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Kap survey on stainless steel crowns among undergraduates

Ranjana V

Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai - 600077
Email: 151901051.sdc@saveetha.com

Deepak. S

Senior lecturer, Department of dental armamentarium, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai - 600077
Email: deepaks.sdc@saveetha.com

Dr Adimulapu Hima Sandeep

Senior lecturer, Department of Conservative Dentistry and Endodontics, Saveetha Dental College, Saveetha Institute of Medical and Technical Sciences (SIMATS), Chennai, Tamilnadu, India.
Email: himas.sdc@saveetha.com

Abstract--Introduction: Stainless steel crowns (SSC) are an important restorative armamentarium in paediatric dentistry. They are cemented with a biocompatible luting agent and are adapted to individual teeth. An appropriate cementing agent for SSCs is conventional glass ionomer cement. For the restoration of primary teeth, these crowns offer an outstanding alternative to other restorative materials. Aim: The main aim of this survey is to analyse the knowledge, attitude and practice on stainless steel crowns among undergraduates. Materials and method: Self-administrated questionnaire was designed based on the knowledge, attitude and practice of stainless steel crowns. The questionnaire contained 14 questions which were shared through Google forms link. The study population included undergraduates belonging to the 18 – 25 age group. The statistics done using SPSS software, chi square test was done to check the association and a p value of 0.05 was said to be statistically significant. The survey has been completed in the month of February 2021. Results: 53% think extensively decayed teeth are the major indication for stainless steel crown, 34% think as a preventive restoration and 13% think severe cases of bruxism. Chi square analysis was done between gender and their opinion on whether stainless steel crowns are better than porcelain crowns, where 40% out of 68% females and 9% out of 32% males strongly

believe that stainless steel crowns are better than porcelain crowns. Results were statistically not significant. Hence females have a stronger opinion that stainless steel crowns are better than porcelain crowns than males (Pearson's chi square value = 8.225, df= 2, p value = 0.016(>0.05)). Conclusion: From the survey, it was evident that the majority of the interns and 4th years had better knowledge, attitude and practice on stainless steel crowns than 3rd years and think it is safe to use. Teeth restored with SSCs have a greater treatment success rate.

Keywords--Paediatric dentistry, Primary teeth, Restorative material, Stainless steel crown, innovative technique.

Introduction

Stainless steel crowns (SSC) are an important restorative armamentarium in paediatric dentistry. They are cemented with a biocompatible luting agent and are adapted to individual teeth (1). An appropriate cementing agent for SSCs is conventional glass ionomer cement (2). For the restoration of primary teeth, these crowns offer an outstanding alternative to other restorative materials. Full coronal coverage is provided by stainless steel crowns. During placement, they are subjected to minimal technique sensitivity and are extremely durable (3). Grossly destructed primary tooth that is restored with SSC helps in preventing fracture during mastication as they absorb most of the forces and allow only minimal forces to reach the dentine. Therefore ultimate tensile strength is much below the resultant dentinal stresses (4). Each restoration has its own advantage along with certain limitations. SSC placement is easy and they are retentive and durable, although increased chair time, less esthetic appearance and usage of multiple materials are considered to be certain limitations of this type of restoration (5). Inflammation of the surrounding gingival tissue is a problem frequently associated with SSC due to poorly fitted crowns (6). In high risk children, primary molar restoration with SSC has a better long term consequence compared to amalgam restoration (7). However, indirect pulp treatment and pulpotomy of primary molar that are restored by SSC are found to be even more successful (8).

Esthetic alternatives to SSCs have been developed in order to restore a child's carious anterior teeth (9). Preveneered crowns, composite strip crowns and open-faced crowns help in overcoming certain problems associated with SSCs as they are convenient, durable and esthetic (10). The properties of a material associated with the surface are free surface energy, surface tension, roughness, hydrophobicity, wettability, hydrophilicity, microhardness, electrostatic interaction are important as they affect staining and plaque accumulation. Adhesion of microorganisms is higher when the surface free energy is higher and also less microorganism adherence is expected when the surface is more hydrophobic, although the presence of saliva changes this scenario (11).

Teeth restored with SSCs have a greater treatment success rate. Although SSC is considered a valuable procedure provided a good oral hygiene level must be maintained (12). There is no proper research or survey carried out previously on

knowledge, attitude and practice on stainless steel crowns among post graduates. Our team has extensive knowledge and research experience that has translated into high quality publications (13–22),(23–26),(27–31)(32). The main aim of this survey is to analyse the knowledge, attitude and practice on stainless steel crowns among undergraduates.

Materials and Method

Self-administrated questionnaire was designed based on the knowledge, attitude and practice of stainless steel crowns. The questionnaire contained 14 questions which were shared through Google forms link. The study population included undergraduates belonging to the 18 – 25 age group. The participants were explained about the purpose of study in detail. The questions were carefully studied and the participants marked the corresponding answers. Measures were taken to minimize the sampling bias. Validity was checked both internally and externally. Sample method carried out was simple random sampling. Method of representation of each output variable was in pie charts and bar graphs. The statistics done using SPSS software, chi square test was done to check the association and a p value of 0.05 was said to be statistically significant. The survey has been completed in the month of February 2021.

Results

Survey on knowledge, attitude and practice on stainless steel crowns was done. The study population included undergraduates belonging to the 18- 25 years of age group. The survey results were tabulated and statistically analyzed [Table 1]. 100% participants actively responded to the questions. 48% think stainless steel crowns can be used on adults, 31% think no and 21% think maybe [Figure 1]. 53% think extensively decayed teeth are the major indication for stainless steel crown, 34% think as a preventive restoration and 13% think severe cases of bruxism [Figure 2]. 41% think all kinds of food can be consumed while wearing a crown, 42% think no and 17% think maybe [Figure 3].

Chi square analysis was done between gender and their opinion on alternatives to dental crowns, where 30 out of 68 females and 8 out of 32 males strongly believe that inlay is an alternative for dental crown. Results were statistically not significant. Hence females have a stronger opinion that inlay is an alternative for dental crowns than males [Figure 4]. Chi square analysis was done between gender and their opinion on the longevity of stainless steel crowns, where 41% out of 68% females and 14% out of 32% males strongly believe that stainless steel crowns last less than 4 years. Results were statistically not significant. Hence females have a stronger opinion that stainless steel crowns last less than 4 years than males [Figure 5]. Chi square analysis was done between gender and their opinion on whether stainless steel crowns are better than porcelain crowns, where 40% out of 68% females and 9% out of 32% males strongly believe that stainless steel crowns are better than porcelain crowns. Results were statistically not significant. Hence females have a stronger opinion that stainless steel crowns are better than porcelain crowns than males [Figure 6]. Chi square analysis was done between gender and their opinion on whether stainless steel crowns are cost efficient, where 31% out of 68% females and 15% out of 32% males strongly

believe that stainless steel crowns are cost efficient. Results were statistically not significant. Hence females have a stronger opinion that stainless steel crowns are cost efficient than males [Figure 7].

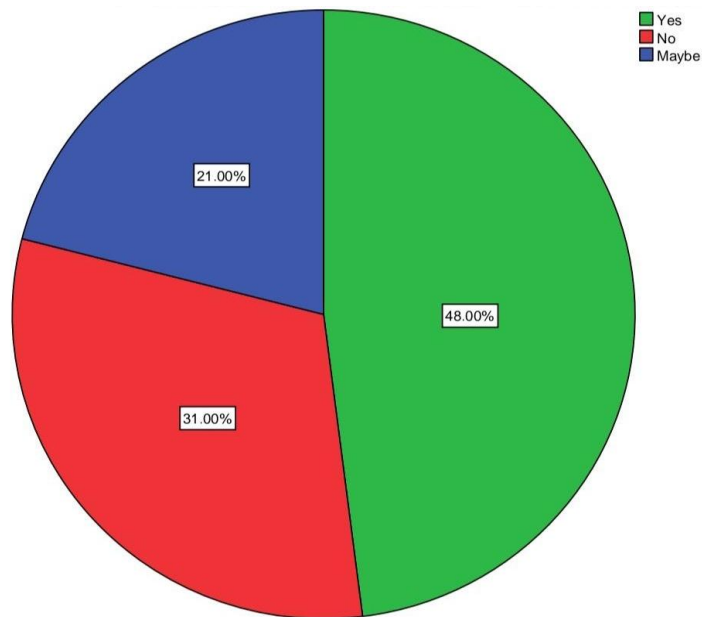


Figure 1 represents the distribution of participants based on the opinion on whether stainless steel crowns can be used on adults, where 48% responded yes (green), 31% responded no (red) and 21% responded maybe (blue).

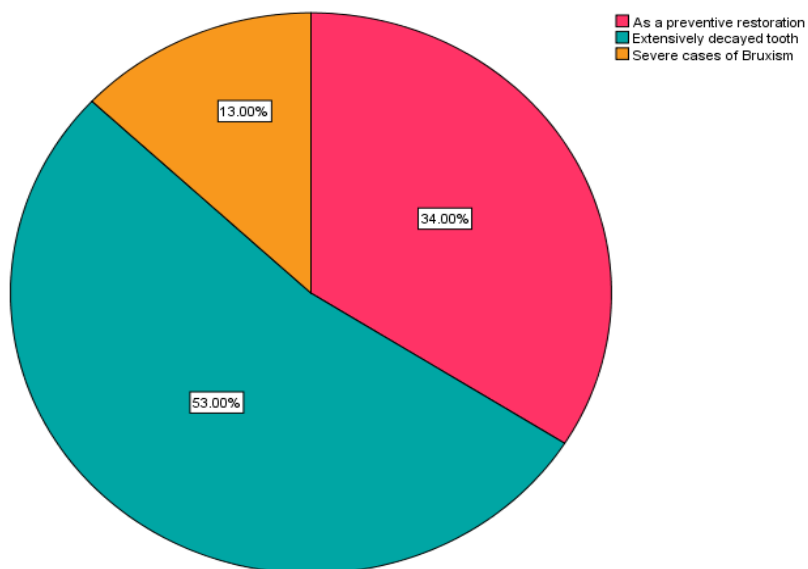


Figure 2 represents the distribution of participants based on the opinion on the major indication for stainless steel crown, where 53% responded extensively to decayed teeth (light blue), 34% responded as a preventive restoration (pink) and 13% responded to severe cases of bruxism (orange).

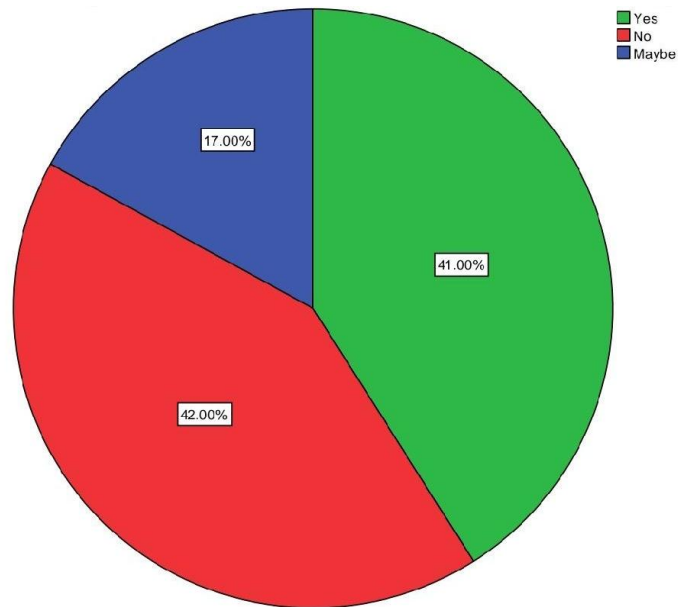


Figure 3 represents the distribution of participants based on the opinion on whether all kinds of food can be consumed while wearing a crown, where 41% responded yes (green), 42% responded no (red) and 17% responded maybe (blue).

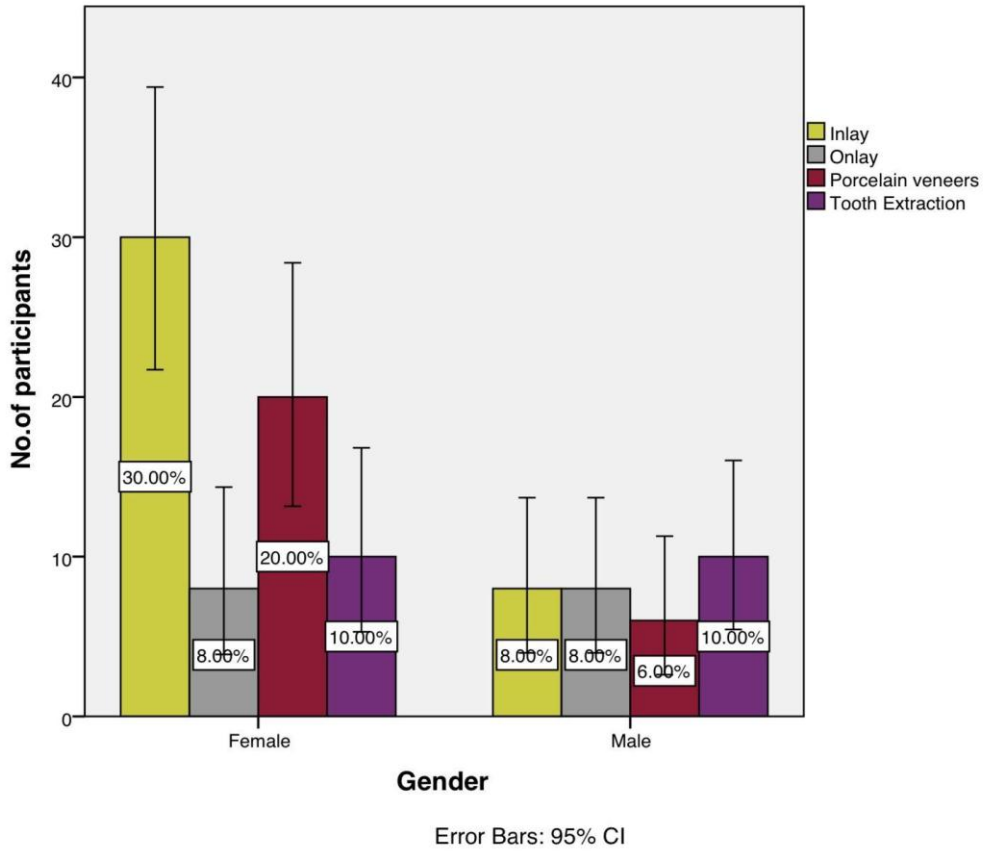


Figure 4: Bar charts representing association between gender and opinion on alternatives to dental crowns. X axis represents gender and Y axis represents the number of participants. Yellow denotes Inlay, grey denotes Onlay, light brown denotes Porcelain veneer and purple denotes Tooth extraction. Females strongly believe that inlay is the alternative to dental crowns than male, however, it is not statistically significant (Pearson’s chi square value = 8.405, df= 3, p value = 0.038(>0.05)).

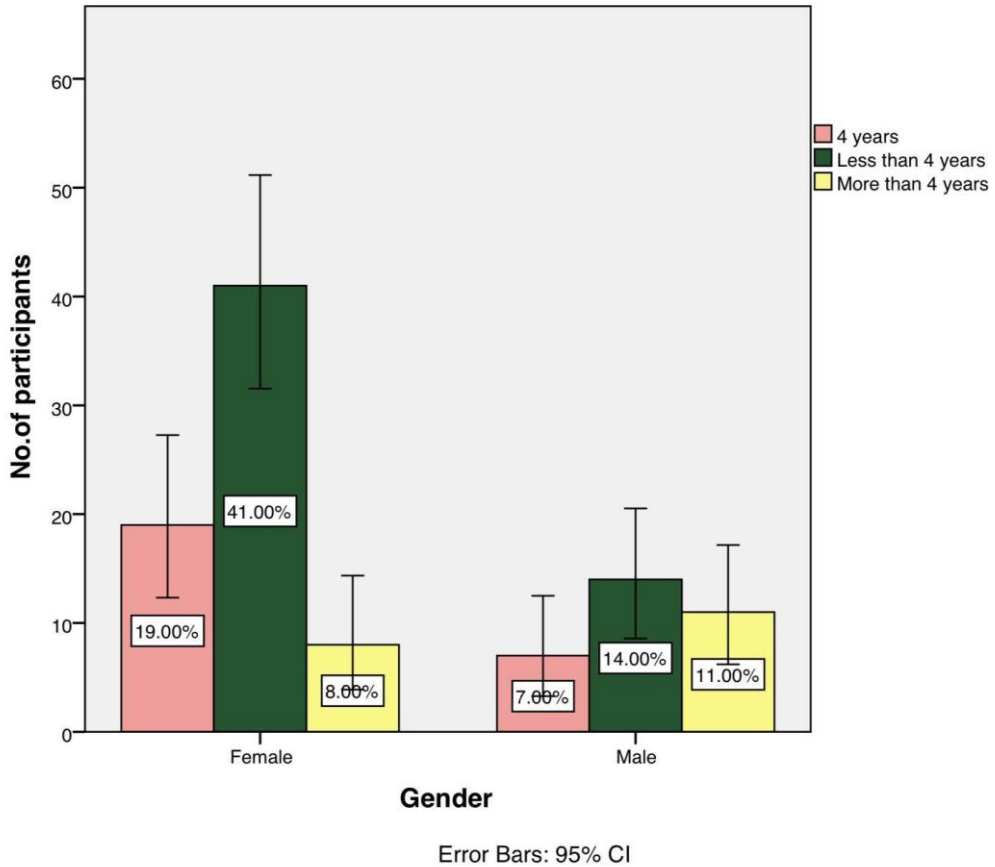


Figure 5: Bar charts representing association between gender and opinion on the longevity of stainless steel crowns. X axis represents gender and Y axis represents the number of participants. Light pink denotes 4 years, dark green denotes less than 4 years and light yellow denotes more than 4 years. Females strongly believe that stainless steel crowns last for less than 4 years than male, however, it is not statistically significant (Pearson's chi square value = 7.246, df= 2, p value= 0.027(>0.05)).

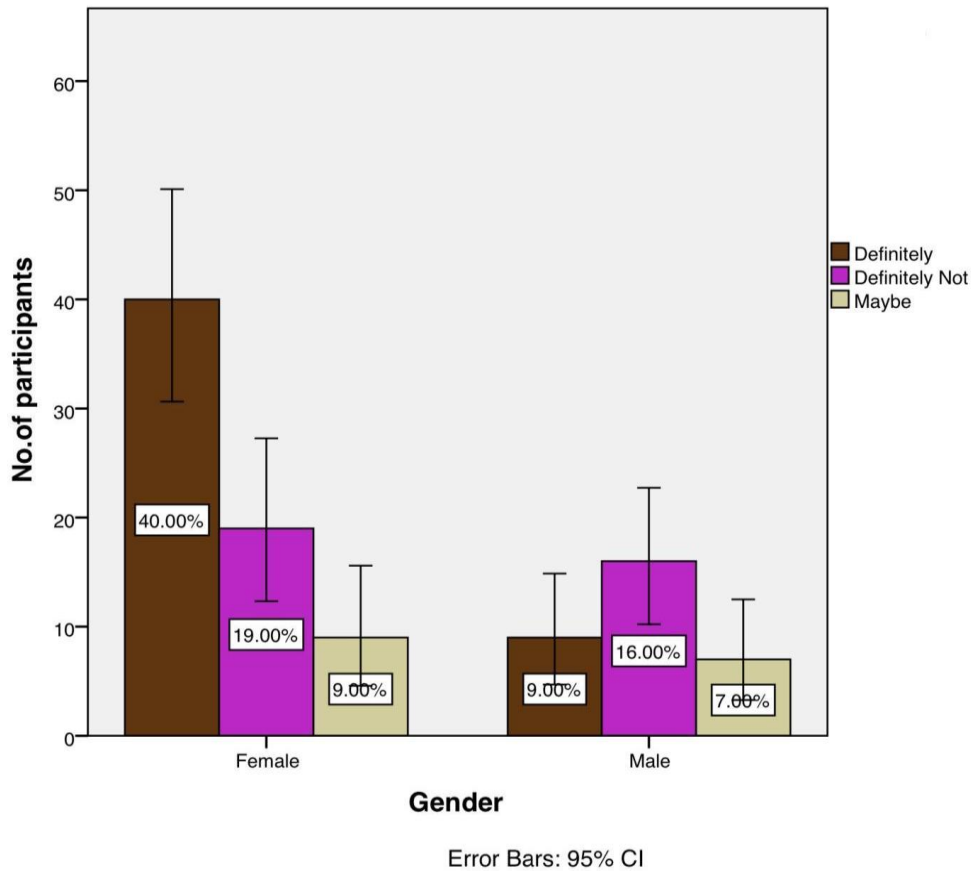


Figure 6: Bar charts representing association between gender and opinion on whether stainless steel crowns are better than porcelain crowns. X axis represents gender and Y axis represents the number of participants. Dark brown denotes definitely, violet denotes definitely not and white denotes maybe. Females strongly believe that stainless steel crowns are better than porcelain crowns than male, however, it is not statistically significant (Pearson's chi square value = 8.225, df= 2, p value = 0.016(>0.05)).

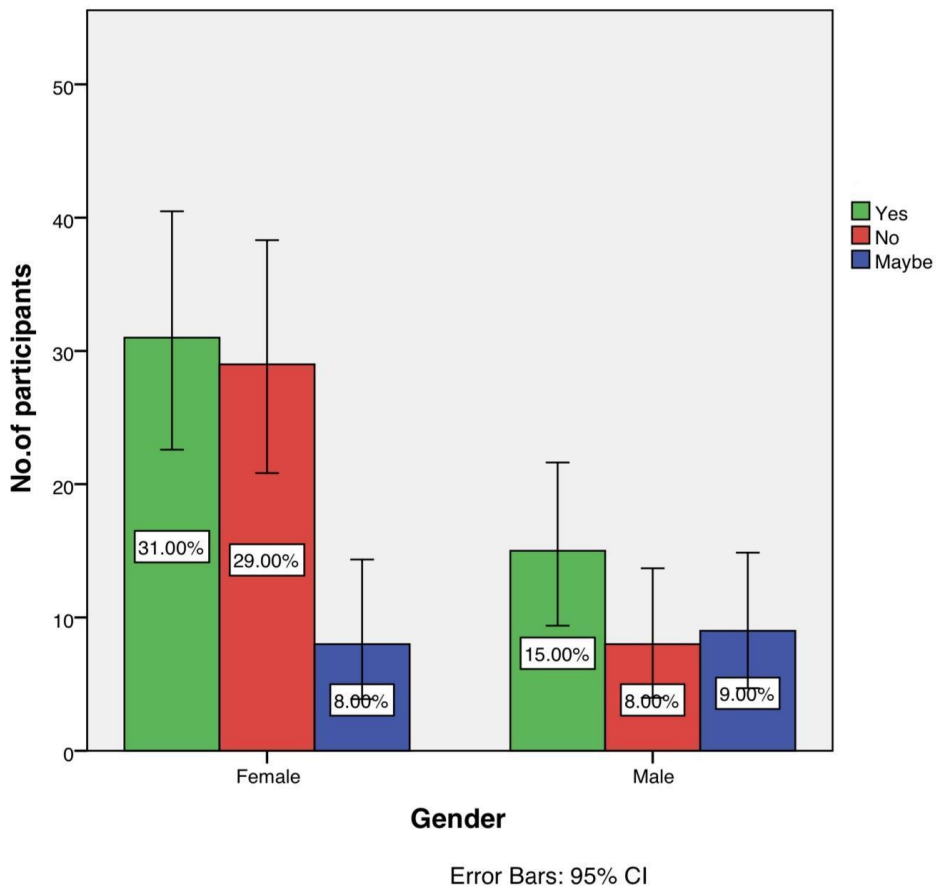


Figure 7: Bar charts representing association between gender and opinion on whether stainless steel crowns are cost efficient. X axis represents gender and Y axis represents the number of participants. Green denotes yes, red denotes no and blue denotes maybe. Females strongly believe that stainless steel crowns are cost efficient than male, however, it is not statistically significant (Pearson's chi square value = 5.265, df= 2, p value = 0.072(>0.05)).

Table 1
Represents the questions that were included in the survey

S.NO	QUESTION	CHOICES	PERCENTAGE
1.	Age?	<ul style="list-style-type: none"> • 20 - 30yrs • 30 - 40yrs • above 40 yrs 	<ul style="list-style-type: none"> • 35% • 45% • 20%
2.	Gender?	<ul style="list-style-type: none"> • Female 	<ul style="list-style-type: none"> • 68%

		<ul style="list-style-type: none"> • Male 	<ul style="list-style-type: none"> • 32%
3.	Number of years of experience in dentistry?	<ul style="list-style-type: none"> • 0-5 yrs • 5-10yrs • above 10 yrs 	<ul style="list-style-type: none"> • 45% • 37% • 18%
4.	How long do you think stainless steel crowns last?	<ul style="list-style-type: none"> • Less than 4 years • 4 years • More than 4 years 	<ul style="list-style-type: none"> • 55% • 26% • 19%
5.	Do you think stainless steel crowns can be used on adults?	<ul style="list-style-type: none"> • Yes • No • Maybe 	<ul style="list-style-type: none"> • 48% • 31% • 21%
6.	What do you think is the major indication for stainless steel crowns?	<ul style="list-style-type: none"> • Extensively decayed tooth • As a preventive restoration • Severe cases of Bruxism 	<ul style="list-style-type: none"> • 53% • 34% • 13%
7.	What do you think is the major contra indication for stainless steel crowns?	<ul style="list-style-type: none"> • Exfoliation of primary molar within 6 to 12 months • Excessive tooth mobility • Patients with known nickel allergy 	<ul style="list-style-type: none"> • 50% • 35% • 15%
8.	Do you think stainless steel crowns are cost efficient?	<ul style="list-style-type: none"> • Yes • No • Maybe 	<ul style="list-style-type: none"> • 46% • 37% • 17%
9.	In your practice, do you feel stainless steel crowns are better than porcelain crowns?	<ul style="list-style-type: none"> • Definitely • Definitely Not • Maybe 	<ul style="list-style-type: none"> • 49% • 35% • 16%
10.	Do you think filling is better than placing a crown?	<ul style="list-style-type: none"> • Definitely • Definitely Not • Maybe 	<ul style="list-style-type: none"> • 48% • 32% • 20%
11.	What do you think is an alternative to dental crowns?	<ul style="list-style-type: none"> • Inlay • Porcelain veneers • Tooth Extraction • Onlay 	<ul style="list-style-type: none"> • 38% • 26% • 20% • 16%
12.	Do you think dental crowns are safe?	<ul style="list-style-type: none"> • Yes • No • Maybe 	<ul style="list-style-type: none"> • 46% • 32% • 22%

13.	Can a crowned tooth get infected?	<ul style="list-style-type: none"> ● Definitely ● Definitely Not ● Maybe 	<ul style="list-style-type: none"> ● 44% ● 38% ● 18%
14.	Do you think all kinds of food can be consumed while wearing a crown?	<ul style="list-style-type: none"> ● Yes ● No ● Maybe 	<ul style="list-style-type: none"> ● 41% ● 42% ● 17%

Discussion

A previous study done by Attari and Roberts, it was concluded that the success rate of a preformed metal crowns was superior compared to other restorative materials and was indicated for the restoration of badly broken down primary molars (33). Whereas, in this survey 49% think stainless steel crowns are definitely better than porcelain crowns, 35% think definitely not, 16% think maybe. Another study done by Willershausen *et al*, found that SSC restorations with respect to the oral bacterial colonization has a potential positive inhibitory effect compared to composite fillings (34). In this survey, 44% think that the crowned tooth gets infected definitely, 38% think definitely not and 18% think maybe. The crown marginal extension or adaptation did not significantly affect the interproximal bone resorption, duration of presence of the crown and oral hygiene level and also it preserved the tight proximal contact between molars (35). Here, 46% think dental crowns are safe, 32% think no and 22% think maybe.

Another study done by Demarco et al, revealed that the longevity of a restoration is affected by individual caries in permanent teeth which is even more challenging in primary teeth. High caries risk in primary teeth are mostly due to increased sugar intake and poor oral hygiene. Also use of rubber dam instead of cotton roll was found to increase the longevity of the restoration (36). In this survey, it was found that 53% think longevity is for less than 4 years, 34% think longevity is for 4 years and 13% think more than 4 years. A study done by Ansai et al, revealed that carries-etiologic bacterial strains such as *S. mutans* and *Lactobacillus* are present in saliva which produces high concentration of organic acids which demineralised the dental enamel and cause further infections (37). In this survey, it was found that 44% think crowned teeth will definitely get infected, 38% think definitely not and 18% think maybe.

Most of the results from previous literature are more or less similar to the result of this survey. Limitations of this survey include a small sample size, a particular sample population was taken for the survey. Further studies can be conducted by including more samples and different study populations like postgraduates for comparison analysis.

Conclusion

From the survey, it was evident that the majority of the interns and 4th years had better knowledge, attitude and practice on stainless steel crowns than 3rd years

and think it is safe to use. Teeth restored with SSCs have a greater treatment success rate.

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Conflict of interest

The author declares that there was no conflict of interest in the present study.

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- Edubridge learning private limited.

Ethical Clearance: Not Required

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