

A Survey to Assess the Knowledge and Awareness of Zirconia as Fixed Prosthesis among Dental Students

Bitragunta Rajendra Prasad, Lagadapati Sri Charitha, Reddy Priya Darshini, Pathuri Raveen Teja, Yerra Samanvitha, Swetha Jujavarapu

Department of Prosthodontics and Crown and Bridge, GSL Dental College and Hospital, Jagannadhapuram Agraharam, Andhra Pradesh, India.

Abstract

Background: Zirconia dental crowns are emerging as a top choice for both esthetic enhancement and long-term durability in dental restoration. Zirconia's versatile properties make it a valuable asset in various clinical scenarios due to its exceptional mechanical strength, chemical stability, and optical characteristics. Hence, knowledge and awareness regarding the availability and usage of zirconia crowns in various clinical situations are necessary among dental students. **Materials and Methods:** The present study was a questionnaire-based, cross-sectional survey that was distributed through an online link and circulated among the dental students which contained 20 custom-designed, multiple-choice, open-ended, and check-listed questions related to zirconia crowns. **Results:** The results revealed that 96.8% of participants were aware of dental crowns and among which 93.6% were aware that zirconia is a material for crowns. About 86.4% were aware that zirconia can be customized according to shade, 42.4% believed that zirconia caused wear of opposing teeth, and 80.6% preferred zirconia for long-span and short-span bridges. **Conclusion:** From the present study, it can be observed that most of the respondents were aware of the availability of zirconia but were unsure about its properties. Hence, knowledge regarding zirconia as a choice for dental crowns should be encouraged.

Keywords: All-ceramic, Monolithic, Zirconia crowns.

INTRODUCTION

An increase in public demand for a natural look and metal-free options has spurred the development of various esthetic ceramic restorations.^[1] Ceramic crowns can be fabricated from various ceramic materials, including lithium disilicate, zirconia, leucite-reinforced glass, and glass-infiltrated alumina. These newer metal-free crowns are becoming increasingly popular in dental practice.^[2]

Zirconia is considered one of the most promising ceramics because of its excellent mechanical properties and esthetics.^[3,4]

It is a resilient white ceramic material and closely replicates the natural look of teeth. Zirconia's versatile properties make it a valuable asset in various clinical scenarios due to its exceptional mechanical strength, chemical stability, and optical characteristics. Its superb biocompatibility further enhances its suitability for diverse dental applications.^[5] In addition, zirconia crowns tend to accumulate less plaque compared to other materials, thanks to their highly polished surface.

Despite the advancements in ceramics, it is unclear how much of this new knowledge actually reaches dental students. The introduction of new materials and their applications in dentistry

necessitates that dentists engage in study and training to ensure the best choices for each case.^[6] Hence, the aim of this questionnaire-based study was to assess the knowledge and awareness regarding the use of zirconia as a means of fixed prosthesis among dental students.

MATERIALS AND METHODS

The present study was a questionnaire-based, cross-sectional survey that was carried out among dental students in East Godavari District. The 18–27 years age group was included in this study with a male predilection of 123 and a female predilection of 402. The questionnaire was distributed through an online link and circulated among the dental students for ease of accessibility and distribution which contains demographic

Address for correspondence: Dr. L.Sri Charitha,
Department of Prosthodontics and Crown and Bridge
GSL Dental College and Hospital, Jagannadhapuram Agraharam,
Andhra Pradesh, India.
Email: sricharithalagadapati@gmail.com

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Table 1: Questionnaire and comparison of responses regarding awareness of zirconia crowns among dental students

S. No.	Question	Responses	%	P-value
1	Are you aware of dental crowns	Yes	96.8	<0.001
		No	3.2	
2	What are various materials used for the fabrication of dental crowns	Metal	0	<0.001
		Metal-ceramic	2	
		Zirconia	4.8	
		All-ceramic	2.4	
		All of the above	90.8	
3	Are you aware of zirconia as material for dental crown	Yes	93.6	<0.001
		No	6.4	
4	Zirconia can be used as ^[7]	Crown and bridge	22.8	<0.001
		Implants	2.4	
		Post	0.4	
		All of the above	74.4	
5	What property of zirconia makes you suggest it ^[8]	Superior esthetics	6.8	<0.001
		High strength	6.4	
		Excellent biocompatibility	0.8	
		All of the above	86	
6	Does zirconia cause wear of opposing teeth	Yes	42.4	0.376
		No	57.6	
7	Are you aware of the different types of zirconia available	Yes	60	0.487
		No	40	
8	Lifespan of zirconia ^[9]	5 years	20.4	<0.001
		10 years	50	
		15 years	29.6	
9	Are zirconia and all ceramic crowns similar	Yes	31.6	<0.001
		No	68.4	
10	Which of the following is zirconia crowns	Option 1	11.2	<0.001
		Option 2	24	
		Option 3	64.8	
11	Which is more esthetic	Zirconia	66.8	<0.001
		All-ceramic	33.2	
12	Which is more costlier	Zirconia	79.6	<0.001
		All-ceramic	20.4	
13	Which type of zirconia has more strength ^[10]	Monolithic	27.6	<0.001
		Multi-layered	72.4	
14	Which type of crown is preferred for dark-colored tooth	Zirconia	55.2	<0.001
		All-ceramic	21.2	
		Metal -ceramic	23.6	
15	Can zirconia be customized according to the shade	Yes	86.4	<0.001
		no	13.6	
16	What should be the thickness of zirconia crowns	2 mm	29.6	<0.001
		1.5 mm	59.2	
		1 mm	11.2	
17	Can zirconia crowns be used for long-span bridges ^[11]	Yes	80.4	<0.001
		No	19.6	
18	Which finish line should we prefer for zirconia crowns	shoulder	64.8	<0.001
		chamfer	35.2	
19	Which luting agent to be preferred for zirconia crowns ^[12]	Glass ionomer cement	52.8	<0.001
		Zinc Phosphate	23.6	
		Resin cement	23.6	
20	Does luting agent shade affect zirconia crowns	Yes	35.6	0.205
		No	23.2	
		May be	41.2	

details and questions related to knowledge and awareness regarding zirconia crowns.

Twenty custom-designed, multiple-choice, open-ended, and check-listed questionnaires were fabricated (Table 1). The questionnaire required responses of “yes,” “no,” or “maybe.” The sample size was determined based on the study’s convenience. All collected data were analyzed, and visual representations of the findings were created.

RESULTS

A total of 525 responses were recorded of which females showed more awareness about zirconia crowns when compared to males (Table 1).

The results revealed that 96.8% of participants were aware of dental crowns and among which 93.6% were aware that zirconia is a material for crowns, with only 6.4% being unaware of its availability. Regarding their knowledge of zirconia products, 22.8% were familiar with zirconia crowns and bridges, 2.4% knew about zirconia implants, 0.4% were aware of zirconia posts, and a majority of 74.4% had knowledge of all these zirconia products. 42.4% believed that zirconia caused wear of opposing teeth whereas 57.6% were unaware. About 80.6% preferred zirconia for long-span and short-span bridges but 19.4% preferred for short-span bridges. When analyzed regarding the thickness of zirconia for dental crowns, 29.6% of participants chose 2 mm, 59.2% chose 1.5 mm whereas 11.2% preferred 1 mm.

It was found that 6.8% of participants chose zirconia products for their superior esthetics, 6.4% for their high strength, 0.8% for their excellent biocompatibility, and the remaining 86% chose all these three factors are important. About 60% of participants were aware of different types of zirconia available and 72.4% believed that multi-layered zirconia has more strength compared to monolithic zirconia.

86.4% were aware that zirconia can be customized according to shade. It was also observed that 66.8% of participants felt that zirconia has superior esthetics and 79.6% of participants felt that zirconia is costlier compared to all-ceramic. When assessing preferences for crowns for dark-colored teeth, 55.2% preferred zirconia, 21.2% preferred all-ceramic, and 23.6% preferred metal-ceramic crowns.

Analysis of material choice for luting zirconia crowns showed that 52.8% of participants preferred using glass ionomer cement, and 23.6% of participants preferred zinc phosphate and resin cement. 35.6% were aware that luting agent shade affects zirconia crowns whereas 23.2% were unaware and 41.2% were unsure about its impact.

DISCUSSION

For full-coverage restoration of severely compromised teeth, porcelain-fused-to-metal crowns have long been considered the “gold standard” due to their reliability.^[6] Moreover, 30 years of

clinical use. An appropriate veneering porcelain can be used to mask the underlying cast-metal coping, creating a tooth-like restoration. However, the gray color and opacity of the metal require a thick opaque layer, which can make it challenging to achieve esthetics that closely mimic a natural tooth.^[13]

Today, zirconia crowns are gaining popularity as a more esthetically pleasing and biocompatible alternative for full-coverage restorations, including in the posterior regions of the mouth. They offer excellent esthetic properties, including color stability, wear resistance, and biocompatibility. They can be made from a single material (monolithic) or in a bilayered configuration, where a high-strength ceramic coping is covered with matching veneering porcelain. This approach helps to reduce issues such as veneer chipping and improves the overall durability and appearance of the restoration.^[14,15]

When esthetics are crucial, all ceramics are preferred as they can effectively mimic the natural appearance of tooth substance. However, ceramics are brittle materials^[14] that can be easily fractured.

The primary challenge with metal-free restorations has been that ceramic materials often have micro defects in their structure, which can expand over time and eventually cause fractures and failure of the prostheses.^[16,17] While this issue affects nearly all ceramic materials, zirconia differs in that it can overcome this problem through a process called “transformation toughening.” In this process, zirconia transforms from a tetragonal phase to a monoclinic phase ($t \rightarrow m$), significantly enhancing its strength and durability.^[18]

The knowledge and awareness regarding the availability and usage of zirconia crowns in various clinical situations is necessary among dental students. They must recognize the significance of material choice when fabricating fixed prostheses, making it essential to have proper knowledge and to enhance both the educational process and clinical application of this knowledge.

CONCLUSION

From the present study, it can be observed that most of the respondents were aware of the availability of zirconia but were unsure about its properties. Hence, knowledge regarding zirconia as a choice for dental crowns should be encouraged. The results of this study highlighted the importance of ongoing education and better preparation for dental students on the use of zirconia for metal-free restorations.

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