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Awareness and Knowledge Regarding the Concept of Shortened Dental Arches Among Dental Surgeons in Karachi, Pakistan

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ABSTRACT

Tooth loss remains a major oral health problem with a high public and individual health effect. impacting the majority of persons in their middle and older years. **Objective:** To evaluate knowledge and comprehension of the idea of shortened dental arches among dental surgeons of Karachi, Pakistan. **Methods:** A convenience sample of 300 dentists who work in private hospitals in Karachi was used to perform a descriptive cross-sectional survey. A self-administered questionnaire was given to the participants to ask opinions regarding awareness, function, aesthetics, and comfort of the shortened dental arch concept. SPSS version 25.0 was used to statistically analyze the data from June 2023 to December 2023. **Results:** The results of the study revealed that approximately 31.7% believed that shortened dental arches offer a generally good periodontal prognosis, 33.8% of dental surgeons revealed that few restorative treatments were available, 31.2% believed that shortened dental arches do not lower the risk of overtreatment, 32.66% prolong the retention of natural teeth, 30% decrease the occlusal vertical dimension and 32.4% had TMJ issues. **Conclusions:** Dental surgeons' attitudes and comprehension of the shortened dental arches concept were inadequate. Hence shortened dental arches provide a practical approach to dental care by preserving posterior tooth function without requiring complete arch restoration. By improving clinical decision-making, it was possible to improve patient outcomes by having a better understanding of the existing level of awareness and expertise among dental surgeons.

INTRODUCTION

A particular kind of dentition known as the Shortened Dental Arch (SDA) is characterized by an undamaged anterior region and a decrease in the number of posterior teeth that occlude each other, beginning posteriorly [1]. Although it is normally preferred, many people may not be able to achieve complete dental arch occlusion because people lose teeth as they age [2]. Molar teeth are the most susceptible to dental deterioration of all teeth and are often extracted. As a result, over time, there tend to be fewer posterior teeth and occluding tooth contacts [3-6]. When it comes to the dental arch and craniofacial structures, the natural dentition exhibits a balanced location between the tongue and the surrounding muscles. To provide a natural profile and effective restoration for patients who are edentulous or dentate, prosthodontic therapy may consider standard parameters such as the position of the anterior tooth and rearmost molar, as well as ridge breadth, length, and height. It is crucial to comprehend the natural form of the dental arch since prosthetic restorations can benefit from knowing the usual values of the arch's size and anatomical shape [7]. According to the research, dental arches that include the

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premolar and anterior areas satisfy the need for a functional dentition. However, each person has different functional needs, and different numbers of teeth are needed to meet those needs. As a result, dental care must be customized to each patient's unique needs and level of adaptability [8]. The development of functional disorders pertaining not only to the maxillofacial area but also as a whole is aggravated by anomalies of the occlusion, whose distinctive features include incorrect tooth position, absence of multiple dentition contacts, altered alveolar process shape, disturbed size of the jaw bones and their spatial arrangement in the skull, and altered alveolar process shape [9]. The idea of a shortened dental arch has drawn severe criticism from a large number of conventional practitioners. It has been believed that the untimely loss of molar teeth is associated with a relative risk factor for TMJ disorders [10] along with reduced masticatory function. Additionally, it has been proposed that shortened dental arches are linked to occlusal instability, which is brought on by tooth migration [11]. The loss of molar support can result in temporomandibular joint dysfunction, occlusal instability, and impaired mastication, dental professionals may maintain that all lost teeth should be replaced to maintain a satisfactory level of oral function and a healthy masticatory system [12]. The World Health Organization's oral health aim, which emphasizes the bare minimum of 20 teeth needed to maintain a healthy, naturally functioning dentition without the need for a prosthesis, is likewise consistent with the SDA philosophy. The public's contemporary perspective of dentistry is supported by the SDA concept, which emphasizes achieving the psychosocial aspects of oral health rather than just treating the need to replace missing teeth [13]. Nonetheless, there has been much debate over the theory that tooth loss will lead to less-than-ideal oral function and comfort [14]. The appearance of the grin may depend on a few posterior teeth, and tooth loss may also be influenced by other psychological variables. Although patients are more likely to desire the prosthetic replacement of front teeth than posterior teeth, they may also want the repair of a missing premolar for cosmetic reasons [12]. Patients with shortened dental arches can benefit from a well-established treatment option called cantilever resin-bonded fixed dental prosthesis [15].

Even while people now generally accept the idea of a shortened dental arch, it is still not used by most of the dental surgeons of Pakistan. Therefore, it's important to assess the disparity between the dentist's stance on shortened dental arches and the patient's desire for non-traditional methods of replacing lost posterior teeth. The purpose of the study was to evaluate the awareness and knowledge regarding the concept of shortened dental arches among dental surgeons in Pakistan.

METHODS

A descriptive cross-sectional survey was conducted among the dental surgeons of Karachi working in the private hospital from June 2023 till December 2023. The study used a convenience sampling strategy to select the participants. The study did not take dental assistants or students into account. Based on the tolerable margin of error (5%), the confidence level (95%), and the total number of licensed dental practitioners (n=27428), a minimum required sample size of 276 was determined through open epi. However, 300 participants in total were included to increase study power. This study used a self-administered, structured, consisting of close-ended questions. questionnaire was given to assess awareness and their knowledge. The questionnaire included twenty items on participants' awareness and attitudes concerning shortened dental arches in addition to demographic data on gender, age, work experience, etc. The questionnaire was created by reviewing related research that has been carried out globally by in 2020. The three-point Likert scale (very aware, somewhat aware, and not at all aware) was used to record responses. A five-point Likert scale was used for other item responses (strongly agree, agree, disagree, and strongly disagree). The research was approved ethical review committee of Sir Syed Medical and Dental College for Girls with Ref. No: sscms/college/principal(dental)/2023/085. Consent was taken from all the participants they were informed regarding the aim and objective of the study. Further, it was informed that the information in this research will kept private and utilized exclusively for study. SPSS version 25.0 was used to statistically analyze the data. Hence, descriptive statistics of frequency distribution and percentages were calculated for each of the category variables. The Chi-square test was used to compare the questionnaire item responses by specialization. A p-value of less than 0.01 was regarded as statistically significant.

RESULTS

The current study investigated dental surgeons' attitudes and levels of awareness of shortened dental arches. The survey was completed by 300 dental surgeons, the majority of whom 57.3% were male belonging to the age group of 26–30 years. Approximately 75% had less than 10 years of experience. The study participants' practice and demographic factors were displayed in table 1.

Table 1: Demographic Details of study Participants

Variables	N (%)
Gender	
Male	172 (57.3%)
Female	128 (42.6%)

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Age	
20-25	82 (27%)
26-30	106 (35.3%)
30-40	42 (14%)
41-50	48 (16%)
50 above	22 (7%)
Work Experience	
Less than 10 Years	225 (75%)
More than 10 Years	75 (25%)
Designation	
General Dentists	266 (88%)
Specialist	34 (11%)

Almost 31% were unsure about using shortened dental arches in occlusion with a single standing tooth, patients with periodontal disease and dental decay, which primarily affects molars 33%, were preferred candidates for shortened dental arches. Furthermore, 32% of research participants were unsure if the shortened dental arches caused speech issues and 29% were unaware of the fact that the unsupported molars may cause TMJ issues. On the contrary 31.6% of participants agreed that shortened dental arches offer a good prognosis for periodontal disease and it can be recommended to 33.3% of patients who have few options for restorative care as shown in table 2.

Table 2: Awareness and Knowledge of Dental Surgeons Regarding Shortened Dental Arches

S. No.	Statements	Strongly Agree N (%)	Agree N (%)	Not Sure N (%)	Disagree N (%)	Strongly Disagree N (%)
1	Can Individuals with One Standing Tooth and Appropriate Dental Occlusion Apply the Shortened Dental Arches Concept?	45 (15.0%)	75 (24.6%)	94 (31%)	40 (13%)	46 (15%)
2	Do the Ten Pairs of Occluding Teeth from The First Incisors to The Second Premolars Consist of a Shortened Dental Arches Concept?	42 (14%)	92 (30.6%)	95 (31.6%)	40 (13.3%)	31 (10.3%)
3	The Shortened Dental Arches Concept can be Recommended to Patients Who Have Periodontal Disease or Caries, Which Mostly Impact the Molar Dentition	41 (13.6%)	92 (30.6%)	100 (33%)	41 (13.6%)	26 (8.6%)
4	For Patients with an Overall Favorable Periodontal Prognosis, The Shortened Dental Arches Concept may be Considered	37 (12.3%)	95 (31.6%)	94 (31.3%)	34 (11.3%)	40 (13%)
5	The Shortened Dental Arches Concept Can Be Suggested to Patients Who Have Few Options for Restorative Care	44 (14.6%)	100 (33.3%)	85 (28.3%)	40 (13.3%)	31 (10.3%)
6	There are no Strict Criteria for using the Shortened Dental Arches Idea with Patients	35 (11.6%)	57 (19%)	90 (30%)	47 (15.6%)	71 (23.6%)
7	For a Patient, An Intact Dental Arch Spanning from The First Incisors to The Second Premolars Is Aesthetically Acceptable	38 (12.6%)	113 (37.6%)	82 (27.3%)	37 (12.3%)	30 (10%)
8	Adequate Oral Function Requires 10 or More Occluding Pairs of Teeth	47 (15.6%)	104 (34.6%)	85 (28.3%)	35 (11.6%)	29 (9.6%)
9	For elderly patients, the main goal of treatment planning should be to preserve the anterior and premolar sections of the dental arches	40 (13.3%)	102 (34%)	86 (28.6%)	37 (12.3%)	35 (11.6%)
10	Shortened dental arches do not worsen periodontitis in people with poor margins of margin bone.	37 (12.3%)	82 (27.3%)	95 (31.6%)	51 (17%)	35 (11.6%)
11	Shortened dental arches prevent the loss of occlusion in the vertical dimensions.	41 (13.6%)	92 (30.6%)	88 (29.3%)	42 (14)	37 (12.3%)
12	Shortened dental arches do not cause complications with the TMJ	48 (16%)	98 (32.6%)	87 (29%)	35 (11.6%)	32 (10.6%)
13	Shortened dental arches do not result in issues with speaking.	48 (16%)	93 (31%)	96 (32%)	29 (9.6%)	34 (11.1%)
14	Shortened dental arches enable people to keep their original teeth over extended periods.	51 (17%)	98 (32.6%)	81 (27%)	35 (11.6%)	35 (11.6%)
15	Shortened dental arches lower the possibility of overtreatment.	56 (18.6%)	95 (31.6%)	86 (28.6%)	31 (10.3%)	32 (10.6%)
16	Those Individuals who have a shortened dental arch	37 (12.3%)	93 (31%)	100 (33.3%)	38 (12.6%)	32 (10.6%)
17	Individuals who do not have molar support develop TMJ problems.	44 (14.6%)	68 (22.6%)	86 (28.6%)	62 (20.6%)	40 (13.3%)
18	Patients who have a self-esteem deficit are content with how their teeth seem.	49 (16.3%)	90 (30%)	92 (30.6%)	38 (12.6%)	31 (10.3%)
19	Patients with shortened dental arches report feeling comfortable in their mouths.	53 (17.6%)	83 (27.6%)	104 (34.6%)	28 (9.6%)	32 (10.6%)

Specialists generally agreed more with the concept of shortened dental arches than general dentists when it came to ten pairs of occlusive teeth, this idea was being suggested to patients with periodontal disease and caries, hence the overall favorable prognosis for periodontal disease in cases where patient options were limited and aesthetic acceptability was one of the factors. Examining the responses from specialists and general dentists, a comparable difference was found ($p<0.05$). Hence, shortened dental arches does not aggravate periodontitis specifically in those cases where the levels of marginal bone were low, lack of TMJ issues, and the applicability of these findings was more frequently reached by specialists than by general dentists ($p<0.05$) as shown in table 3.

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Table 3: Awareness and Knowledge of General Dentists and Specialists Regarding Shortened Dental Arches

S. No.	General Dentists (%)					Specialists (%)					p-Value
	Strongly Agree	Agree	Not Agree	Disagree	Strongly Disagree	Strongly Agree	Agree	Not Agree	Disagree	Strongly Disagree	
1	12.70	25.80	32.20	13.10	16.20	22	19.30	27.50	15.60	15.60	0.136
2	10.80	31.50	33.40	13.10	11.10	24.80	25.70	24.80	12.80	11.90	0.008*
3	9.60	32.50	36.60	12.40	8.90	25.70	24.80	28.40	12.80	8.30	0.001*
4	9.90	32.50	33.10	10.80	12.70	21.10	26.60	26.60	11.90	13.80	0.034*
5	11.50	36.60	28.90	13.10	9.90	22.90	25.70	25.70	14.70	11	0.029*
6	10.80	19.40	30.60	15.60	23.60	11.90	18.30	29.40	15.60	24.80	0.994
7	9.60	38.50	30.30	11.50	10.20	22	33.90	20.20	15.60	8.30	0.005*
8	14	35.40	29.30	11.50	9.90	20.20	33	25.70	12.80	8.30	0.587
9	11.10	35.40	29.30	11.70	12.40	19.30	30.30	27.50	13.70	9.20	0.221
10	11.40	22.80	33.80	18	12.90	16.10	32.80	26.60	15.10	11.40	0.020
11	12.40	29.60	28.40	16.60	12.90	12	30.80	31.20	12.50	11.50	0.056
12	16.60	30.60	31	9.20	12.60	15.70	34.30	27.60	15.10	9.30	0.046*
13	13.30	32.60	31	10.50	12.60	18.30	31.70	31.20	9.40	9.40	0.067
14	17.70	29	31.90	8.90	13.10	18.70	37.90	23.40	13.50	10.40	0.207
15	19	27.30	32.90	9.10	11.70	18.80	35.90	23.90	11.50	9.90	0.176
16	11.40	27.10	34.80	14.60	12.10	16.60	33.40	32.30	8.80	8.90	0.034*
17	11.60	26.50	27.60	18.70	15.60	18.70	18.80	27.10	23.90	11.50	0.931
18	12.10	29.40	35.50	11.30	11.70	19.80	30.70	28.10	13	8.30	0.156
19	17.30	24.20	38.90	7.40	12.10	17.70	31.30	29.70	13	8.30	0.876

*p-value considered significant

DISCUSSION

The study presents unique data regarding awareness and knowledge of shortened dental arches among general dentists and specialists in Karachi, Pakistan. Studies indicate a significant lack of awareness and knowledge about shortened dental arches among dental surgeons in various regions [16]. One of the Indian studies conducted by Agrawal N. revealed that although few dentists practiced shortened dental arches, the majority of dentists had a positive opinion of the concept despite not being familiar with it. Raising awareness of shortened dental arches should be emphasized among dental surgeons [17]. Specialists had a positive attitude but concerns about management outcomes were always an issue [18]. The results of the study revealed that most of the dental surgeons were unsure regarding the concept of shortened dental arches. Further, the results of the study revealed that the specialists were more aware of the idea of shortened dental arches which was similar to a study conducted in Jordan by Abu-Awwad M *et al.*, in 2019 [1]. Results from a study conducted by Walter MH *et al.*, showed that dentists with master's degrees applied the concept of shortened dental arches more frequently than dentists with bachelor's degrees [18]. However, compared to general dentists, specialists had much more knowledge regarding shortened dental arches. The results of the study were consistent with the previously cited studies according to which shortened dental arches were preferred for the provision of conservative treatment [19, 20]. These findings were consistent with those of these studies for older individuals who have sufficient adaptive capacity, the standard shortened dental arches consisting of four occlusal units, often premolars satisfy their needs [21]. Research shows that individuals with shortened dental arches have a better prognosis for the remaining teeth, less expensive treatment, preservation of oral tissues, good occlusal stability, and easier maintenance of oral hygiene [22]. The main limitation of this study design was the small sample size which limits the study's findings' generalizability. It was noted that the study's results were generally consistent with those of other research which were conducted in different parts of the world belonging to similar nature but the intensity of the responses differed because of different mindsets regarding the concept of shortened dental arches. All of these findings emphasize the fact that all dental surgeons should have further education and training regarding the idea of shortened dental arches.

CONCLUSIONS

There was a lack of understanding and attitude among dental surgeons regarding the concept of shortened dental arches. Shortened dental arches provide a practical approach to dental care that was especially helpful for low-income and older patients since they preserve posterior tooth function without requiring complete arch restoration. By identifying educational gaps, guiding targeted training programs, and improving clinical decision-making, it was possible to improve patient

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outcomes and make more effective use of available resources by having a better understanding of the existing level of awareness and expertise among dental surgeons.

Authors Contribution

Conceptualization: KK
Methodology: KK, UAI, SM
Formal analysis: T, S, UAI
Writing, review and editing: T, A, SM

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

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