

# Prevalence of Most Preferred Shades for Direct Restoration among Indian Population

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## ABSTRACT

**Background:** Children and young adults often present to a dental practice after accidents that affect their anterior teeth. Esthetic restoration of the maxillary anterior dentition can be accomplished by using direct or indirect techniques. Direct resin composite restoration can be characterized as a life-like definitive restoration and is a predictable, conservative, and reliable chairside procedure.

**Aim:** To assess the prevalence of the most preferred shade for direct restoration among the Indian population.

**Methods:** A retrospective study was carried out and the case records of patients undergoing direct restoration were collected by reviewing patient records and analyzing the data of 86000 patients from November 2020 to January 2021. Patients undergoing Class III and IV direct restoration were selected. The data were collected and subjected to statistical analysis and correlation using SPSS software.

**Results:** In this study it was found that 90% of the class III direct composite restoration was done in upper anterior teeth and only 10% of them were done in lower anterior teeth. On doing chi square test, it was found that majority of the upper and lower anterior teeth class III restorations were done using A2 shade. This correlation was found to be statistically significant ( $p < 0.000 < 0.05$ ).

**Conclusion:** From this study it is concluded that majority of the Class III and class IV restorations were done in upper anterior teeth and the most commonly preferred shade by these patients was A2.

**Key words:** Anterior teeth, Composite, Direct restoration, Innovative method, Shade matching

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## INTRODUCTION

The esthetic demands of the patient or parents should be considered before deciding on the technique (layered monochromatic or layered multichromatic restoration) to be used, so that the esthetics of the smile and face can be restored [1]. Even though direct and indirect treatment options exist, the common treatment option for these patients is a direct composite resin restoration [2]. Compared to conventional direct and indirect techniques, the direct adhesively bonded composite restoration offers many advantages [3]. If the patient does not smoke or drink dark-colored liquids that

can alter the color of the teeth, esthetic bonding with composites is the most conservative approach for several reasons: namely, (1) Sound tooth structure will not be removed, (2) Anesthetics are infrequent, (3) One appointment is common, and (4) The professional fee is usually inexpensive [4]. The decision to use a single shade (and opacity) or a combination of shades (2 or more opacities) depends on the individual characteristics of the incisal third [5].

Direct restoration performed chairside by way of anatomical layering of composite resin over the dental surfaces, allows clinicians to correctly determine the shape and size of teeth, improving the esthetics of the smile [2]. Handling composite freehand requires practice and may be considered a disadvantage to some, but with effective technique, an ideal result is possible [6]. The great popularity of composite resin restorations also results from their acceptable longevity at relatively low financial cost [7].

While anterior composite restorations are ubiquitous, advanced multiple-layering techniques using a range of

shades, opacities and translucencies remain the domain of relatively few practitioners [8]. The most common and widely practiced technique for anterior composites is the monochromatic technique [9]. Most of the time, employing a monochromatic technique does not yield optimal aesthetic results, since the complicated color and optical properties existing in a natural tooth cannot be reproduced by any single composite shade [10].

Achieving aesthetic durable composite restorations, especially in the smile frame, is highly satisfying not only for the patient but for the clinician as well. Composites, with the advancements in layering techniques, offer the most conservative, cost effective and aesthetic solutions for cosmetic restoration of teeth. Our team has extensive knowledge and research experience that has translate into high quality publications [11-30].

Hence the aim of this paper is to assess the prevalence of most preferred shade for direct restoration among Indian population.

**MATERIALS AND METHODS**

This is a retrospective study regarding patients undergoing class III and class IV direct restoration who have visited Saveetha Dental College and Hospitals between June 2019-January 2021. The case records of these patients were collected by reviewing patient records and analyzing the data of 86000 patients. The final sample size of 3,605 patients in which sampling bias was minimized with the verification of photos and cross verification. The study was reviewed by two reviewers and it was cross verified. Ethical committee approval was obtained from the Institutional Ethics Committee.

The case records of patients undergoing direct restorations were collected by reviewing patient records and analyzing the data of 86000 patients. The data of these patients was collected and tabulated. It included parameters–Patients ID, Age, Gender, arch involved and shade preferred. Age was categorized into 6-19 years, 20-35 years, 36-45 years, 46-60 years and more than 60 years. Arch involved was the upper and lower arch. Types of shades were categorized into A1, A2, A3, A3.5, B1, B2 and B3 shade.

The data of these patients were collected and tabulated. After further verification by an external reviewer, it was imported to SPSS v23.0 software by IBM for statistical analysis. Percentage, mean, standard deviation, frequency of parameters was employed in the analysis. Chi-square test was used to detect the significance between age, gender, type of restoration and shade preferred. P-value of less than 0.05 was considered as statistically significant.

**RESULTS AND DISCUSSION**

In this study, a total of 3,605 patients were screened. Out of the total number of patients screened, 1,888 patients underwent class III direct restoration and 1,717 patients underwent class IV direct restoration. Among the patients undergoing class III direct restoration, about 41% of them were 20-35 years old, 25% of them were 36-45 years old, 17% of them were 45-60 years old, 15% of them were 6-19 years old and 2% of them were more than 60 years old (Figure 1). Out of these patients, 62% of the patients were females and 38% of the patients were males (Figure 2). 90% of these restorations were

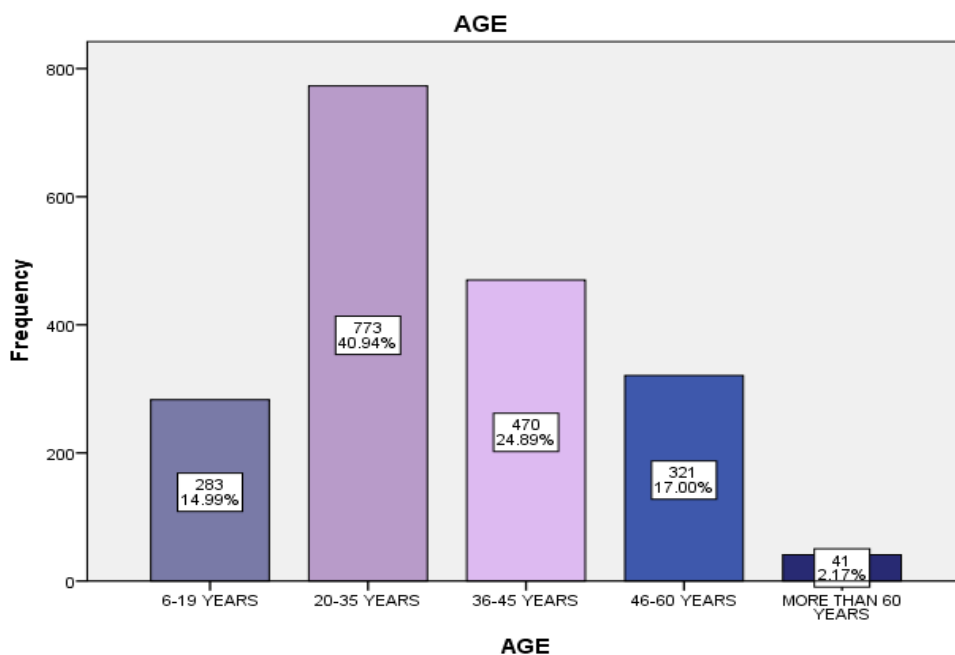


Figure 1: Bar chart depicting the age of the patients who underwent class III direct restorations. The x - axis represents the age of the patients and y - axis represents the number of patients who underwent class III direct restorations. Violet colour represents the age group 6-19 years, dark purple represents 20-35 years, light purple represents the age group 36-45 years, blue color represents the age group 46-60 years and dark blue represents more than 60 years. Majority of the patients belonged to the age group 20-35 years (41%).

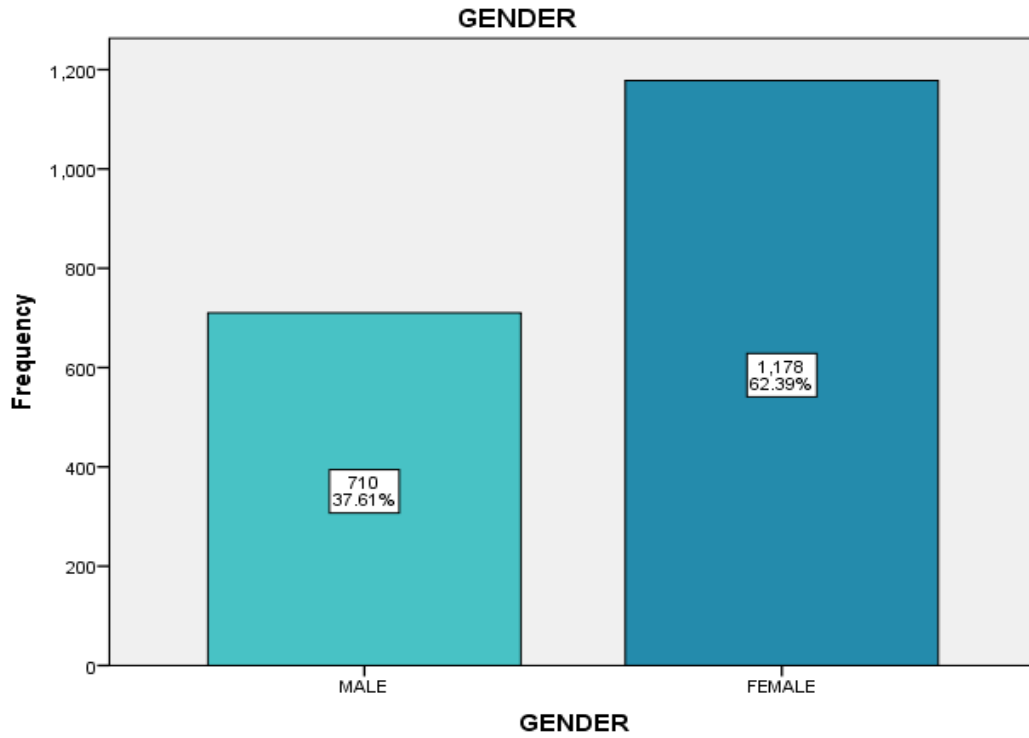


Figure 2: Bar chart depicting the gender of the patients who underwent class III direct restorations. The x - axis represents the gender of the patients and y - axis represents the number of patients who underwent class III direct restorations. Light blue represents males and dark blue represents females. Majority of the patients included in this study were females (62%).

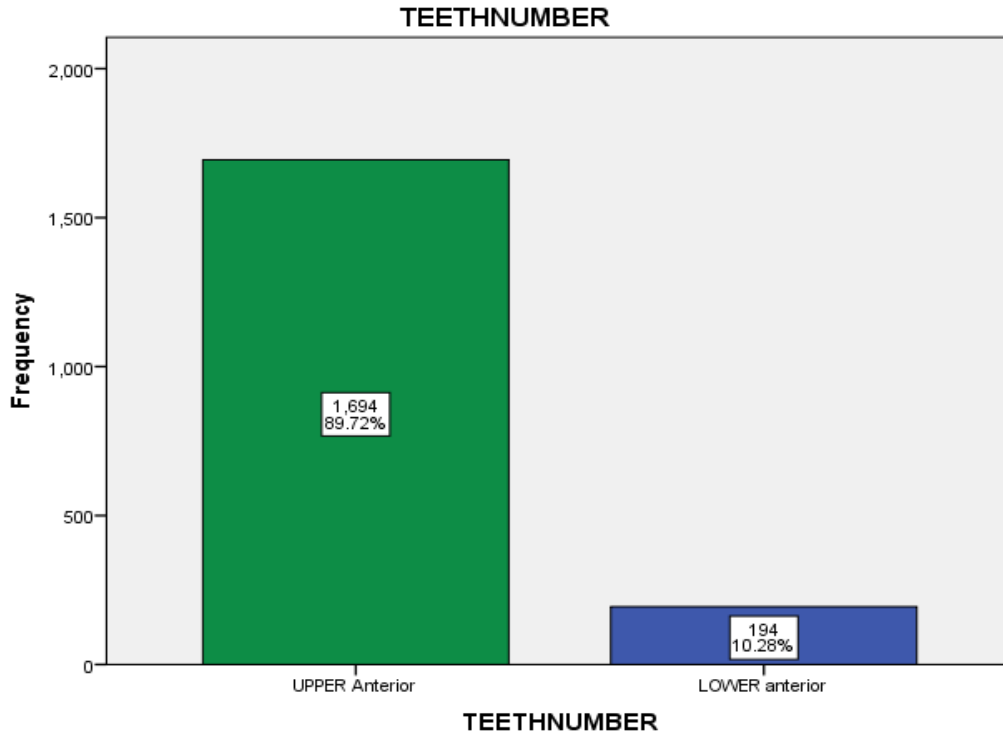


Figure 3: Bar chart depicting the arch involved in the patients who underwent class III direct restorations. The x - axis represents the arch involved and y - axis represents the number of patients who underwent class III direct restorations. Green represents upper anterior teeth and blue represents lower anterior teeth. Majority of the class III restorations were done in upper anterior teeth (90%).

done in upper anterior teeth and 10% of them were done in lower anterior teeth (Figure 3). Majority of the

restorations were done using A2 shade (62%) followed by A1 shade (24%), A3 shade (5%) and B2 shade (5%)

(Figure 4).

On doing chi square association, it was found that majority of the class III direct restorations in the upper anterior teeth were done using A2 shade followed by A1 shade and similarly the majority of the restorations in the lower anterior teeth were done using A1 shade. This

difference was found to be statistically significant ( $p-0.000<0.05$ ) (Figure 5). On doing chi square test between shade preference and gender of the patients, it was found that majority of the male and female patients preferred A1 shade of composite for class III direct restoration and this correlation was found to be statistically significant ( $p-0.028<0.05$ ) (Figure 6).

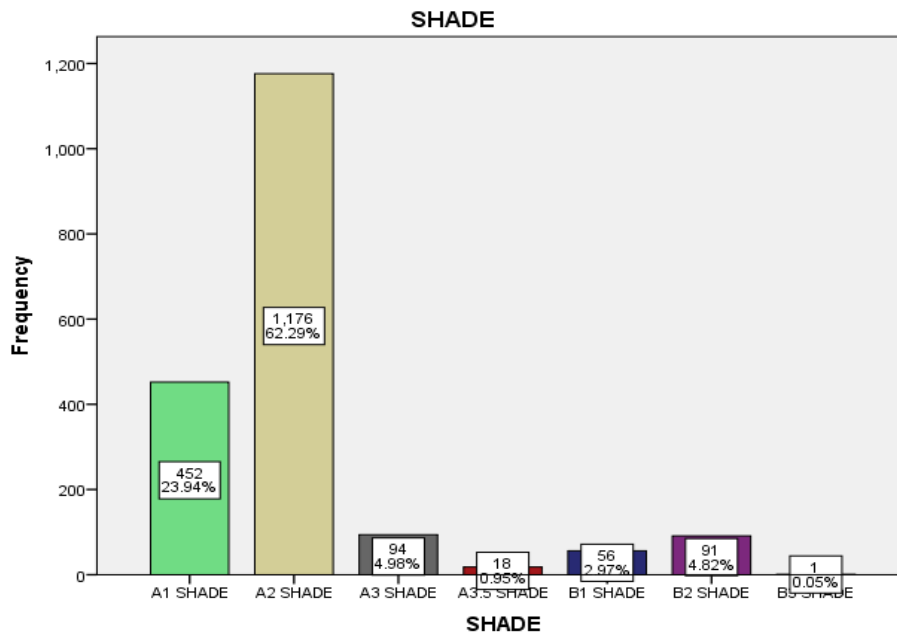


Figure 4: Bar chart depicting the shade of choice in the patients who underwent class III direct restorations. The x - axis represents the shade of restoration and y - axis represents the number of patients who underwent class III direct restorations. Green represents A1 shade, beige represents A2 shade, grey represents A3 shade, red represents A3.5 shade, blue represents B1 shade, purple represents B2 shade and pink represents B3 shade. Majority of the class III restorations were done using A2 shade (62%).

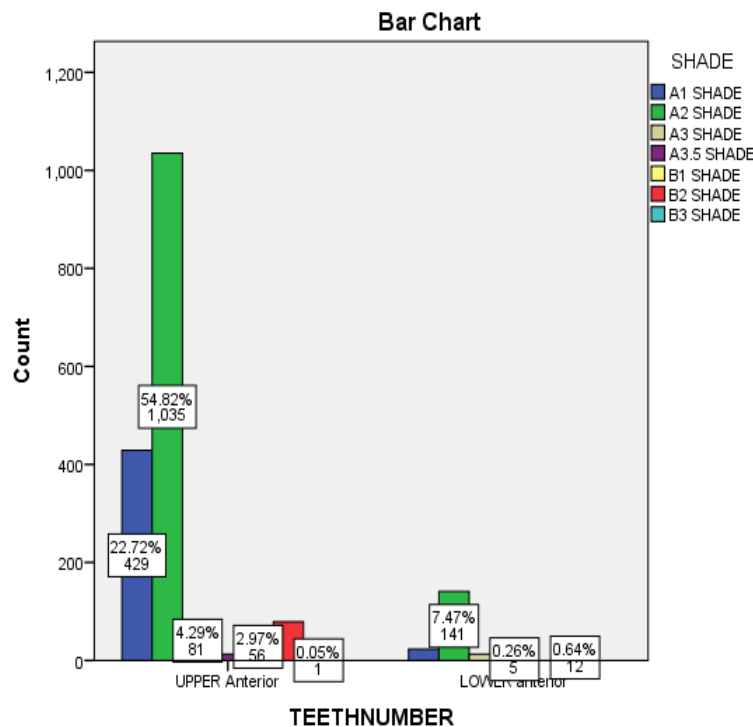


Figure 5: Bar chart depicting the association between arch involved and shade of choice for class III restoration. The x - axis represents the arch involved and y - axis represents the shade of preference for class III direct restoration. The different arches involved are upper and lower anterior. Blue represents A1 shade, green represents A2 shade, beige represents A3 shade, purple represents A3.5 shade, yellow represents B1 shade, red represents B2 shade and light blue represents B3 shade. There was significant association noted and it was found that A2 shade was most preferred for class III restorations in upper anterior ( $p-0.000<0.05$ ).

Among the patients undergoing class IV direct restoration, about 46% of them were 20-35 years old, 26% of them were 6-19 years old, 15% of them were 36-45 years old, 10% of them were 46-60 years old and 2% of them were more than 60 years old (Figure 7). Out of these patients, 63% of the patients were males and 37% of the patients were females (Figure 8). 94% of these restorations were done in upper anterior teeth and 6% of them were done in lower anterior teeth (Figure 9). Majority of the restorations were done using A2 shade (55%) followed by A1 shade (28%), A3 shade (6%) and B1 shade (5%) (Figure 10).

On doing chi square association, it was found that

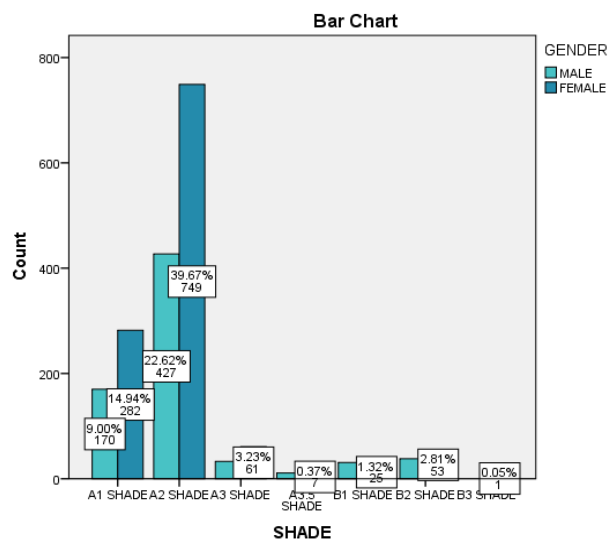


Figure 6: Bar chart depicting the association between shade of choice for class III restoration and gender. The x - axis represents the shade of preference for class III direct restoration and y-axis represents gender. The different shades involved are A1, A2, A3, A3.5, B1, B2, B3. Light blue represents males and dark blue represents females. There was significant association noted and it was found that A2 shade was most preferred in female patients (p-0.028 <0.05).

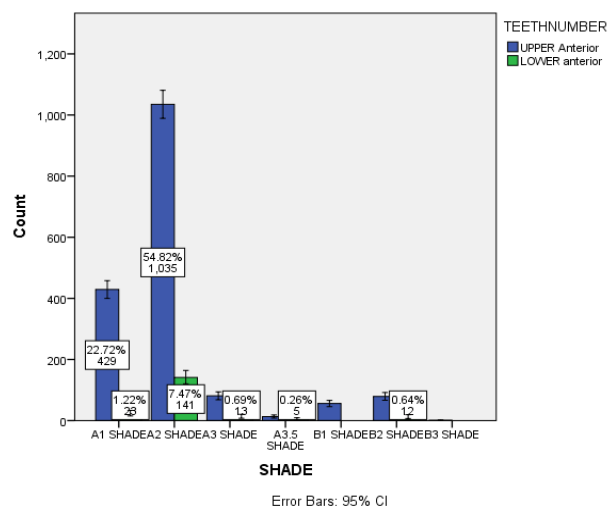


Figure 7: Bar chart representing the comparison of shade of restoration and arch involved in class III restoration. X-axis represents the shade of the restoration and Y-axis represents the arch involved in class III restoration. Blue represents upper anterior teeth and green represents lower anterior teeth.

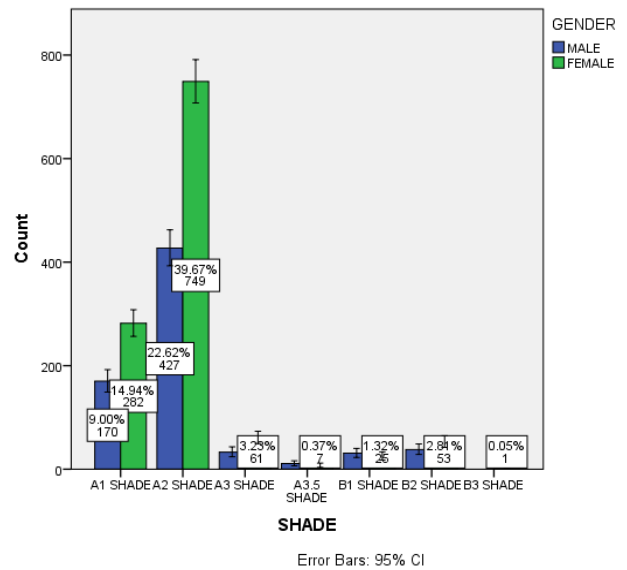


Figure 8: Bar chart representing the comparison of shade of restoration and gender of the patients. X-axis represents the shade of the restoration and the Y-axis represents gender. Blue represents males and green represents females.

majority of the class IV direct restorations in the upper anterior teeth were done more commonly using A2 shade followed by A1 shade and similarly the majority of the restorations in the lower anterior teeth were done using A1 shade. This difference was found to be statistically significant (p-0.007<0.05) (Figure 11). On doing chi square test between shade preference and gender of the patients, it was found that majority of the male and female patients preferred A1 shade of composite for class IV direct restoration and this correlation was found to be statistically significant (p-0.017<0.05) (Figure 12).

Direct resin bonding represents a conservative means of providing aesthetic restoration of the anterior dentition. Such techniques enable chairside control of colors, morphology, and ultimately, aesthetic results [31]. Composite resin has proven to be a predictable and reliable restorative material for the treatment of traumatized dentin or dental caries in the anterior region [32].

Composite’s optical properties are strongly influenced by several factors: nature and size of the filler; the material’s thickness; fluorescence of the dentin; opacity degree of the dentin; degree of translucency of the enamels; opalescence of the enamels; and refractive index of the enamel [33]. Hence the identification of respective dentin and enamel optical characteristics is of considerable interest for the development of tooth colored materials [34].

Prior literature published by several authors described limited area measurement instruments, with an optical diameter of 3–5 mm, in the analysis of shade [35,36]. Today’s shade-matching technologies have been developed in an effort to increase the success of color matching, communication, reproduction and verification in clinical dentistry [37], and, ultimately, to increase the efficiency of esthetic restorative work

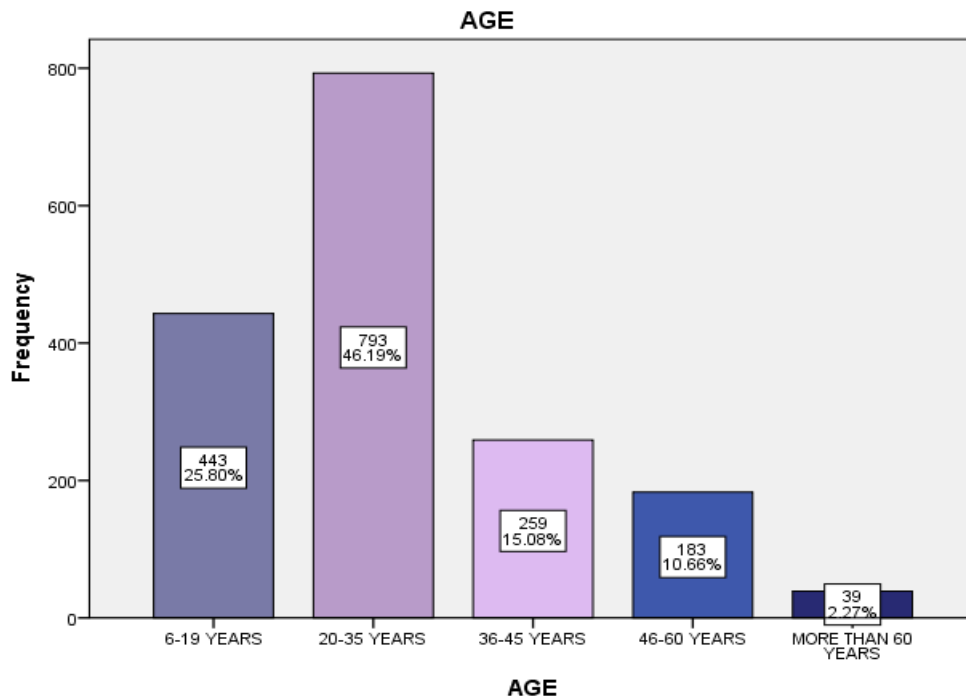


Figure 9: Bar chart depicting the age of the patients who underwent class IV direct restorations. The x-axis represents the age of the patients and y-axis represents the number of patients who underwent class IV direct restorations. Violet colour represents the age group 6-19 years, dark purple represents 20-35 years, light purple represents the age group 36-45 years, blue color represents the age group 46-60 years and dark blue represents more than 60 years. Majority of the patients belonged to the age group 20-35 years.

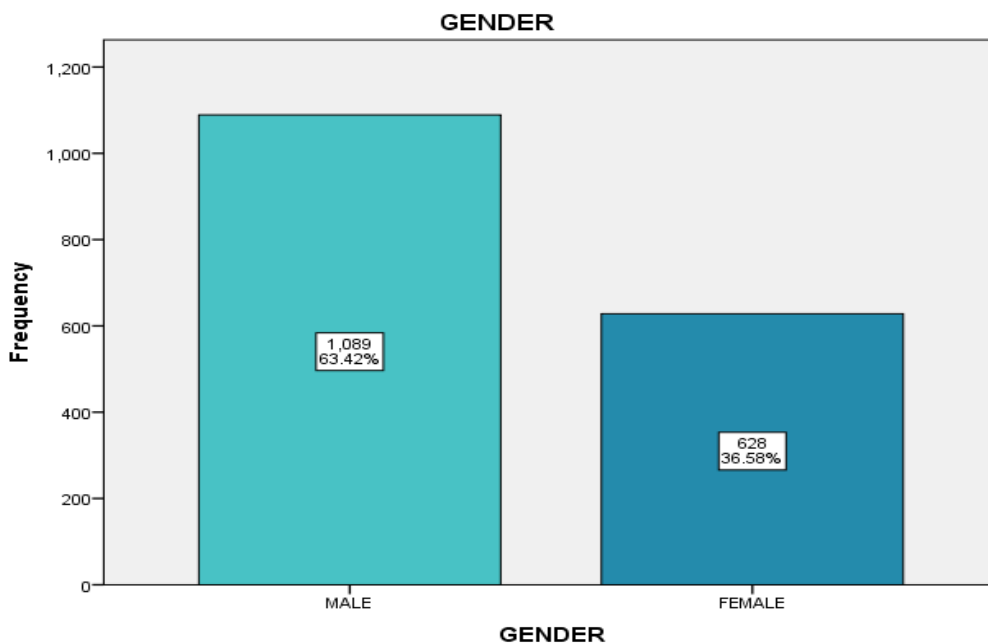


Figure 10: Bar chart depicting the gender of the patients who underwent class IV direct restorations. The x-axis represents the gender of the patients and y-axis represents the number of patients who underwent class IV direct restorations. Light blue represents males and dark blue represents females. Majority of the patients included in this study were females.

within any practice. Dental shade-matching instruments have been brought to market to reduce or overcome imperfections and inconsistencies of traditional shade matching. The most commonly used shade-matching method is the visual method, Vitapan Classical and its derivations are probably the most commonly used shade guides [38]. Bonding and adhesive ceramic

restorative procedures have the potential of reversing the esthetic manifestations of the aging process for teeth [39]. It is, however, the clinician's professional and ethical obligation to master the art and science of dental aesthetics, equipping himself with the latest successful techniques and materials so as to provide his patients with state-of-the-art treatment modalities.

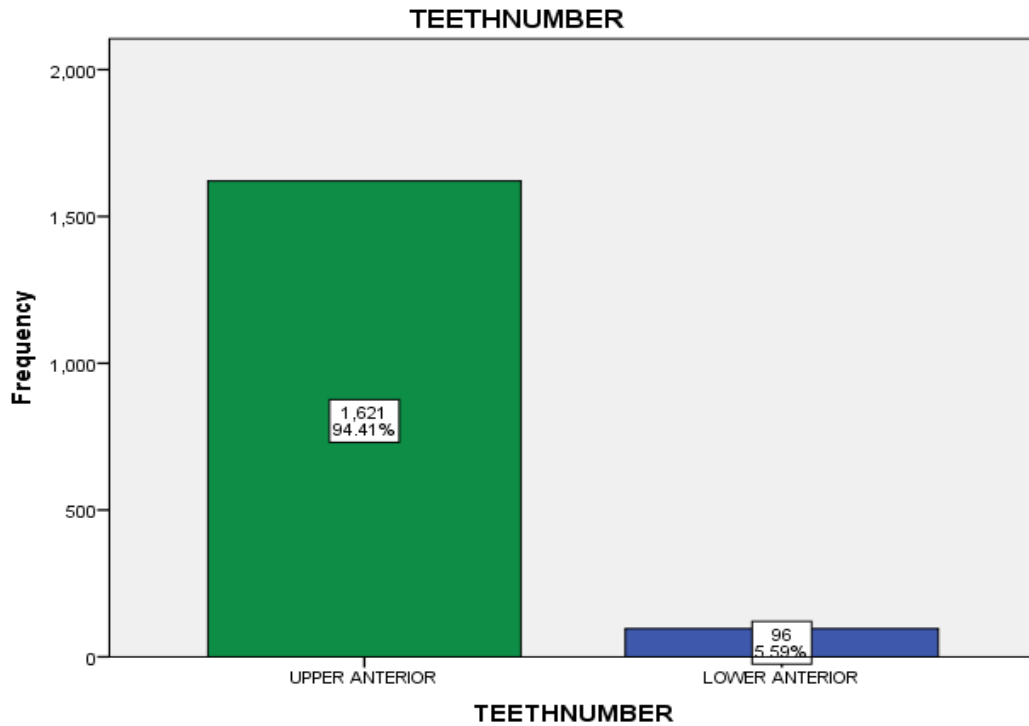


Figure 11: Bar chart depicting the arch involved in the patients who underwent class IV direct restorations. The x - axis represents the arch involved and y - axis represents the number of patients who underwent class IV direct restorations. Green represents upper anterior teeth and blue represents lower anterior teeth. Majority of the class IV restorations were done in upper anterior teeth.

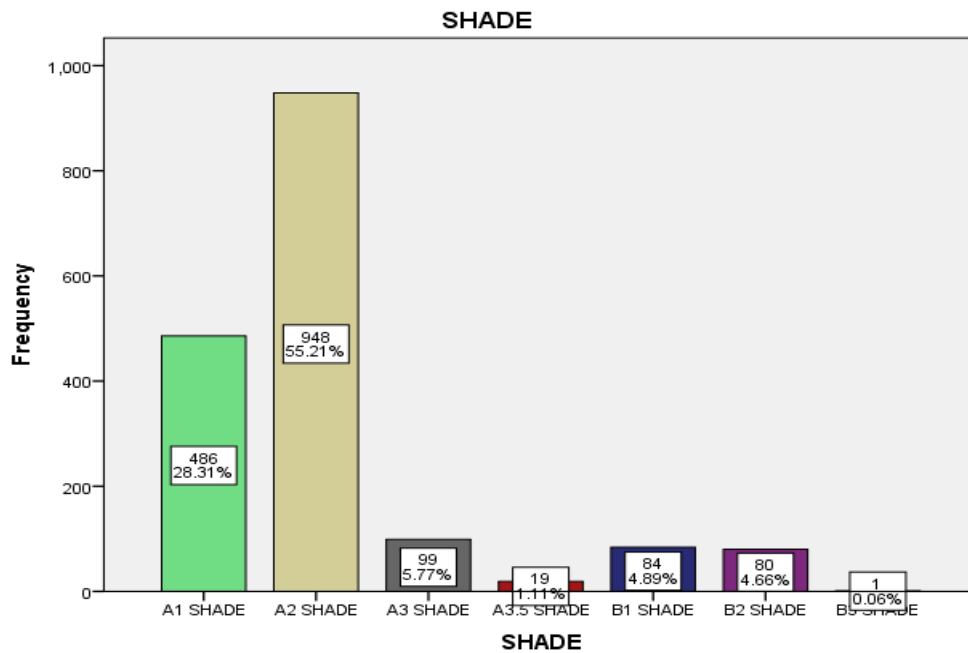


Figure 12: Bar chart depicting the shade of choice in the patients who underwent class IV direct restorations. The x-axis represents the shade of restoration and y-axis represents the number of patients who underwent class IV direct restorations. Green represents A1 shade, beige represents A2 shade, grey represents A3 shade, red represents A3.5 shade, blue represents B1 shade, purple represents B2 shade and pink represents B3 shade. Majority of the class IV restorations were done using A2 shade (55%).

**CONCLUSION**

Within the limitation of the study, it was found that class III and class IV direct restorations were more commonly done in upper anterior teeth and the most commonly preferred shade for direct restoration was A2 and it was more commonly preferred in females.

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**CONFLICT OF INTEREST**

None declared.

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