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Edited by Vini Mehta

E-mail: vmehta@statsense.in

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Knowledge and perspectives on osteo-odonto-keratoprosthesis among the Riyadh Elm dental community

Abbasi Begum Meer Rownaq Ali^{1,*}, Shaden Nife Abdullah Al Omary¹, Afnan Abdulmalek Qaseem Ali¹, Reem Farhan Aqeel Alanazi¹, Hina Kausher¹, Tamam Altrkawi² & Oubada M.R Suliman³

¹Department of Applied Medical Sciences, College of Pharmacy, Nursing and Medical Sciences, Riyadh Elm University, Riyadh-Kingdom Saudi Arabia; ²Department of Preventive Dentistry, College of Medicine and Dentistry Riyadh Elm University, Riyadh-Kingdom Saudi Arabia; ³Department of Prosthodontics, College of Medicine and Dentistry Riyadh Elm University, Riyadh-Kingdom Saudi Arabia; *Corresponding author

Affiliation URL:<https://www.riyadh.edu.sa/>**Author contact:**

Abbasi Begum Meer Rownaq Ali - E-mail: abbasi.begum@riyadh.edu.sa
Shaden Nife Abdullah Al Omary - E-mail: shaden.n.alamri2021@student.riyadh.edu.sa
Afnan Abdulmalek Qaseem Ali - E-mail: afnan.a.ali2021@student.riyadh.edu.sa
Reem Farhan Aqeel Alanazi - E-mail: reem.a.alanazi2019@student.riyadh.edu.sa
Hina Kausher - E-mail: hina.kausher@riyadh.edu.sa
Tamam Altrkawi - E-mail: dr.tammam@riyadh.edu.sa
Oubada M R Suliman - E-mail: oubada.suleiman@gmail.com

Abstract:

The osteo-odonto-keratoprosthesis (OOKP) is a novel and effective treatment option for patients with end-stage corneal disorders who have a poor prognosis for conventional corneal transplantation. Therefore, it is of interest to understand the level of awareness, knowledge and perception among the dental professionals about their potential role in Osteo-Odonto-Keratoprosthesis. Background characteristics of the participants and responses for the knowledge, practice and awareness of OOKP were analysed using descriptive analysis. The association between different variables was determined via the Chi-square test. Majority of the study population are unaware of the term OOKP. There was a positive correlation with the years of experience, knowledge and awareness among the study population. Thus, data shows a growing need for increasing the knowledge awareness among the dental fraternity about OOKP.

Keywords: Osteo-Odonto-Keratoprosthesis (OOKP), corneal disorders, vision restoration, dental professionals

Background:

The leading cause of vision impairment worldwide, after cataracts, is still corneal blindness [1]. In many situations, traditional corneal grafting is a good option but when there is significant damage to the ocular surface, it frequently fails and requires alternative therapies, such as keratoprosthesis [2, 3]. A novel and successful treatment option for individuals with end-stage corneal disorders who have a poor prognosis for corneal transplantation is the osteo-odonto-keratoprosthesis (OOKP). OOKP is a technique pioneered by Strampelli during the 1960s, which involves using autogenous teeth and alveolar bone as a base on which an optical cylinder is implanted [4, 5]. The technique is highly advantageous when other forms of therapy are not effective due to extensive dryness and scarring as seen in conditions like Stevens-Johnson syndrome, chemical burns and ocular cicatricial pemphigoid [6]. There are various developments in the technique such as the use of the Rome-Vienna protocol among others that are contributing significantly to success in the application [7]. Challenges include complications such as glaucoma, lamina resorption and mucosal overgrowth in post-op management [8]. Therefore, it is of interest to increase awareness amongst dental professionals would improve inter-professional teamwork, provide early referral and education opportunities and allow for innovations in maxillofacial prosthetics.

Materials and Methods:**Study design:**

This is a cross-sectional study, designed to obtain qualitative and quantitative information regarding the knowledge, awareness and perception of Osteo-Odonto-Keratoprosthesis for Vision Restoration among Dental and Medical

Professionals and Students at Riyadh Elm University, Kingdom of Saudi Arabia.

Data collection methods:

A self-administered questionnaire will be developed based on literature search. The questionnaire will contain 4 sections (i) participants' demographic data (total number of questions under this section: 3), (ii) OOKP knowledge (total number of questions under this section: 7), (iii) OOKP awareness (total number of questions under this section: 6) and (iv) Future Perspectives on OOKP (total number of questions under this section: 4).

Sample characteristic:**Inclusion criteria:**

This study will include dentists, dental specialist as well as dental students.

Exclusion criteria:

Para medical students and dental students from basic levels were excluded from the study.

Validation of questionnaire:

Questionnaire was subjected to face validation as well as pilot testing was conducted among a small group of sample population.

Sample size:

The representative sample in this study was among dental students currently undergoing clinical training as well as dental practitioners currently practicing to represent the study population. A simple random sampling was used for selecting participants in this study. This ensured that every member of

the population had an equal chance of being included in the study. This further reduced the risk of bias and increases the representativeness of the sample population. Raosoft software was used to calculate the sample size. The sample size will be determined based on 726 estimated population size, a 5% margin of error, 95% confidence interval and 50% response distribution. The estimated sample size will be $n = 252$.

Survey administration:

This is a web-based survey and data was collected via Google Form. This study was conducted for three (3) months, from May, 2025 to August, 2025. Information about the study and invitation to participate in the study was sent via email by the Research Centre to all dental students in training and dental practitioners currently practicing in Riyadh Elm University Hospital. The google form link was included in the email for participation. The objectives of the study were informed to all respondents and participation is voluntary. Informed consent was obtained from all study participants. The confidentiality and anonymity of participants was protected. Measures were implemented to minimize multiple participation such as using email address to log in to the survey link, limiting the number of attempts per email and data cleaning process post data collection.

Study preparation:

The investigators were oriented in a session regarding the study questionnaire and modes of administration.

Ethical approval:

The study was submitted to the institutional review board (IRB) at Riyadh Elm University (REU) and followed REU's IRB policies and procedures. IRB was obtained from the institutional review board with approval number "FUGRP/2025/436/1277/1196".

Statistical analysis:

Background characteristics of the participants and responses for the knowledge, practice and awareness of OOKP were analysed using descriptive analysis. Data was presented as mean $\pm$ SD, frequency and percentage. The association between different variables was determined via the Chi-square test. All statistical analyses were carried out using IBM SPSS Statistics Version 25. P-value <0.05 is considered to be statistically significant.

Results:

Numbers of respondents were 488. Professionals or faculty members accounted for 282 (57.8%) participants among students or interns, whereas 206 (42.2%) were students or interns. Among all respondents, there were 254 females (52.0%) and 234 males (48.0%). The most popular experience period was between 3-5 years with 461 respondents (94.5%). In addition, there were 19 people (3.9%) who worked for 5-10 years and eight persons (1.6%) with more than 10 years' experience. As for specialty groups, the largest one included

153 dental students (31.4%), followed by 76 respondents from prosthodontics (15.6%), 48 dental interns (9.8%), 41 ophthalmologists (8.4%), 39 general dentists (8.0%) and 34 oral surgeons (7.0%). Other specialties included 4.5% or less responder (**Figure 1**). For Q4 (exposure to the term OOKP), the codes were: 0 with 109 responses (22.3%), 1 with 186 (38.1%), 2 with 176 (36.1%) and 3 with 16 (3.3%) (**Table 1**). The mean was 1.20 (SD 0.83) and the median was 1, showing that most responses clustered in the lower-mid codes. For Q5-Q9, about three-quarters of respondents were at code 1: Q5 had 366 (75.0%), Q6 had 368 (75.4%), Q7 had 373 (76.4%), Q8 had 373 (76.4%) and Q9 had 366 (75.0%). Very few chose higher codes (3-4): for Q5, code 3 had 19 (3.9%) and code 4 had 5 (1.0%); Q9 had code 3 with 15 (3.1%) and code 4 with 5 (1.0%). The item means were low (Q5 1.00; Q6 0.93; Q7 0.96; Q8 0.96; Q9 0.95) and medians were 1 (IQR 0). For Q10-Q14 and Q16 (**Table 2**), most people were in code 0 (low knowledge): Q10 302 (61.9%), Q11 263 (53.9%), Q12 244 (50.0%), Q13 283 (58.0%), Q14 281 (57.6%), Q16 300 (61.5%). A significant minority picked code 2 (intermediate): Q10 172 (35.2%), Q11 211 (43.2%), Q12 196 (40.2%), Q13 193 (39.5%), Q14 186 (38.1%), Q16 175 (35.9%). This resulted in low mean scores (approx. 0.75-0.94). Q15 (Stevens-Johnson syndrome as a cause) was exceptional: 435 (89.1%) picked code 2, fewest at extremes (code 0: 23; code 4: 5), with a higher mean (1.91) than other knowledge questions. With respect to Q17 (Role in future of OOKP), the most common code was 2 (318; 65.2%), followed by codes 3 (83; 17.0%) and 4 (14; 2.9%). This question generated the highest mean value among all exposure/knowledge questions (2.07; SD 0.68). The most common code for Q19 (Attitude towards Collaboration) was again code 2 (286; 58.6%), with codes 3 (120; 24.6%) and 4 (30; 6.1%). These values provided a mean of 2.25 (SD 0.75). In terms of Q20 (Need for Educational Materials), Codes 1 & 2 (232; 47.5% and 212; 43.4%, respectively) provided the mean of 1.66 (SD 0.81) (**Table 3**). To facilitate interpretation of the aggregate domain scores, a level classification was constructed for the total awareness, knowledge and perspectives scores regarding OOKP using the percentage thresholds adopted in the reference article (80-100% = good, 60-79% = moderate/fair and $<60\%$ = poor) (**Table 4**). **Table 5** shows the comparison of the total awareness, knowledge and perspectives scores regarding OOKP between males and females using an independent samples t-test. Male respondents showed higher mean awareness and knowledge scores than female respondents, whereas the perspectives score was comparable between the two groups. **Table 6** displays the Pearson correlation coefficients for the relationship between the participant age and year of study with three OOKP domain scores. Statistically significant positive correlations exist between participant age and awareness ($r=0.214$, $p<0.001$) and knowledge ($r=0.231$, $p<0.001$). These correlations imply that participants who have grown older had a greater understanding of and clinical exposure to OOKP. On the other hand, the correlation between age and perspectives was weak but significant ($r=0.098$, $p=0.030$). This result implies that attitudinal orientation

towards OOKP depended less on the age of participants than cognitive domain scores. Year of study is positively correlated with awareness ($r=0.162$, $p<0.001$) and knowledge ($r=0.178$, $p<0.001$), which is congruent with expectations that academic advancement is associated with progressive gain in related competencies. Year of study did not significantly correlate with perspectives score ($r=0.073$, $p=0.107$). It implies that the favourable attitudes of participants towards OOKP depended less on the academic seniority of respondents. **Table 7** shows inter-correlations between total scores on each of the three domains of OOKP. A statistically significant and moderately strong positive inter-correlation between awareness and knowledge ($r = 0.481$, $p < 0.001$) is evident. In other words, respondents who had encountered more terminologies and literature concerning OOKP exhibited a relatively higher level of knowledge regarding the specifics of this process. Awareness also correlated positively with perspectives ($r = 0.287$, $p < 0.001$), thus revealing that respondents whose awareness of OOKP was high enough also held relatively positive attitudes towards its inter-professional applications and further development. Knowledge also correlated positively with perspectives ($r = 0.341$, $p < 0.001$). The observed correlation reveals the coherent link between these

three constructs such that respondents who possessed greater knowledge about OOKP also expressed stronger support for its educational expansion. All in all, these results provide additional evidence regarding the expected directionality between the three knowledge-attitude-practice constructs under study and validate the construct validity of the instrument with awareness being the driving factor.

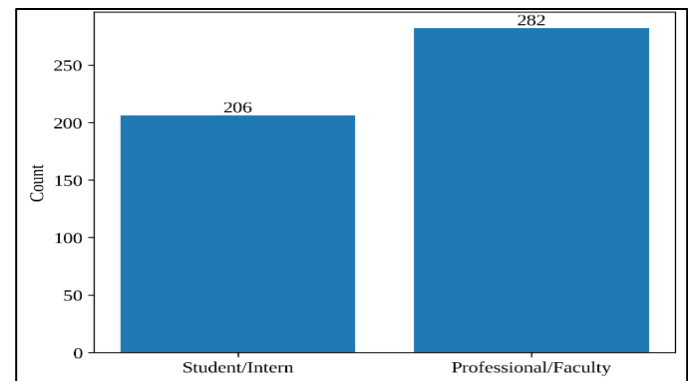


Figure 1: Group distribution

Table 1: Awareness/exposure to OOKP (Values are n (%). Numeric response codes are reported as recorded in the coded sheet)

Item	0	1	2	3	4	Mean $\pm$ SD	Median (IQR)
Q4. Have you ever come across the term Osseodonto-Keratoprosthesis (OOKP)?	109 (22.3)	186 (38.1)	176 (36.1)	16 (3.3)	0 (0.0)	1.20 $\pm$ 0.83	1 (1)
Q5. Are you aware that OOKP is a multidisciplinary procedure involving both dental and ophthalmological expertise?	78 (16.0)	366 (75.0)	20 (4.1)	19 (3.9)	5 (1.0)	1.00 $\pm$ 0.49	1 (0)
Q6. Have you encountered any clinical case studies involving OOKP during your education?	86 (17.6)	368 (75.4)	17 (3.5)	12 (2.5)	5 (1.0)	0.93 $\pm$ 0.49	1 (0)
Q7. Have you seen any references to OOKP in textbooks related to dentistry or ophthalmology?	82 (16.8)	373 (76.4)	14 (2.9)	14 (2.9)	5 (1.0)	0.96 $\pm$ 0.48	1 (0)
Q8. Have you come across any recent research discussing innovations or updates related to OOKP?	83 (17.0)	373 (76.4)	13 (2.7)	14 (2.9)	5 (1.0)	0.96 $\pm$ 0.48	1 (0)
Q9. Are you aware of recent innovations in optical cylinder design to improve visual outcomes in OOKP?	90 (18.4)	366 (75.0)	12 (2.5)	15 (3.1)	5 (1.0)	0.95 $\pm$ 0.50	1 (0)

Table 2: Knowledge of key OOKP clinical concepts (Values are n (%); Mean $\pm$ SD based on coded responses)

Item	0	1	2	3	4	Mean $\pm$ SD
Q10. How are you in identifying the primary indication for OOKP?	302 (61.9)	11 (2.3)	172 (35.2)	0 (0.0)	3 (0.6)	0.75 $\pm$ 0.98
Q11. How familiar are you with the tissue used to support the optical cylinder in OOKP?	263 (53.9)	10 (2.0)	211 (43.2)	0 (0.0)	4 (0.8)	0.92 $\pm$ 1.02
Q12. How are you in identifying the type of tooth typically harvested for the OOKP procedure?	244 (50.0)	41 (8.4)	196 (40.2)	0 (0.0)	7 (1.4)	0.94 $\pm$ 1.01
Q13. How are you with the material used for the optical cylinder in OOKP?	283 (58.0)	6 (1.2)	193 (39.5)	0 (0.0)	6 (1.2)	0.85 $\pm$ 1.02
Q14. How are you about the stages involved in the OOKP surgical procedure?	281 (57.6)	17 (3.5)	186 (38.1)	0 (0.0)	4 (0.8)	0.83 $\pm$ 1.00
Q15. How likely do you think corneal blindness leading to OOKP surgery is caused by Stevens-Johnson Syndrome?	23 (4.7)	16 (3.3)	435 (89.1)	9 (1.8)	5 (1.0)	1.91 $\pm$ 0.50
Q16. How familiar are you in identifying the key material used in OOKP for long-term anatomical and functional outcomes?	300 (61.5)	10 (2.0)	175 (35.9)	0 (0.0)	3 (0.6)	0.76 $\pm$ 0.98

Table 3: Future perspectives and educational needs (Values are n (%); Mean $\pm$ SD based on coded responses)

Item	0	1	2	3	4	Mean $\pm$ SD
Q17. Do you think OOKP will continue to play a significant role in ophthalmology in the future?	5 (1.0)	67 (13.7)	318 (65.2)	83 (17.0)	14 (2.9)	2.07 $\pm$ 0.68

Q18. Would you be interested in taking courses or attending lectures to learn more about OOKP?	7 (1.4)	315 (64.5)	125 (25.6)	19 (3.9)	21 (4.3)	1.45 ± 0.78
Q19. Do you think dental professionals and ophthalmologists should work together more closely on OOKP-related cases?	4 (0.8)	48 (9.8)	286 (58.6)	120 (24.6)	30 (6.1)	2.25 ± 0.75
Q20. Do you believe there should be more educational resources for dental professionals about OOKP?	3 (0.6)	232 (47.5)	212 (43.4)	10 (2.0)	31 (6.4)	1.66 ± 0.81

Table 4: Level classification for total scores of awareness, knowledge and perspectives regarding OOKP

Percentage of total scores (%)	Total awareness score	Total knowledge score	Total perspectives score	Level
80–100	19–23	23–28	13–16	Good
60–79	14–18	17–22	10–12	Moderate/fair
<60	0–13	0–16	0–9	Poor

Table 5: Comparison of total scores of awareness, knowledge and perspectives regarding OOKP between males and females using independent t-test (n = 488)

Outcome	Male Mean (SD) (n = 234)	Female Mean (SD) (n = 254)	t-statistics (df)	p
Awareness	1.21 (0.58)	0.83 (0.61)	7.04 (486)	<0.001
Knowledge	1.18 (0.78)	0.93 (0.76)	3.58 (486)	<0.001
Perspectives	1.85 (0.52)	1.87 (0.67)	-0.37 (486)	0.714

Table 6: Association between age and year of study of the participants with total scores of awareness, knowledge and perspectives regarding OOKP using Pearson correlation test (n = 488)

Variables	r	p
Age vs. awareness	0.214	<0.001
-Knowledge	0.231	<0.001
-Perspectives	0.098	0.030
Year of study vs. awareness	0.162	<0.001
-Knowledge	0.178	<0.001
-Perspectives	0.073	0.107

Table 7: Association between total scores of awareness, knowledge and perspectives regarding OOKP (n = 488)

Variables	r	p
Awareness vs. knowledge	0.481	<0.001
Awareness vs. perspectives	0.287	<0.001
Knowledge vs. perspectives	0.341	<0.001

Discussion:

OOKP is a crucial procedure for the patients with end stage corneal disease, severe inflammatory corneal disease and warrants the dental professionals and ophthalmologist to be aware of this procedure which could significantly restore the vision [9, 10]. The present study demonstrated that the majority of the participants were unaware of the term osteo-odonto-keratoprosthesis (OOKP), indicating limited exposure of the dental fraternity toward this highly specialized interdisciplinary procedure. OOKP is considered one of the most effective treatment modalities for end-stage corneal blindness, particularly in patients unsuitable for conventional corneal transplantation, owing to the use of an autologous tooth-bone complex as a biological support for the optical cylinder. Despite its clinical significance, awareness regarding the procedure among dental professionals remains inadequate, possibly because OOKP is primarily discussed within ophthalmology literature and receives minimal emphasis in undergraduate and postgraduate dental curricula. Similar observations regarding insufficient awareness of interdisciplinary and advanced dental-medical procedures among dental students and practitioners have been reported in previous studies [11, 12]. Male respondents in the present study exhibited higher mean awareness and knowledge scores compared to female respondents. This difference may be

attributed to variations in clinical exposure, interest in surgical innovations, or accessibility to continuing education programs; however, the difference should be interpreted cautiously as sociocultural and institutional factors may also influence knowledge acquisition. Comparable gender-based variations in awareness and knowledge have been reported in studies evaluating dental professionals’ understanding of advanced diagnostic and treatment modalities, although the evidence remains inconsistent across populations [13, 14]. Older participants demonstrated modestly greater familiarity and clinical understanding of OOKP. This finding may be explained by increased clinical exposure, cumulative professional experience and greater opportunities for interdisciplinary interactions over time. Experienced clinicians are more likely to encounter complex ophthalmologic cases requiring dental involvement, thereby improving their understanding of procedures such as OOKP. The positive correlation observed between years of experience and awareness and knowledge scores further supports this interpretation. Previous literature has similarly highlighted that professional experience significantly contributes to enhanced clinical awareness and decision-making abilities among healthcare professionals [15, 16]. Interestingly, the year of study did not significantly predict perspective scores, suggesting that participants generally possessed a favourable professional attitude toward OOKP irrespective of academic seniority. This finding indicates that although factual knowledge and awareness may vary according to experience and exposure, the willingness to appreciate the role of dentistry in interdisciplinary patient care remains consistently positive across academic levels. Such an observation reflects the growing recognition among dental professionals regarding the importance of collaborative healthcare approaches in managing complex craniofacial and ocular disorders [17, 18]. The findings of the present study emphasize the urgent need to improve knowledge and awareness regarding OOKP among the dental fraternity. Incorporation of interdisciplinary topics such as OOKP into undergraduate and postgraduate dental education, continuing dental education programs, workshops and collaborative seminars involving ophthalmologists and

oral surgeons may help bridge the existing knowledge gap. Enhanced awareness among dental professionals is particularly important because successful OOKP treatment depends significantly on dental expertise for the preparation and maintenance of the osteo-odonto lamina. Increased educational exposure may therefore contribute toward improved interdisciplinary collaboration and better patient outcomes in the management of end-stage corneal blindness.

Conclusion:

Studying OOKP with reference to dentistry and maxillofacial prosthetics is one of the ways how to bring together two different areas of healthcare industry – that of medicine and that of dentistry. Raising awareness among dental practitioners will result in enhanced quality of care offered by them as well as in increased cooperation between different specialists. Utilization of teeth in OOKP is both a reflection of the multifaceted nature of dental tissues and the means by which new techniques for the use of maxillofacial prosthesis will be developed, especially eye reconstruction prosthesis.

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