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FREQUENCY OF INDIRECT RESTORATIONS AMONG PATIENTS ATTENDING DENTAL HOSPITALS - A RETROSPECTIVE STUDY

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ABSTRACT

The restoration of a carious tooth is usually done by excavation of the carious portion of the tooth and the subsequent replacement with a suitable restorative material. The choice of restorative material depends on the extent of the carious lesion,the tooth affected and various other clinical and patient factors.Two modalities of treatment have been followed for the restoration of such carious tooth namely direct restoration and indirect restorations. Indirect restorations mainly involve restorations that are fabricated in the lab and then luted into the prepared cavity to replace the missing portion of the tooth.These restorations are custom cast in labs with either metal or base metal alloys or by ceramics and porcelains.The current study aims at evaluating frequency of indirect restorations among patients attending dental hospital. Case records of around 86,000 patients availing treatment at our dental hospital between June 2019 and March 2020 were analyzed and the required data was extracted. A total of 1773 results were found for the indirect restorations. Data was transferred to excel sheets and imported to SPSS software. Results revealed that indirect restorations were done more in patients of the age group of 18-30 years. On comparing the frequency of indirect restorations among gender,maximum number of indirect restorations were done for females,maximum number of indirect restorations were done for maxillary teeth and most of the restorations done were single crowns as compared to other type of indirect restorations and found to be statistically significant($p<0.05$)Patients should be further educated regarding the importance of maintaining natural integrity of the tooth and more awareness should be created in this respect.

Keywords: Direct restorations; Endodontic therapy; Gender; Indirect restorations ; Onlay ; Quality of life; Survival rate

INTRODUCTION

The majority of clinical decisions regarding the most appropriate choice of restorative material and technique are relatively straightforward and are usually dictated by a variety of factors including lesion size, etiology ,aesthetic ,occlusal ,endodontic and periodontal considerations, number of teeth affected, patient compliance, habits etc.(1) The decision making process of choosing either a direct or an indirect approach for any given clinical situation depends mainly on presence of large cavities / failed direct restorations with multiple missing cusps, anterior

teeth with large interproximal cavities,failed crowns.Indirect restorations are widely used to restore posterior teeth (2) .Small defects are usually treated with direct restorations and for larger defects like cusp replacement and deep cervical caries different restorative options are available(3) . A tooth with large posterior and anterior defects, an indirect composite restoration can be a feasible solution ((3,4).Indirect restorations like inlay/onlay are generally indicated when there is a larger defects and this type of restorations also have the advantage of precision and better control on the final morphology and occlusion. However, the need for a tapered preparation design might result in increased tooth tissue loss which can be prevented by using immediate dentin sealing and direct composite buildups to remove undercuts.

Inlays and onlays are forms of indirect restoration used when a molar or premolar is too damaged to support a basic filling, an inlay is placed on the chewing surface between the cusps of the tooth, while an onlay covers one or more cusps. Preparing and placing inlays and onlays is a multistep process, which involves preparing the tooth (e.g; removing the decay), taking an impression of the area to receive the restorations, preparing the inlay or onlay in a dental laboratory or with special equipment (CAD/CAM) and cementing or bonding the restoration of the tooth.Inlay/onlay restorations fits in a modern restorative concept and the demands for the operator are not reduced when compared with direct restorations (5),(6).Crowns were considered to be the best restorations for severely compromised teeth.The materials used such as gold, composite resin or ceramics used plays a major role in determining the longevity of the restorations. Factors that influence the longevity of an inlay/onlay restorations include the strength of the tooth, amount of chewing that occurs on the restorations and a patient's willingness to maintain oral hygiene.

All indirect restorations require luting cements to retain them. Luting cements can have a large influence on the performance and biocompatibility of the overall restoration. Two broad categories of cements available are water based cements and resin-based cements. From these two categories, a dentist has a wide variety of materials with different working characteristics and properties.The choice often depends on the type of material selected for the indirect restoration and the clinical requirements, such as setting characteristics, film thickness, setting rates and adhesion to the underlying tooth.Previously our team has a rich experience in working on various research projects across multiple disciplines. (7–17). Now the growing trend in this area motivated us to pursue this project.In the present study, the aim was to assess the frequency of indirect restorations among patients attending dental hospitals in chennai.

MATERIALS AND METHODS

The type of research was a cross sectional analytic study, All dependent variables here were mainly assessed. The data collection was retrospective in nature. Case records of around 86,000 patients availing treatment at our dental hospital between june 1 2019 to march 31 2020 were analyzed and the required data was extracted. The inclusion criteria was patients above 18 years of age, having teeth restored with the indirect restorations such as full veneer crowns, Inlays,

onlays. Patients below 18 years of age, periodontal disease, malfunctional habits like bruxism etc and teeth with malformations were excluded from the study.

The data was first extracted and then all data was transferred to an MS Excel sheet and tabulated SPSS software was used for performing statistical analysis. Chi square test was done along with other tests to determine correlation between the dependent and the independent variables.All the data were analyzed and results were displayed as percentages and bar graphs were used for pictorial representation of the data. The ethical clearance for the study was obtained from the institutional research SDCC/SIHEC/2020/DIASDATA/0619-0320. Patient personal information was kept confidential in exception to the examiners.

RESULTS AND DISCUSSION

In the present study, on assessing the frequency of indirect restorations, patients in the age group of 18-30 years had the maximum number of indirect restorations (43.62%) and the least being 51-60 years (6.94%) [Figure 1] On comparing the frequency of indirect restorations among gender more number of indirect restorations were done for females (67.79%) as compared to males (32.21%)[Figure 2].On analyzing the frequency of indirect restorations among teeth,maximum number of indirect restorations were done for maxillary teeth (27.82%) as compared to mandibular teeth.[Table 1,Figure 3]. On assessing the association between teeth and type of indirect restorations, maximum number of indirect restorations done were single crown (27.03%) as compared to other type of indirect restorations and found to be statistically significant (p <0.05) [Table 2, Figure 4]

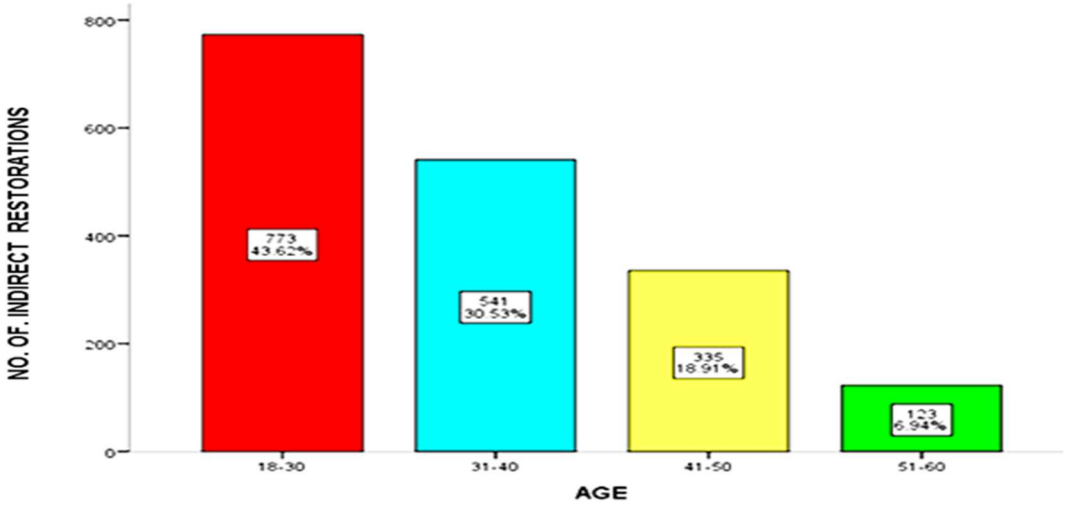

Figure 1 : Bar graph shows the frequency of indirect restorations. X axis denotes the age group of the patients, Y axis denotes the number of indirect restorations.18-30 years (Red), 31-40 years (blue), 41-50 years(yellow) and 51-60 years (green).Patients in the age group of 18 - 30 years (Red) had the maximum number of indirect restorations(43.62%) as compared to other age groups.

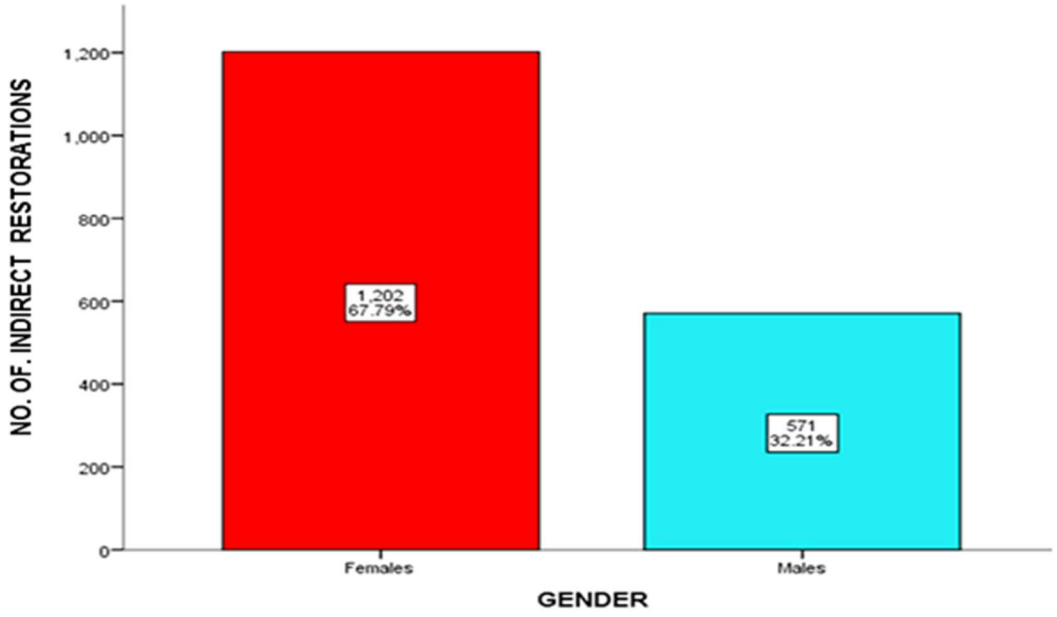

Figure 2- Bar graph shows the frequency of indirect restorations, among gender,X-axis denotes the gender of the patients,Y-axis denotes the number of indirect restorations. Females(Red),males(blue). More indirect restorations were done in females (67.79%) as compared to males.

Table 1: Frequency distribution of types of indirect restorations among teeth.Table 1 represents frequency distribution of types of indirect restorations among teeth and it shows that 27.1% in 11-18 quadrant, 27.8% in the 21-28 quadrant, 22.2% in 31-38 and 22.8% in 41-48.

TEETH [Quadrant]	FREQUENCY	PERCENTAGE
11-18	481	27.1%
21-28	493	27.8%
31-38	393	22.2%
41-48	406	22.8%

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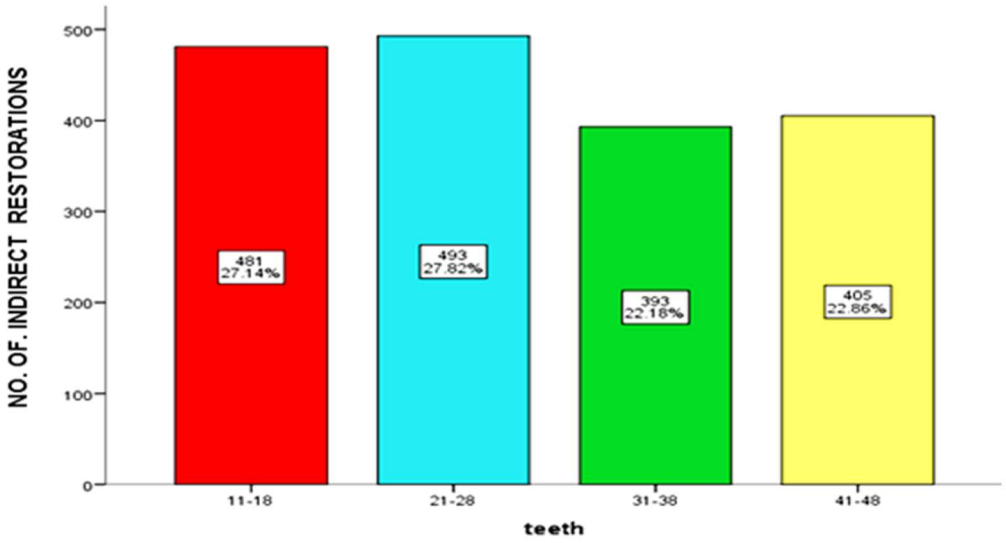

Figure 3- Bar graph shows the frequency of indirect restorations among teeth, X- axis denotes the teeth and Y- axis denotes the number of indirect restorations. 11-18 (Red), 21-28 (blue), 31-38 (green) and 41-48 (yellow). More number of indirect restorations were done for the maxillary teeth (27.82%) when compared to mandibular teeth.

Table 2- Frequency distribution of types of indirect restorations.Table 2 represents frequency distribution of types of indirect restorations and it shows 1.9% were class I metal inlay, 0.6% were class II metal inlay, 4.1% were ceramic inlay, 0.6% were all ceramic onlay, 92.9% were single crown and 0.1% were composite inlay, Chi square test ; p value =0.000, (p <0.05) statistically significant.

TYPE OF INDIRECT RESTORATIONS	FREQUENCY	PERCENTAGE
Class I Metal Inlay	33	1.9
Class II Metal Inlay	10	0.6
Ceramic inlay	73	4.1
All ceramic onlay	8	0.6
Single crown	1648	92.9
Composite inlay	1	0.1
Total	1773	100

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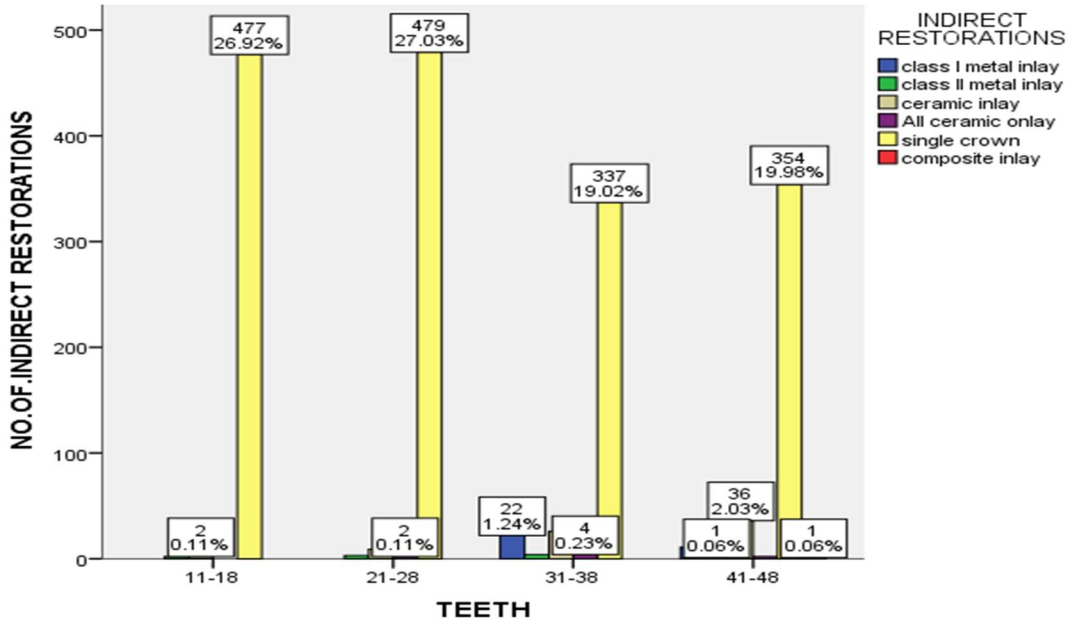

Figure 4 - Bar graph showing the association between teeth and type of indirect restorations, X- axis denotes the teeth and Y- axis denotes the number of indirect restorations.Maximum number of indirect restorations done were Single crowns(yellow) as compared to other type of indirect restorations and it was statistically significant.Association done by chi square test, pearson chi square value - 117.004; df- 15; p value =.000 ($p < 0.05$)

All ceramic materials are used to fabricate lifelike restorations and toothlike color, translucency contribute to highly esthetic restorations. Ceramic is a very hard and strong material capable of sustaining biting forces but, being a brittle glasslike material it can fracture when subjected to extreme forces or sharp impact. Because of the natural hardness of ceramic, these restorations are highly resistant to wear (18). However, if they are not highly polished and smooth, they rapidly can wear opposing restorations or natural teeth. Over the years, laboratory-fabricated all-ceramic restorations have become very popular owing to their excellent esthetic properties, high strength and excellent biocompatibility.. These materials are composed largely of fused natural oxides(18,19) . Their glasslike properties render them very inert, and they tend to be highly biocompatible and well-tolerated.However, all-ceramic restorations rely on technique-sensitive resin-based cements and adhesives to hold them in place and to seal the tooth against leakage.The low fracture resistance of all-ceramic restorations also limits them primarily to single-tooth restorations (20). Ceramic veneer restorations replace a very thin layer of enamel on the front of teeth to improve the appearance or color of the teeth. These restorations are only approximately 0.5 millimeter in thickness, but because they are bonded to the underlying tooth with resin-based cements and they have proven to be very durable.Previously we have done various in vitro studies and clinical trials on laminates and veneers, restorative materials for non carious cervical lesions, management of avulsed teeth, calcified canal ,remineralizing agents,root canal irrigants, intracanal medicaments,root canal instrumentation (21–25).

In the present study we wanted to focus on indirect restorations.All-ceramic crowns, inlays and onlays can be similarly bonded to teeth to improve their strength and performance. A properly constructed and bonded all-ceramic restoration can provide many years of service with very little change in color or appearance. Metal ceramic restorations are made by thermally bonding dental porcelains to an underlying metal framework that has been cast to fit the tooth or bridge preparation.The high supportive strength of the underlying metal allows metal-ceramic restorations to provide full coverage of posterior teeth and to be used for multiple-tooth bridges. The natural tooth color of ceramic masks the unnatural appearance of the underlying metal to provide excellent toothlike color and appearance.

The result of the study showed that females were more who had undergone indirect restorative procedures. This could be attributed to the factor that male patients often do not find time for such multi appointments treatments due to work schedule. The age group of 18-30 years of age showed better compliance, since this age group is usually more concerned with both the aesthetic and functional aspects of teeth. A key factor could also be the influence of oral health status on the individual's social lifestyle. The age group of 51-60 years of age, or a more senile age groups due to obvious reasons of limited mobility or activity have a poorer compliance.Furthermore, in terms of tooth of interest, more compliance was observed in treatment of maxillary teeth. This could be contributed to the fact that the maxillary teeth are most affected by dental caries and also cause the most inconvenience and diet restrictions when decayed or compromised . It was equally important to educate the patient on the importance of completing all the appointments of the indirect restorative procedures.Such education will have to begin from the primary health care setup. Social culture and level of education also plays an important role. It can be concluded by stating that the improvement of patient compliance necessitates an overall multidimensional approach.Our institution is passionate about high quality evidence based research and has excelled in various fields ((26–36). We hope this study adds to this rich legacy.

STUDY LIMITATIONS

The study was confined to a limited population and cannot be considered as generalized data.

FUTURE SCOPE AND PRACTICAL IMPLICATIONS

Study can be done on a larger population and methods to improve patient compliance can be planned.

CONCLUSION

Within the limitations of the study, it was found that patients in the age group of 18- 30 years had the maximum number of indirect restorations done. Association between gender and frequency of indirect restorations revealed the maximum number of indirect restorations was done for the female patients. Association between teeth and frequency of indirect restorations showed, the maximum number of indirect restorations was done in the maxillary teeth.

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