduate students on primers used for orthodontic bonding.

MATERIALS AND METHODS:

An Online survey was conducted with a self structured questionnaire with a sample size of 100 participants comprising the undergraduate dental students.The questionnaire consists of questions that help in collecting socio-economic data, questions that help in provoking awareness among the participants and questionnaires also related to the awareness and knowledge about the bonding agents. The questionnaire was validated in the standard manner. Measures such as selection of participants randomly, placing restrictions over the participant population and age groups are taken to minimise the bias occurring in sampling. The questionnaire was circulated using the online part from " google form" and the link was circulated through social media to the respondents. The results were collected and the data was analysed using SPSS version 2.0.The responses were recorded and the results of the analysis were represented in the form of a pie chart.

RESULTS AND DISCUSSION

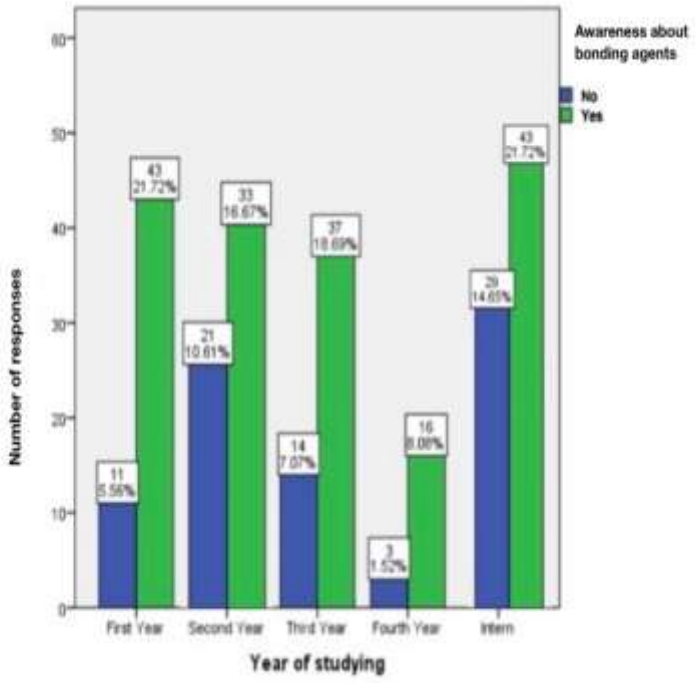

Fig 1: The bar graph depicts the association between the year of study and awareness about the bonding agents. X axis represents the year of studying and the Y axis represents the bonding agents. Out of the study population , Majority of the interns(27.27%) were more aware than second year students (21.72%) followed by third year students (15.66%) followed by fourth year students (4.04%) and awareness about the bonding agents.P value = 0.554 (>0.05) hence not significant .

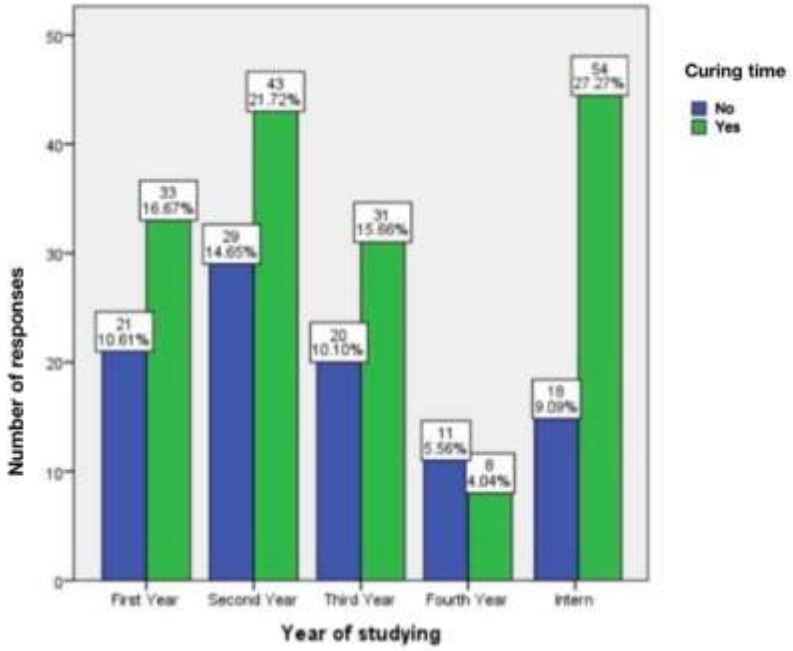

Fig 2: bar graph represents the association between year of study and awareness about the curing time.X axis represents the year of study and Y axis represents the number of responses of curing time .Of which blue indicates no and green indicates yes. Out of the total study population, the majority of the interns (21.72%) followedby the first year students(21.72%) followed by the third year students (18.69%) followed by the second year students (16.67%) and fourth year (8.08%). Chi square test was done and association was found to be statistically not significant.

In the current study, 46.9% of the population belongs to 1st year-2nd year and around 30.8% of the study population belongs to 3rd year and around 22.3% of them belong to interns.. Around 61.6% of the population are males and around 38.4% of them are females . Majority of the population around 75.4% are aware about the bonding agents used during orthodontic bonding , around 16.1% of the study population are not much aware about the bonding agents and around 8.5% of them may be aware about the bonding agents used during orthodontic bonding. Around 56.4% of the population responded that 10-20 seconds is the curing time required for bonding agents , around 20.9% of the study population Responded that 2-5 minutes are enough , around 12.3% of them responded that 4 minutes is enough for the bonding agents and 10.4% of them responded that 1 minute is enough for the curing time for bonding agents. According to this article (20), the curing time for bonding agents should be 10-20 seconds. Majority of the population around 20.9% responded that bonding agents decrease the surface roughness during orthodontic bonding , 12.3% of the undergraduate students responded that bonding agents increases the surface area and roughness, 10.4% of them responded it decreases the surface area during orthodontic bonding and majority of students 56.4% of them responded all the above. Around 83.9% of the population Responded that the bonding agent causes any allergic reaction, post operative sensitivity or causes any infection after use and around 16.1% of the study population do not respond the same . According to this article(19) ,Almost all types of dental bonding agents contain acrylates.Allergic contact dermatitis is known as a noninfectious inflammatory disease of the skin characterized by the delayed hypersensitivity reactions .Around 56.4% of the population responded that bonding agent was introduced by Irwin Smigel , 16.1% of them responded that Buonocore introduced bonding agents, 15.2% of them responded that bonding agent was introduced by bertolloti and around 12.3% of them Responded that Kanca introduced bonding agents .Around 56.4% of them responded that saliva contamination is the most common factor resulting in bracket debonding , around another 24.6% of them Responded that the common factor that results in bracket debonding is due to application of too much bonding agent , 15.2% of them responded that due to masticatory forces bracket debonding occurs and around 3.8% of them responded that due to low retentiveness bracket debonding happens.

According to this article(21).Ceramic brackets will not flex when squeezed with debonding pliers. The preferred mechanical debonding is to lift the brackets off with peripheral force application, much the same as for steel brackets. Several tie-wings still may fracture, which in practice requires grinding away the rest of the bracket.Around 56.4% of the population responded that HEMA is the hydrophilic primer used during orthodontic therapy , 24.6%of them responded that MIP is used during orthodontic therapy, 15.2% of them responded that Assure is the hydrophilic primer used during orthodontic therapy and around 3.8% responded that orthosolo should be used as hydrophilic primer during orthodontic therapy.

Around 22.55% of the population responded that there are totally seven generations of bonding agents and around 50% of the study population responded that there are six generations of bonding agents and 27.54% of them responded that there are four generations of bonding agents. Around 56.4% of the population responded that MIP acts in the presence of moisture contaminated enamel and around 16.1% of them think that MIP acts in the absence of moisture contaminated enamel and 27.5% of them responded that MIP does not act on any of the conditions.

According to a previous study the primers are used to provide a proper bond strength between the tooth and bracket. Because composite adhesives for orthodontic bonding are applied to the enamel surface after priming, an antimicrobial primer is beneficial for reducing biofilms and demineralization at the interface between the bracket and the tooth surface. Awareness regarding the materials used for orthodontic procedures is of importance among undergraduate students as thorough material knowledge which will help in clinical practical as well.Our team has extensive knowledge and research experience that has translate into high quality publications(22–32)(33–42)

CONCLUSION

With the limitations of the study, we concluded that the majority of the 1st year and 2nd year students had a clear knowledge on primers and their uses in orthodontic bonding when compared to 3rd years and interns.

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CONFLICT OF INTEREST

There was no potential conflict of interest.

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