AWARENESS ON ALLOYS USED IN CAST PARTIAL DENTURES AMONG DENTAL STUDENTS

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ABSTRACT:

INTRODUCTION: A Cast Partial Denture is a removable partial denture that mainly consists of a cast metal framework and artificial teeth set in an acrylic resin. Cast Partial dentures are usually strong, durable and retentive. The major disadvantage of cast partial denture is time-consuming and a complex procedure as compared to the normal acrylic dentures. Dental alloys are custom made for individuals used for restoration of a missing tooth. The alloys that are primarily used in cast partial dentures are nickel, chromium and cobalt, which is further divided into the nickel-containing and nickel-free alloys. Alloys are basically used as filling materials as amalgam in cases such as all-metal fixed partial denture and removable partial denture framework casting. **Materials and methods:** The present study was done by conducting an online survey among 101 students of a dental institution.The survey consisted of 12 close ended questions which were circulated using Google forms. The data was collected and statistically analyzed using SPSS software. **Results**: The results show that the majority of the students were aware about the alloys used in cast partial dentures. **Conclusion**: From the study it can be concluded that there was a positive response and awareness among the dental students on the alloys used in cast partial dentures.

Keywords: Acrylic resin, Cast partial dentures, Innovative technology, Innovative technique, Metal alloys, Zirconia.

INTRODUCTION:

A Denture is usually referred to a frame holding one or more artificial teeth, which can be used to replace missing teeth in the mouth(1,2) .A Cast partial denture is defined as a removable partial denture that consists of a cast metal framework which contains artificial teeth set in an acrylic resin. Removable partial dentures can have a lot of advantages as it is widely used in clinical practice(3). Removable partial dentures have been very popular since many decades . This is because of the introduction of acrylic polymers and the use of chrome cobalt alloys in dentistry. Many patients choose removable partial dentures because of various factors(4). Cast partial dentures are believed to overcome financial limitations, overcome biochemical issues and it also facilitates hygiene access (5). They are also known for their best practice in case of many clinical scenarios like replacing lost hard and soft tissues, which results in providing esthetic support for the orofacial structures and for long edentulous spans(6). One of the most traditional methods for rehabilitating partial edentoulous cases is to use cast partial dentures(6,7).

Cast Partial Denture with its retained attachment system is considered as one of the best treatments among the various options for achieving better aesthetic results(8). Cast partial denture can be an excellent treatment alternative when masticatory effect and bite force is kept under consideration(9).Gold and base metal alloys are used in the fabrication of cast removable partial dentures (1). Gold alloy is used in dentistry during the fabrication of cast restorations because of its material and clinical properties and is well known for its longevity(10). Alloys have several properties which help during fabrication(11). Dental Alloys are mainly used for its mechanical properties, bio-compatibility, and corrosion resistance in ceramic restorations(9). Titanium alloys are known for inertness, biocompatibility use in removable prostheses(8). Metal alloys are used in wrought forms and in casting for inlays, onlays, crowns, bridges and denture frameworks(3).

Conventional fixed partial dentures, fixed partial dentures and removable partial dentures are the most common treatment plans used for the aesthetic and functional rehabilitation of partially edentulous patients(12). The use of titanium alloys in cast partial dentures has increased worldwide (13–21),(22–27),(28–32). The present study mainly aims to create awareness about alloys used in cast partial dentures among dental students.

MATERIALS AND METHODS:

A cross sectional study was conducted among the dental students of a dental institution in the form of a questionnaire that was circulated online. The survey was approved by the institutional review board. The sample size of this study was 101.The study protocol was approved by the institutional review board . The questionnaire consisted of 12 questions that mainly focused on awareness of alloys in cast partial dentures among dental students. The questionnaire was distributed among the dental students through online survey website google forms. The data was collected, compiled and was arranged in a systematic manner and was analysed according to SPSS software.The Pearson Chi Square test was also done. The results were then represented in the form of pie charts and bar graphs.

RESULTS:

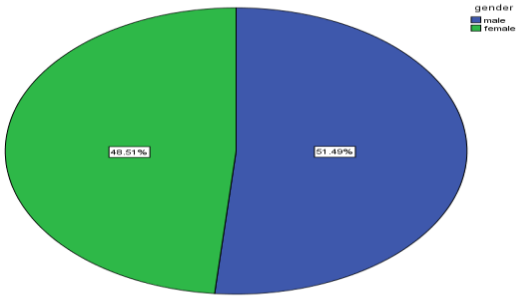

Figure 1: Pie chart representing the frequency distribution of gender of the students. 51.49% of the students were male and 48.51% of the students were female.

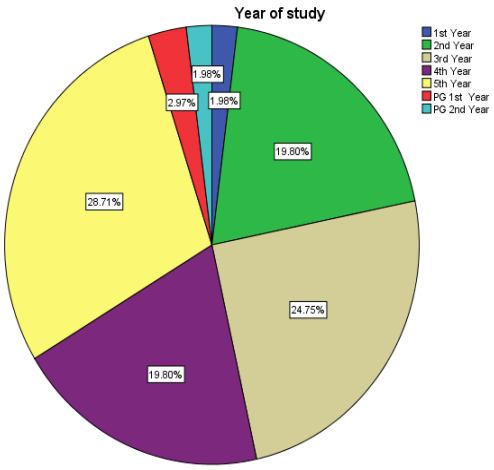

Figure 2: Pie chart representing the frequency distribution of Year of study. 28.71% of the students belonged to 5th year, 24.74% of the students were 3rd years, 19.8% of the students were 4th years, 19.8% of the students were 2nd years, 2.97% of the students belonged to PG 1st year, 1.98% of the students belonged to PG 2nd year and 1.98% of the students were 1st years.

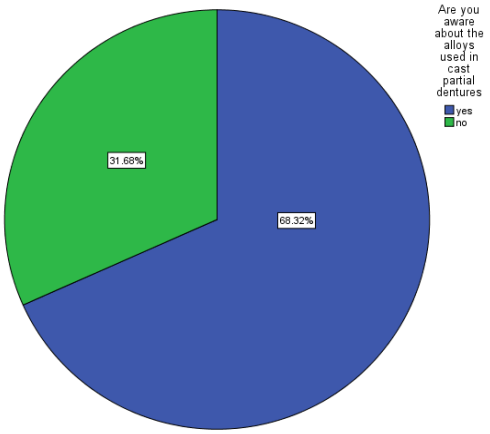

Figure 3: Pie chart representing the frequency distribution of the awareness of students on alloys used in cast partial dentures. 68.32% of the students said they were aware and 31.68% said they were not.

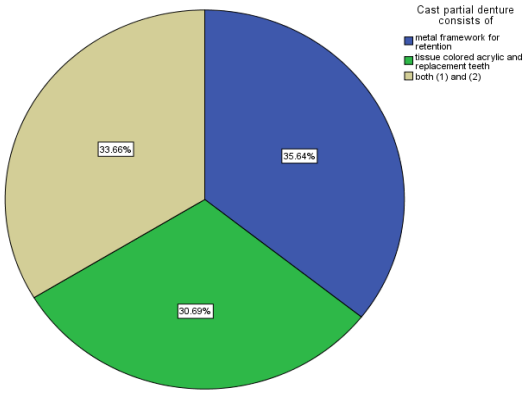

Figure 4: Pie chart representing the frequency distribution of the knowledge on the constituents of cast partial denture. 35.64% of the students said it is mainly consisted of metal framework for retention, 33.66% of the students said both (1) and (2) and 30.69% of the students said it consisted of acrylic and replacement teeth.

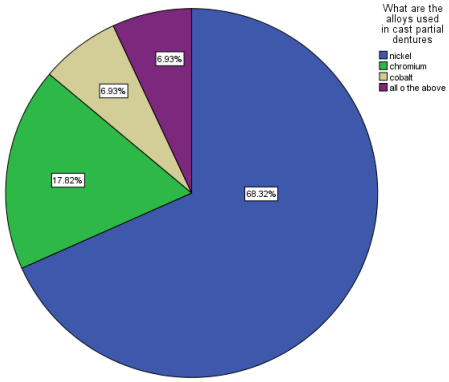

Figure 5: Pie chart representing the frequency distribution of knowledge on the alloys used in cast partial dentures. 68.32% of the students said cast partial dentures are made up of nickel, 17.82% of the students said it is made up of chromium, 6.93% of the students said cobalt and 6.93% of the students said all of the above.

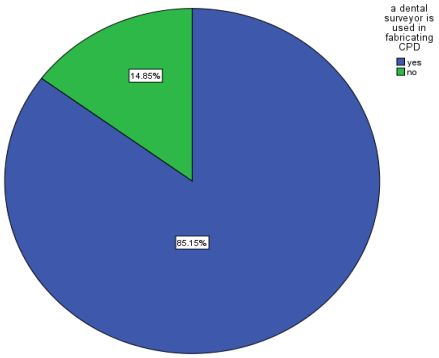

Figure 6: Pie chart representing the frequency distribution of the knowledge if a dental surveyor is used in fabricating cast partial denture. 85. 15% of the students said yes and 14.85% of the students said no.

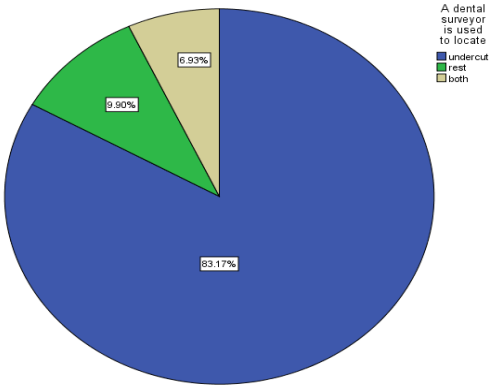

Figure 7: Pie chart representing the frequency distribution whether a dental surveyor is used to locate undercut, rest or both. 83.17% of the students said undercut, 9.90% of the students at rest and 6.93% of the students said both.

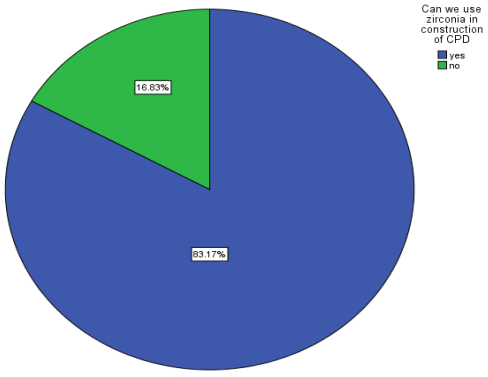

Figure 8: Pie chart representing the frequency distribution of the use of zirconia in construction of cast partial denture. 83.17% of the students said yes zirconia is used in construction of CPD whereas 16.83% of the students said no.

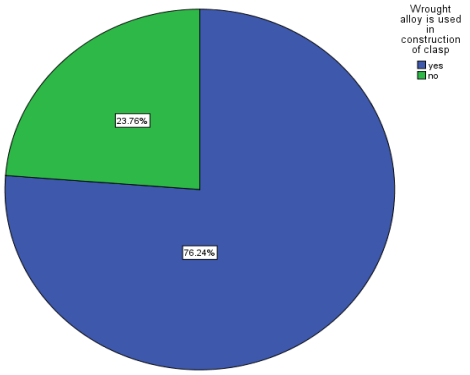

Figure 9: Pie chart representing the frequency distribution of the knowledge of wrought alloy used in construction of clasp, where 76.24% of the students said yes and 23.76% of the students said no.

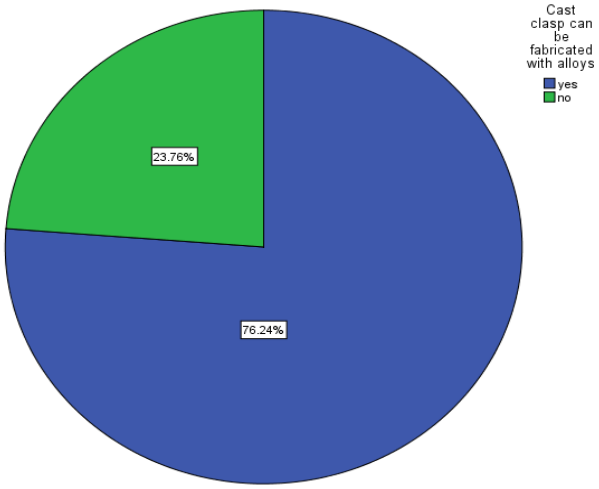

Figure 10: Pie chart representing frequency distribution if cast clasp can be fabricated where 76.24% of the students said yes and 23.76% of the students said no.

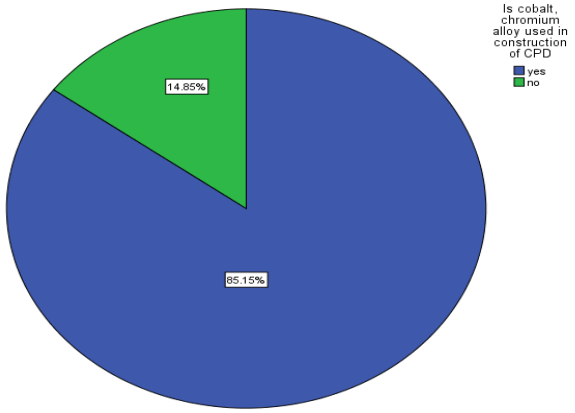

Figure 11: Pie chart representing the frequency distribution of the knowledge on the use of cobalt chromium alloys in construction of cast partial denture where 85.15% of the students said yes it is used whereas 14.85% of the students said no.

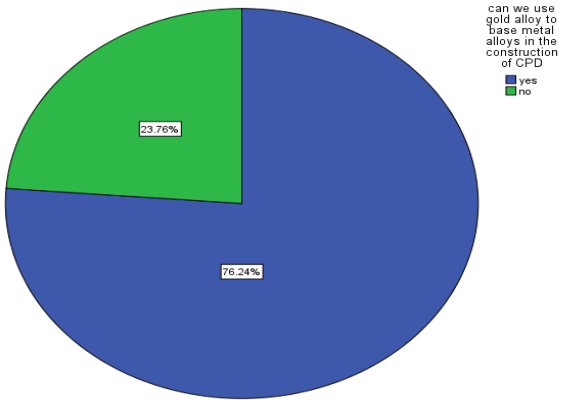

Figure 12: Pie chart representing the frequency distribution on the use of gold alloys as base metal in construction of cast partial denture. 76.25% of the students said yes and 23.76% of the students said no.

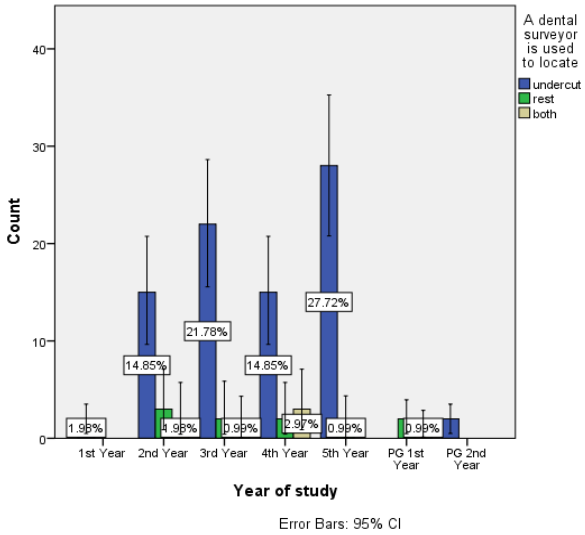

Figure 13: Bar chart depicting the association between year of study and the knowledge on the use of a dental surveyor in locating undercut, rest or both. X axis represents the year of study and Y-axis represents the number of responses. Majority of the students belonging to 5th year(blue) said that a dental surveyor is used to locate undercut(27.72%), 1.98% of the students belonged to 1st year said it is used to locate rest(green), and 0.99% of the PG 1st year students said it is used to locate both(white). The P value was found to be 0.024(p value<0.05) which was found to be statistically significant.

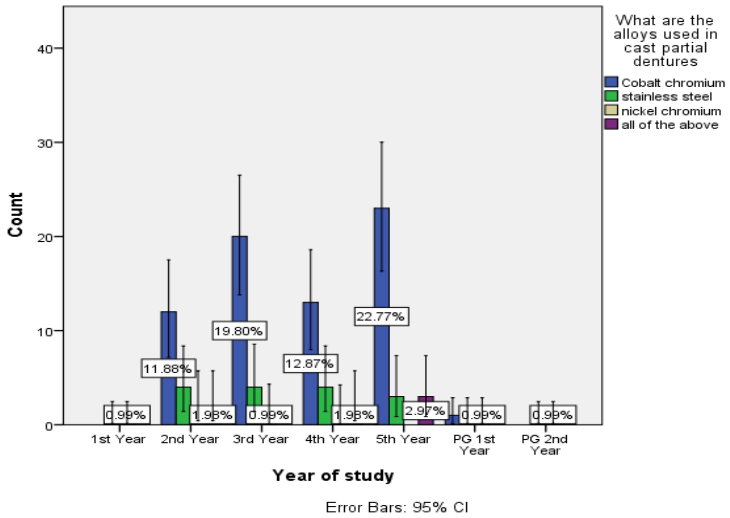

Figure 14: Bar chart depicting the Association between year of study and the knowledge about the various alloys used in cast partial dentures. X axis represents the year of study and the Y- axis represents the number of responses. 22.77%of the 5th year students said that cobalt chromium is the commonly used alloy in cast partial dentures(blue), 1.98% of the 4th year students said stainless steel is commonly used in cast partial dentures(green), 0.99% of the 1st year students said that nickel chromium is commonly used alloy in cast partial dentures(white). The p value was found to be 0.062(p value<0.05) which was found to be statistically insignificant.

DISCUSSION:

The survey consisted of 12 questions. The questionnaire consisted of questions like gender, where 51.49% of the males participated in the survey and 48.51% of females participated in the survey. 28.71% of the students belonged to 5th year, 24.74% of the students were 3rd years, 19.8% of the students were 4th years, 19.8% of the students were 2nd years, 2.97% of the students belonged to PG 1st year, 1.98% of the students belonged to PG 2nd year and 1.98% of the students were 1st years.The students were asked if they were aware about the alloys used in cast partial dentures where 68.32% of the students answered yes and 31.68% of the students answered no. When the students were asked what does cast partial denture consist of, 35.64% of the students said it consisted of a metal framework which is used for retention, 33.66% of the students said both one and two and 30.69% of the students it it consisted of tissue coloured acrylic and a replacement teeth. Around 68.32% of the students said nickel is the commonly used alloy in cast partial denture, 17.82% of the students said chromium, 6.93% of the students said cobalt and 6.93% of the students said all of the above. When the students were asked if Dental surveyors were used in fabricating cast partial dentures 85.15% of the students said yes and 14.85% of the students said no. When the students were asked what a dental surveyor located, around 83.17% of the students undercut, 9.90% of the students and rest and 6.93% of the students said both.

When the students were asked if zirconia can be used in construction of clasp,83.17% of the students said yes and 16.83% of the students said no. 76.24% of the students said wrought alloy can be used in construction of clasp and 23.76% of the students said it cannot be used. Around

76.24% of the students and cast clasp can be fabricated with alloys and 23.76% of the students said no. When the students were asked if cobalt, chromium alloys can be used in construction of cast partial dentures, around 85.15% of the students said yes and 14.85% of the students said no. Around 76.24% of the students said yes to gold and can be used as a base metal in the construction of cast partial denture whereas 23.76% of the students had no. The association between year of study and the knowledge on the use of a dental surveyor in locating undercut, rest or both was done. The chi square test was performed The p value was found to be 0.024(p value<0.05) which was found to be statistically significant. The association between year of study and the knowledge of the use of various alloys used in cast partial dentures was done. The chi-square test was performed. The P value was found to be 0.062(p value<0.05) which was found to be statistically insignificant.

Previous studies suggest that metal castings in dentistry are used to fabricate hollow mold, by pouring molten metal and solidifying the metal ,solid metal casting from the mold(33). The metal casting is used for restoring the teeth, replacing the missing teeth, and is used as frameworks for removable partial dentures(10). Previous studies done by Debarchitha suggest that various types of metals are used in dentistry, since many years The properties, and the reaction within the oral cavity should be understood(34). Alloys are made of two or more metals(10,35). A study showed that dental students are aware of the use of noble metal alloys and its various superior properties in the fabrication of a fixed partial denture(36). A study by Youssef Al Jabbari shows that Cobalt-Chromiumalloys are base-metal alloys and are known mainly for their biomedical applications in the orthopedic and dental fields. In dentistry, Co-Cr alloys are used in the fabrication of metallic frameworks of removable partial dentures and now in recent times they have been used as metallic substructures and implants (37). A study by Joe Zhou concludes that various metal alloys used in prosthodontic restorations should be biocompatibility issues should be mainly focused, so that dentists prescribe patients with optimum metal alloy for each type of restoration (38).

Limitations of the study is that the population of the present study population includes only 101 students. It needs a large population that can be widely extended to create more awareness about the use of alloys in cast partial dentures among dental students. So when the study is widespread more results on students' awareness can be analysed.

CONCLUSION:

Cast partial denture provides better results because of its ability of retention ,excellent masticatory efficiency, comfort, and maintenance of periodontal health.The present study concludes that many dental students are aware about the alloys used in cast partial dentures. It was noteworthy that the study participants considered it important to know the use of various alloys used in cast partial dentures. Male dental students had better knowledge about the use of alloys in cast partial dentures than female dental students. Further the survey can be done among a wide scale population to increase the knowledge, awareness about the alloys used in cast partial dentures.

CONFLICT OF INTEREST: Nil

ACKNOWLEDGEMENT: I would like to thank Saveetha Dental college for giving me this wonderful opportunity to perform this study.

SOURCE OF FUNDING:

- Saveetha Institute of Medical and Technical Sciences
- Saveetha Dental College
- Minda Industries Ltd, Hosur.

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