

# KNOWLEDGE, AWARENESS AND PRACTICE REGARDING THE USE OF NOBLE METAL ALLOYS IN FIXED PARTIAL DENTURE AMONG THE DENTAL STUDENTS- A PILOT SURVEY

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## ABSTRACT:

**Aim:-** To assess the knowledge, attitude and practise regarding the use of noble metal alloys in fixed partial denture among the dental students.

**Objective:-** To determine the awareness and practise about the use of noble metal alloys in fixed partial denture among the dental students.

**Materials and methods:-** A closed- ended questionnaire comprising 10 questions were given 100 dental students and their responses were analysed and tabulated.

**Results:-** Majority of the dental students are aware about the use of noble metal alloys in the fabrication of a fixed partial denture. About 70% of the students consider that precious metal is favourable for the fabrication of a fixed prosthesis. A vast number of students preferred the use of noble metal alloys during the fabrication of a fixed prosthesis so as to have an accurate fit on the mouth. 85% of that subjects imply that noble metal alloys improves the workability, burnish ability and density. In the study, more than half the subjects (63%) feel that the noble metal alloys bond better with porcelain.

**Conclusion:-**The dental students are aware of the use of noble metal alloys and its various superior properties in the fabrication of a fixed partial denture. Therefore various awareness lectures or programmes should be conducted among the dental students so as to further increase their knowledge about the noble metal alloys.

**Key words:-** Alloy, fixed partial denture, noble metal, survey

## INTRODUCTION:-

Noble metals used for dental castings consist of alloys of gold, palladium, and silver with smaller amounts of iridium, ruthenium, and platinum. The majority are used as a template for additional ceramic veneering. The alloy is selected based on long-term clinical data, physical properties, esthetic potential and laboratory data on bond strength and thermal compatibility with commercial dental porcelains. Gold-based alloys, may appear to be expensive compared with the palladium-based alloys, they have clearly established their clinical integrity and acceptability over an extended period of time. Apart from the relatively low sag resistance of the high gold-low silver content alloys and the potential thermal incompatibility with some commercial porcelain products, few clinical failures have been observed. The palladium-based alloys are less costly than the gold-based alloys. Palladium-silver alloys require extra precautions to minimize porcelain discoloration. Palladium-copper and palladium-cobalt alloys may also cause porcelain discoloration, as copper and cobalt are used as colorants in glasses. The palladium-cobalt alloys are least susceptible to high-temperature creep compared with all classes of noble metal alloys.

High noble alloys contain 40% gold. Gold- platinum alloy is one of the high noble alloys which are developed as an alternative to palladium alloys. They are used for full cast as well as metal-ceramic restorations. These alloys are limited to short span bridges as they are more prone to sagging. Since palladium has a very high melting temperature, impart a white or grey color and improves sag resistance, gold-palladium alloy can be used as a noble alloy for the fabrication of full cast or metal ceramic restorations. Gold-palladium alloy also consists of indium, tin or gallium which promotes an oxide layer.

Noble alloys contain at least 25% by weight of noble metal such as gold, palladium or silver. Gold-copper-silver-palladium alloy has more of copper and silver. These alloys have a fairly low melting temperature and are more prone to sagging during application of porcelain. This alloy is mostly used for full cast restorations. Palladium-copper-gallium alloys are basically very rigid and is an excellent alloy for the fabrication of full cast restorations or porcelain-fused to metal restorations. Palladium-silver and silver-palladium alloys are more susceptible to corrosion and greening of porcelain. They are very rigid and hence can be

used for longer duration in case of porcelain-fused to metal restorations. These alloys are more castable, easier to solder and easier to work with than the base metal alloys.

Apart from noble metal alloys, various base metal alloys are also used in the fabrication of fixed partial denture. Dental students are exposed to fabrication of fixed partial denture with noble and base metal alloys in varying degrees and few studies are available in the literature reporting the knowledge, awareness and practise regarding the use of noble metal alloys for fixed partial denture amongst dental students. And hence, this study was initiated to explore this further.

#### AIM AND OBJECTIVE:-

To assess the knowledge, attitude and practise regarding the use of noble metal alloys in fixed partial denture among the dental students.

Null hypothesis:-

Knowledge, awareness and practise of noble metal alloys to fixed partial denture is inadequate among dental students.

Alternative hypothesis:-

Knowledge, awareness and practise of noble metal alloys to fixed partial denture is adequate among dental students.

#### MATERIALS AND METHODS:-

A self-administered anonymous questionnaire of 10 questions were given to the dental students. The questionnaire was sent to 117 dental students and 100 of them responded to the questions and the response rate was 85.47%. Out of 100 participants, 73 (73%) were females and 27 (27%) were males. All the respondents were persuing internship in their undergraduate dental surgery course.

The response to the questions were extracted and tabulate . Then, the rate was subjected to analysis and the results were interpreted.

#### QUESTIONNAIRE

Name:-

Age:-

Gender:-

1. Are you aware about the use of noble metal alloys in fixed partial denture?  
(a) Yes                      (b) no
2. In your opinion, which material is favourable for the fabrication of a fixed partial denture?  
(a) Precious              (b) semi-precious              (c) non- precious
3. Are you aware about the composition of noble metal alloys used in FPD?  
(a) Yes                      (b) no
4. Do you think the noble metal alloys are easier to cast and polish during the fabrication of FPD?  
(a) Yes                      (b) no
5. Do you think the restorations made with noble metal alloys have an accurate fit on the tooth?  
(a) Yes                      (b) no
6. Do you think the noble metal alloys bond better with porcelain?  
(a) Yes                      (b) no
7. Do you think the noble metal alloys offer superior corrosion and tarnish resistance?  
(a) Yes                      (b) no

8. Do you think the noble metal alloys offer broad range of hardness and strength for casting fixed restorations as compared to that of chromium type alloys?  
(a) Yes (b) no
9. Do you think the noble metal alloys improves the workability, burnish ability and density?  
(a) Yes (b) no
10. Will you recommend the use of noble metal alloys in your dental practise?  
(a) Yes (b) no

**RESULTS:-**

QUESTION	YES (%)	NO(%)
Are you aware about the use of noble metal alloys in FPD?	68%	32%
Are you aware about the composition of noble metal alloys in FPD?	15%	85%
Do you think the noble metal alloys are easier to cast and polish during the fabrication of FPD?	75%	25%
Do you think the restorations made with noble metal alloys have an accurate fit on the tooth?	80%	20%
Do you think the noble metal alloys bond better with porcelain?	63%	37%
Do you think the noble metal alloys offer superior corrosion and tarnish resistance?	90%	10%
Do you think the noble metal alloys offer broad range of hardness and strength for casting fixed restoration as compared to that of chromium type alloys?	70%	30%
Do you think the noble metal alloys improves the workability, burnish ability and density?	85%	15%
Will you recommend the use of noble metal alloys in your dental practise?	88%	12%

Material considered favourable by the dental students for the fabrication of a fixed partial denture:-

MATERIAL OF CHOICE	PREFERENCE PERCENTAGE
PRECIOUS	70%
SEMI-PRECIOUS	30%
NON-PRECIOUS	0%

**DISCUSSION:-**

In this pilot survey, the basic aim was to reveal the knowledge, attitude and practise regarding the use of noble metal alloys in fixed partial denture among the dental students. The survey was conducted among the dental students.. A total of 100 students participated in this survey. A self- administered questionnaire comprising of 10 questions were given to them and the results obtained were analysed in percentage and tabulated.

The results of the study rejected the null hypothesis and inferred the dental students adequate knowledge and awareness about the use of noble metal alloys in fixed partial denture.

Majority of the dental students (68%) are aware about the use of noble metal alloys in the fabrication of a fixed partial denture. Whereas only 32% of the students had a very little knowledge and awareness regarding the use of noble metal alloys in the fixed prosthesis. About 70% of the students consider that precious metal is favourable for the fabrication of a fixed prosthesis whereas 30% of the students consider semi-precious metal to be ideal for the fabrication of a fixed partial denture. None of the students preferred using a non-precious metal in a fixed prosthesis. A large number of students (85%) are not aware about the composition of noble metal alloys used in the fabrication of a fixed partial denture. 75% of the subjects think that noble metal alloys are easier to cast and polish during the fabrication of a fixed partial denture. A vast number of students (80%) preferred the use of noble metal alloys during the fabrication of a fixed prosthesis so as to have an accurate fit on the mouth.

Ashok et al, reported with 12% breakage of the fixed prosthesis postoperatively. This in turn can be overcome with the use of noble metal alloys in the fabrication of the fixed partial denture.

Akbar et al, studied about the complaints among patients wearing the metal- ceramic fixed partial denture. They reported that 11.2% of fracture has occurred with the use of metal-ceramic fixed partial denture. Results of this study revealed that porcelain fracture was caused by fatigue of the materials used like metal alloys, porcelain and acrylic.

This study is in accordance with the results discussed by Lopes, S. Consani et al, wherein the fit of noble metal alloys have an accurate fit on the crowns with different marginal configurations thereby enhancing the strength of the fixed partial denture.

B. Henriques et al, in his study, optimized the bond strength between gold alloy and porcelain through a composite interlayer obtained by powder metallurgy.

In the study, more than half the subjects (63%) feel that the noble metal alloys bond better with porcelain. About 90% of the students preferred the use of noble metal alloys as they offer superior corrosion and tarnish resistance to the fixed prosthesis. Majority of the students (70%) think that noble metal alloys do not offer broad range of strength and hardness for casting fixed restorations as compared to that of chromium type alloys. 85% of that subjects imply that noble metal alloys improve the workability, burnish ability and density.

However, most of the students preferred the use of noble metal alloys in their dental practice during the fabrication of the fixed partial denture because the noble metal alloys offer many superior properties as compared to that of the other metals or alloys.

#### CONCLUSION:-

The study discusses about the basic properties of noble metal alloys and their uses in the fabrication of the fixed partial denture. These noble metal alloys play an extensive role in the fabrication of a fixed prosthesis. Because of its superior properties such as resistance to tarnish and corrosion, ability to bond better with porcelain, broad range of strength and hardness for casting fixed restorations, accurate fit on the tooth, these noble metal alloys result in better outcome of the treatment as well as patient's satisfaction. Hence, noble metal alloys should be employed for use in the fabrication of fixed prosthesis in the dental practice. Various Awareness programmes should be conducted so as to encourage the use of noble metal alloys among the practising dentists.

#### REFERENCES:-

- [1] Givan A A, Precious Metals in Dentistry, Dent Clin N Am vol 51 2007; 591-601
- [2] Wataha J C, Alloys for prosthodontic restorations, J Prosthet Dent 2002; 87:351-63
- [3] Lopes, Consani S et al, influence of recasting palladium- silver alloy on the fit of crowns with different marginal configurations, J Prosthet dent; 94, 5:430-434
- [4] B. Henriques et al. Optimization of bond strength between gold alloy and porcelain through a composite interlayer obtained by powder metallurgy. Materials Science and Engineering A 528 (2011) 1415-1420
- [5] Wataha J C, Casting alloys, Dent Clin N Am 48 (2004) 499-512
- [6] Kanstrom L, Zamaro G, Sjosted C. Healthy ageing profiles. Geneva, World Health Organization; 2008. [www.euro.who.int/\\_\\_\\_\\_\\_/RC62wd10Rev1-Eng](http://www.euro.who.int/_____/RC62wd10Rev1-Eng).
- [7] Joanne N. Walton; F. Michael Gardner; John R. Agar – A survey of crown and fixed partial denture failures; J. Prosthet., Dent; October 1986; vol. 56, issue 4; 416- 421.
- [8] Lindquist F. Karlsson S.- Success rate and failures for fixed partial dentures after 20 years of service; Part 1; Int.J.Prostodont.; 1998; Mar-Apr; 11 (2); 133 – 8.
- [9] Charles J. Goodacre; Guillermo Bernal, et.al. - Clinical complications in fixed prosthodontics; J. of Prosthet. Dent.; 2003, July, 90 (1), 31 – 41.
- [10] Alex Selby – Fixed prosthodontic failure; A review and discussion of important aspects – Australian Dental Journal.; 1994, June, vol. 39, (3); 150 -6.