International Journal of Dental Sciences and Research, 2017, Vol. 5, No. 2, 25-30
Available online at http://pubs.sciepub.com/ijdsr/5/2/3

DOI:10.12691/ijdsr-5-2-3

Dentists' Attitudes Regarding Shortened Dental Arch Concept in Senior Dental Patients

Manal Alammari*

Department of Oral and Maxillofacial Prosthodontics, King Abdulaziz University, Jeddah, Saudi Arabia
*Corresponding author: malammari@kau.edu.sa

Abstract ***Objective***: A complete dental arch is usually wanted though not affordable nor always achievable especially in old age dental patients with compromised general health. This study investigated dentists' knowledge and attitude regarding the shortened dental arch (SDA) concept. ***Methods***: A cross-sectional study was conducted over a nine months period, during which 200 self-designed structured questionnaires were distributed to general dentists, restorative consultants and prosthodontists from 47 governmental hospitals and private dental clinics. General information about the SDA concept was included in the questionnaire. The questionnaire was divided into four main sections including knowledge, use of SDA concept, its application and the common treatment options selected. ***Results***: There is a significant relationship between higher level of education and the selection of SDA concept as an option for treatment. Governmental institutions are more aware of the selection of the Concept compared to Private, p-value = 0.044. Out of the responding154 dentists, 34.4% were aware of the SDA concept. However, 81% always replaced missing molars. Moreover, 69% did not apply the concept in their treatment plan and did not use it as a treatment option; in fact, 54% of cases potentially suitable for SDA would be restored with cobalt chrome removable partial dental prosthesis (RPDP). 52.6% believed that they would lose income if they applied the concept. 63% of the sample only became aware of the SDA concept when we introduced it. ***Conclusions***: Most dentists agreed that the concept offers some benefits and may be considered as a method for old patients' prosthodontic treatment. Nevertheless, most of the dentists in Jeddah did not apply the SDA concept. There is a need to rise the SDA awareness, approval as well as its implementation clinically. Moreover, RPDPs teaching and practicing should continue to be an integral part of Prosthodontics programs.

Keywords: *dentist awareness, oral function, attitude, shortened dental arch, senior dental patient*

Cite This Article: Manal Alammari, "Dentists' Attitudes Regarding Shortened Dental Arch Concept in Senior Dental Patients." *International Journal of Dental Sciences and Research*, vol. 5, no. 2 (2017): 25-30. doi: 10.12691/ijdsr-5-2-3.

1. Introduction

Senior dental patients (i.e., 65 years of age and older), who retain their natural teeth (i.e. partially edentulous) are increasing and will progressively demand more dental treatment [1]. Therefore, to offer care for partially dentate or edentulous patients, dentists should consider a number of aspects, such as oral functionality, vertical dimension, occlusion, maintenance of hard tissue, and temporo-mandibular joint (TMJ) health, as well as patient comfort. The functional demands of patients are highly variable and individual, requiring dental treatment to be tailored to the individual's needs and adaptive capability.

The World Health Organization (WHO) indicates that a functional, esthetic, natural dentition has at least 20 teeth in antagonist contact [2,3]. This is mainly based on the research by Käyser, who refuted the prevailing belief that any missing tooth should be replaced [4]. He was the first to coin the term "shortened dental arch" (SDA) to describe the concept of acceptable oral function with partial dentition [5,6,7,8,9,10]. Through a number of clinical studies, he and his co-workers concluded that many patients could function without a full complement of teeth and that not all missing teeth require replacement [6,7,8,9,10].

The typical SDA, comprising the anterior teeth and four occlusal units, usually four premolars, meet these requirements for older adults with sufficient adaptive capacity [4]. Evidence suggests that patients with SDA have adequate masticatory function and satisfactory occlusal stability. [11,12] The SDA concept constitutes a problem based treatment approach to such reduced dentitions by satisfying the requirements previously mentioned and potentially reducing costs of treatment. [13,14,15,16].

SDA may occur in an increasing number of subjects because molars are "high-risk teeth" and tend to be lost at an earlier stage than anterior and premolar [17,18,19]. Kayser [4] expected the proportion of individuals with SDAs might be 25% of the population in the age group 41-45 and increasing to 70% in the age group 61-65.

The decision to replace missing posterior teeth may depend on various factors including the patient's perception of need for the prosthesis and/or diagnosis by the clinician for maintenance of oral health. The traditional approach of replacing posterior missing teeth

has been with partial removable dental prostheses (PRDPs). Although patients with apparent compromised function have reported benefits from PRDPs and improved oral health conditions [20] optimal oral hygiene and regular recalls are required to maintain the remaining dentition. [21]

There are also different types of prosthetic appliances to treat missing teeth but there are many factors that guide their selection. Most of patients prefer maintaining remaining teeth with functionally sound occlusion and healthy peridontium rather than complex restorative procedures. There are many criteria before considering SDA as a treatment option, anterior and premolar teeth should be sound and in good occlusion and there should be absence of any parafunctional habits or mandibular dysfunction. However, some patients refuse to accept that missing teeth are not restored. The aim of this research is to evaluate knowledge, attitude of general practitioner dentists and prosthodontists among Jeddah, Saudi Arabia, regarding SDA concept as a prosthodontic treatment approach for senior dental patients', and what treatment modalities they commonly used.

2. Material and Methods

The Research Ethics committee at King Abdulaziz Dental Hospital approved this study. A special data collection form was developed and validated through a pilot study. The pilot study comprised five dentists and its aim was to evaluate the clarity and the feasibility of the questions.

The study conducted over the period of nine months starting from March 2016. During that phase questionnaires were distributed among 200 general dentists, restorative consultants and prosthodontists from 47 governmental hospitals and private dental clinics. General information about the SDA concept was included in the questionnaire. The questionnaire was divided into 4 main sections: Questions about gender, age, working sectors type, education level and specialty. Then Questions regarding knowledge about SDA, use of SDA concept, its application and the common treatment options selected by the participant to treat such cases. Third section was about the attitudes related to various statements concerning SDA concept and finally, dentist's own opinion and vision regarding the concept, the benefits and drawbacks associated with it.

The awareness and knowledge about the SDA concept, and the modality of treatment were the main target of the survey. These clinics were selected randomly according to the region of the city, and each of them were visited at least 2 times. Dentists who did not know about the SDA concept had received explanation at the time of the first visit.

3. Statistical Methodology

This study was analyzed using IBM SPSS version 22. A simple descriptive statistics was used to define the characteristics of the study variables through a form of counts and percentages for the categorical and nominal variables while continuous variables are presented by mean and standard deviations. To establish a relationship between categorical variables, this study used chi-square test. While comparing two group means and more than two groups, an independent *t*-test and One-way ANOVA respectively were used, with Least Significant Difference (LSD) as a post hoc test. These tests were done with the assumption of normal distribution. Otherwise, Welch's *t*-test for two group means and Games Howell for multiple groups were used as an alternative for the LSD test. Lastly, a conventional p-value <0.05 was the criteria to reject the null hypothesis.

4. Results

One hundred and fifty four questionnaires were completed out of two hundreds hand distributed questionnaires (response rate 72.1%); 90 of them (58.4%) were male and 64 (41.6%) were female. 43 (27.9%) of the dentists were Saudi, and 111 (72.1%) were Non-Saudi. All study sample characteristics are listed in Table 1.

Table 1. Characteristics of Study Samples.

Demographics		Count	%
Total		154	100.0
Gender	Male	90	58.4
	Female	64	41.6
Nationality	Saudi	43	27.9
	Non-Saudi	111	72.1
Dental Practice	Governmental	64	41.6
	Private	90	58.4
Location of Practice	North	45	29.2
	South	66	42.9
	West	33	21.4
	East	10	6.5
You are	General Dentist	81	52.6
	Restorative	23	14.9
	Prosthodontists	50	32.5
Educational Level	BDS	75	48.7
	MSC	21	13.6
	PhD	39	25.3
	Saudi Board	16	10.4
	Others	3	1.9
Educational Level	BDS	75	48.7
	Post Grad or Master	40	26.0
	PhD	39	25.3

Regarding the practice of SDA concept, 53 (34.4%) had heard about the concept, while 101 (65.6%) of them never heard about it.

25 (47.2%) of the dentists treated less than five cases of SDA, and 8 (15.1%) had treated from 5 to 9 cases, 6 (11.3%) had treated from 10-15 cases, while only 3 (5.7%) had used the concept to treat more than 15 cases.

Molars were always replaced by125 (81.2%). Of these 47 (37.6%) replaced molars to improve masticatory ability, 16 (12.8%) for aesthetic reasons, 57 (45.6%) for both reasons (mastication and aesthetic), and 5 (4%) because of patient's wishes.

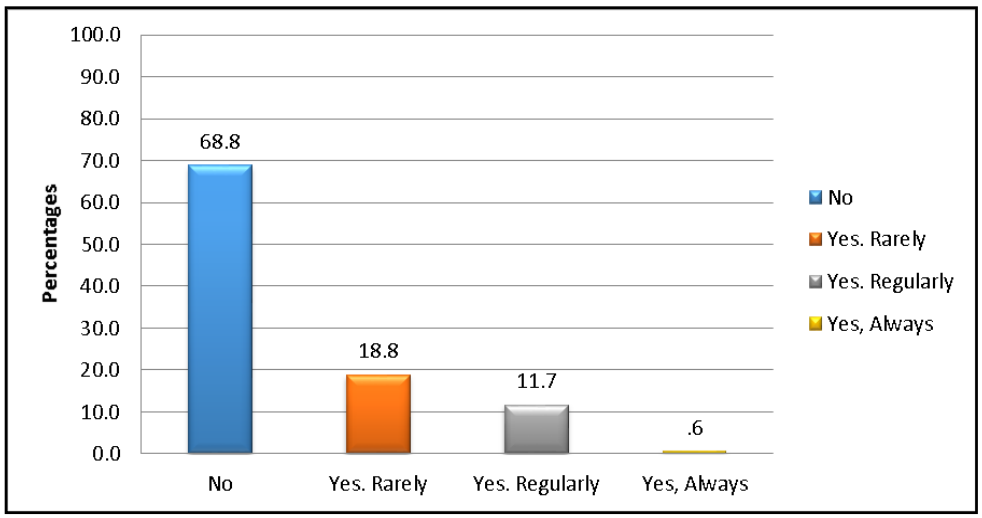


Figure 1. Application of SDA Concept

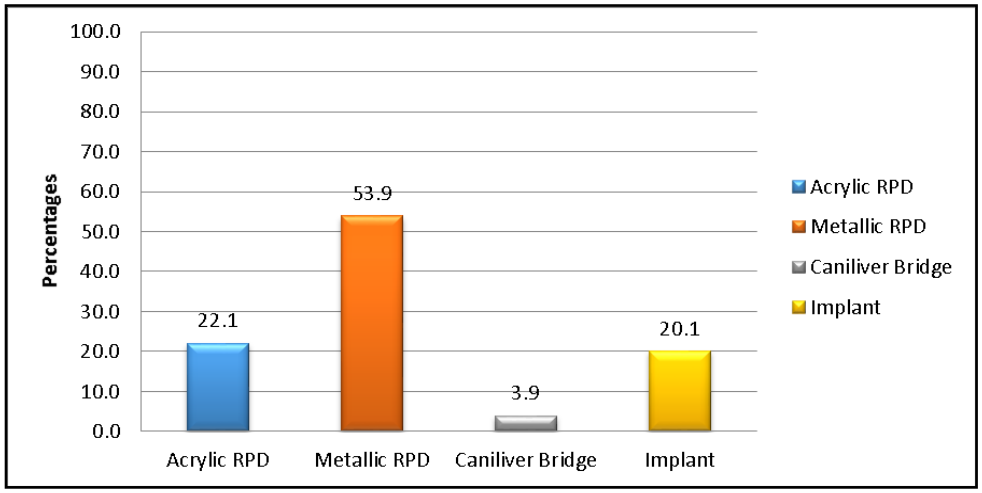
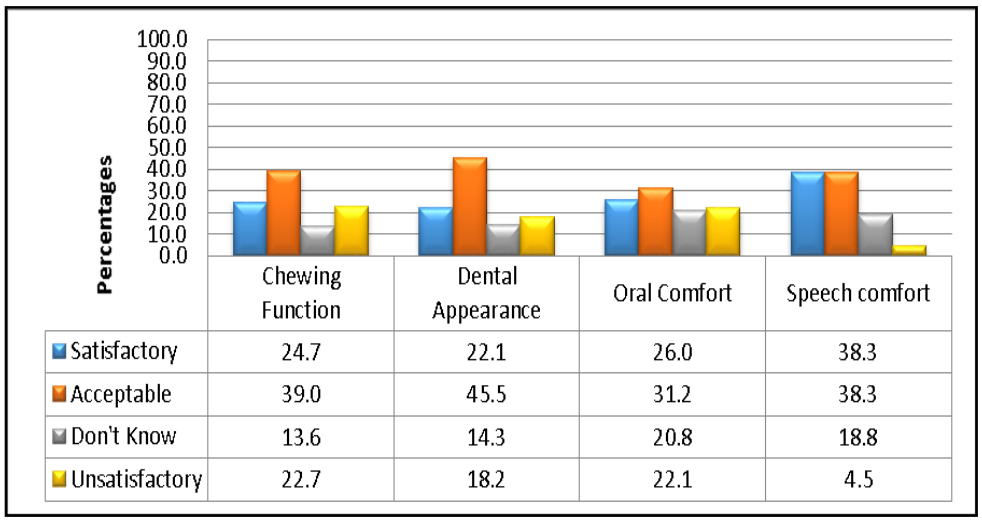


Figure 2. The selected mode of treatment for SDA.



	Chewing Function	Dental Appearance	Oral Comfort	Speech comfort
Satisfactory	24.7	22.1	26.0	38.3
Acceptable	39.0	45.5	31.2	38.3
Don't Know	13.6	14.3	20.8	18.8
Unsatisfactory	22.7	18.2	22.1	4.5

Figure 3. Dentists' opinion regarding SDA

Regarding the application of SDA concept, 106 (68.8%) dentists did not apply the concept, even if they knew about it, while 48 (31.1%) used it as shown in Figure 1.

The most selected mode of treatment for SDA by the participants was metallic removable partial denture (RPDP) 83 (53.9%), as shown in Figure 2.

The dentists have been asked about their opinion regarding the effect of SDA concept on the chewing function, dental appearance, oral comfort and speech comfort as shown in Figure 3.

They were similarly asked if SDA contribute to TMJ, teeth wear, teeth migration and speech problems as shown in Table 2.

Table 2. Opinion regarding the contribution of SDA to disorders, teeth wear, migration and speech problems

SDA contributes to:		Count	%
Total		154	100.0
TMJ Disorders	Agree	81	52.6
	Disagree	46	29.9
	I Don't Know	27	17.5
Teeth Wear	Agree	76	49.4
	Disagree	56	36.4
	I Don't Know	22	14.2
Teeth Migration	Agree	75	48.7
	Disagree	55	35.7
	I Don't Know	24	15.6
Speech Problem(s)	Agree	35	22.7
	Disagree	90	58.4
	I Don't Know	29	18.9

81 (52.6%) think that they will lose profits if they apply the SDA concept while 73 (47.4 %) think that it will not affect the clinic income.

Moreover, 114 (74%) believes that the concept will simplify the oral hygiene of the patient, while 14 (9.1%) disagreed, and 26 (16.9 %) don't know. 100 (64.9%) think that the concept will allow better patient economy, while 27 (17.5%) disagree. Regarding their thoughts about treatment plan simplicity, 108 (70.1%) think it will be simpler and 21(13.6%) disagree, while 25 (16.2%) don't know.

Dentists similarly were asked about their thought about remaining teeth survival with SDA concept, 80 (51.9%) think that remaining teeth will last longer, 39 (25.3%) disagree, and 35 (22.7%) don't know. Regarding their thoughts of the risk of over-treatment, 103 (66.9%) believes that the concept will reduce the over-treatment, 25 (16.2%) disagree, 26 (16.9) do not know.

The dentists were asked about the time since they came across the SDA concept; 97 (63%) of them said "now only" which means by the explanation of the author at the time of the first visit. While 17 (11%) knew about the concept since 2 years ago, 15 (9.7%) since 4 years ago, 6 (3.9) since 6 years ago, 9 (5.8%) since 8 years ago, and 10 (6.5%) had come across the concept since 10 years ago or more.

For those who used to apply the SDA concept; they were asked regarding the usual patient's reaction after they suggested the SDA treatment, 28 (18.2%) said that the patient refuses, 69 (44.8%) said that the patient agreed immediately, and 57 (37%) said that patient agreed after explanation. When they were asked about their thoughts about the most dental situation that is proposed by SDA concept; 58 (37.7%) think that the most situation is that with caries confined to molar region.. 22 (14.3%) think that in situation of a good prognosis of anteriors and premolars. 28 (18.2%) thinks it's most proposed to old patients. Only 9 (5.8%) said it's proposed to a limited restorative case, 11 (7.1%) thought it's mainly targeted to medically compromised patients, and 26 (16.9%) believes that it's proposed to financially limited patients.

There is a significant relationship between the selection of Shortened dental arch concept for treatment & the level of education. With a higher level of education, the selection of shortened Dental arch concept for treatment also is higher, p-value = 0.006.

Governmental institutions are more aware of the selection of the SDA Concept for treatment compared to Private, p-value = 0.044. However, based on this study's sample distribution, it shows that the frequency of usage of SDA concept between these two groups is fairly the same.

The type of dentist play a significant factor in the selection of SDA based on this study's sample size. However, if they are using it, prosthodontists are more often using the concept, followed by the restorative doctors and lastly by the general practitioners, p-value = 0.005 as shown in Table 3.

Table 3. Relationship between different factors and SDA selection

Demographics		SDA Opinion	p-value
Total Mean ± SD		7.08 ± 3.2	N/A
Gender	Male Mean ± SD	7.01 ± 3.3	0.735
	Female Mean ± SD	7.19 ± 3.0	
Nationality	Saudi Mean ± SD	8.91 ± 2.5	<0.001[a]
	Non-Saudi Mean ± SD	6.38 ± 3.1	
Type of Dental Practice	Governmental Mean ± SD	8.38 ± 2.7	<0.001[a]
	Private Mean ± SD	6.17 ± 3.2	
Dentist	General Dentist Mean ± SD	5.58 ± 3.0	<0.001[b]
	Restorative Mean ± SD	8.35 ± 2.2	
	Prosthodontic Dentist Mean ± SD	8.94 ± 2.6	
Educational Level	BDS Mean ± SD	5.63 ± 3.0	<0.001[b]
	Post Grad or Master Mean ± SD	7.88 ± 2.8	
	PhD Mean ± SD	9.08 ± 2.5	

[a]-significant using Welch's *t*-test @<0.05 level.
[b]-significant using One-Way ANOVA test @<0.05 level.

5. Discussion

The literature indicates that dental arches comprising the anterior and premolar nits meet the requirements of a functional dentition. Potential physical, sensory, and cognitive impairments associated with aging may make oral health self-care and patient education/communications challenging [22,23]. Additionally, among eleven types of barriers to dental care, cost of treatment was the most important one. [24].

The SDA approach offers an alternative of less treatment that is also less challenging, less time consuming and less expensive [25]. It would therefore fit well in a worldwide perspective with widespread lack of dental and economic resources as indicated by the WHO [26].

There are indications that the SDA concept may be of particular value in treatment plans for patients in the old age group [27]. There is no indication the reduced dental arch can cause overload on the temporomandibular joint or teeth. This suggests that the neuromuscular system competently controls the added mastication forces caused by the occlusal conditions [28]. That 62.3 % of respondents were not aware of the SDA concept , this can be considered high in view of the fact that SDA has been described as a feasible and favorable treatment choice in the dental literature.

PhD holders were more aware of the SDA concept than those who hold Master or bachelor degrees in dental sciences (significant difference, p = 0.004). This difference may be due to exposure of those dentists to different dental schools in the UK and USA during their postgraduate studies, which incorporate the SDA concept into their curricula. The majority of those who were aware of SDA agreed that it is a beneficial treatment choice for old dental patients. A large proportion of dentists, uninformed of the SDA concept, were also in agreement with this treatment choice.

However, 106(69%) of the dentists did not apply the concept, even if they knew about it, while 48 (31.1%) used it, but with varying frequencies. A similar rate of application of the SDA by dentally qualified staff in restorative dentistry in Netherlands was reported by Witter et al. [29]

Responding dentists showed a positive approach to SDA concept regarding oral function, esthetics, speech, oral hygiene and oral comfort (Figure 3).

Comparable studies [30,31,32] on attitudes and perception of SDA therapy among dentists have shown comparable outcomes to the present study.

Also noteworthy was the comparable assessment (satisfactory or acceptable) by dentists in this study, with regard to the chewing function, appearance and oral comfort, to a survey conducted in Tanzania [33]. This shows that there was a remarkable inconsistency between the academic and clinical/practical perception of the SDA concept.

A large proportion of dentists (74%) in this study agreed with the SDA as a practical treatment choice, which is similar to previous studies conducted in other countries, e.g. the UK 77%, [30].

According to the assessment of dentists in the current study, patients normally reacted well to the application of the SDA as a substitute treatment when benefits were clarified.

The percentage of patients refusing treatment according to the SDA concept in this study was 18% which is comparable to the results found in a study done by Witter et al [29] if we consider the advances in the dental treatment and the level of dental patients awareness nowadays. However, there are indications that the SDA concept may hold value in treatment plans for patients in the old age group [31].

The dentists who always replace molars were 81.2% of the study sample, which is similar to a result of a study done in 2003 in which 89% of the responding dentists confirmed that they usually inserted free-end acrylic partial dentures in subjects with SDA [34].

Governmental institutions are more aware of the selection of the SDA Concept for treatment compared to Private, p-value = 0.044. A likely explanation is that the treatment in governmental institutions is free. For private practitioner, on the other hand, financial considerations might play a part, which is evidenced by the fact that 52.6% of them believe that they will lose profits if they apply the SDA concept. The knowledge of dentists in Saudi Arabia about the shortened dental arch therapy appeared to be inadequate nowadays. It is suggested that the treatment by SDA should be integrated into the undergraduate and postgraduate schools' curricula to understand the idea of preserving functionally strategic part of dentition and avoid overtreatment with all the associated cost and risk in older age group of dental patients.

It is recognized that management of older adults with extremely shortened dental arches with less than four occluding units and satisfied with function is a challenge due to the periodontal status of the anterior and premolar teeth, the adaptive potential of the TMJ and the occlusal stability. Traditionally, conventional PRDs have been commonly used in this situation and it has continued to be the choice of treatment for most dentists in this study. Hence, the educational presence and emphasis of RPDP courses remains significant at dental schools all over Saudi Arabia. However, in the face of the advantages of SDA concept and the potential unfavorable effects of RPDPs, the teaching emphasis should perhaps be shifted towards the SDA for cases with reduced dentitions.

The SDA concept appears to be widely accepted Among European dentists with surveys being carried out during the late 1990s in the UK (consultants in restorative dentistry), [30] the Netherlands, [29] and more widely (European Prosthodontic Association) [32].

Moreover, economical concerns and other limitations (e.g medical conditions) could render some of the senior dental patients untreatable with fixed and implant options [35].

6. Conclusion

The SDA concept is accepted by the majority of dentists but is not frequently practiced. However, it appears that the absence of adequate knowledge and understanding of the concept may be responsible for this. Moreover, sometimes dentist's financial benefits outweigh the choice of the SDA concept as a treatment option.

Within the limitations of the study, it was concluded that general dentists, specialists and prosthodontists had

an overall encouraging opinion toward the SDA concept. There is a need to increase the SDA concept awareness and acceptance for both dentists and dental patients. Practitioners agree with the SDA concept but are relatively inexperienced in its application. Additionally, RPDPs education and practicing should remain to be a vital part of Prosthodontics programs in undergraduate level and as dental continuing education courses for graduate level.

Acknowledgements

The author reported no conflicts of interest related to this study. The author would like to thank Dr. Ghassan Rummani, Dr Somaya Halabi. Dr Raef Aljasem. and Dr Tahani Bin-Lagdam for all their help during distribution and collection of the questionnaire. The researcher appreciates all the participants for their efforts in replying to this study.

References

[1] Public health and aging: retention of natural teeth among older adults-United States, 2002. MMWR Morb Mortal Wkly Rep 2003;52(50):1226-9.

[2] Jepson NJ, Allen PF. Short and sticky options in the treatment of the partially dentate patient. Br Dent J 1999; 187: 646-52.

[3] Allen PF, Witter DJ, Wilson NH. The role of the SDA concept in the management of reduced dentitions. Br Dent J 1995; 178: 355-8.

[4] Kayser AF. Shortened dental arch: a therapeutic concept in reduced dentitions and certain high-risk groups. *Int J Periodontics Restorative Dent* 1989; 9: 426-449.

[5] A survey of dentists practice in the restoration of the shortened dental arch, Nassani et al, 2010, J section. Clinical and experimental dentistry.

[6] de Sa e Frias V, Toothaker R, Wright RF. Shortened dental arch: a review of current treatment concept. *J Prosthodont.* 2004 Jun; 13(2): 104-10.

[7] Report on the shortened dental arch concept, Hill, Jonathan, 2007.

[8] Armellini D, von Fraunhofer JA. The shortened dental arch: a review of the literature, 2004, *J Prosthet Dent*. 2004 Dec; 92(6): 531-5.

[9] Thomason JM, Moynihan PJ, Steen N, Jepson NJA. Time to survival for the restoration of the shortened lower dental arch.*J Dent Res* 2007; 86: 646-650.

[10] Fueki K, Yoshida E, Igarashi Y. A systematic review of prosthetic restoration in patients with shortened dental arches. *Japanese Dental Science Review* 2011; 47: 167-174.

[11] Witter DJ, Creugers NHJ, Kreulen CM, de Haan AFJ. Occlusal stability in shortened dental arches. *J Dent Res* 2001; 80: 432-436.

[12] Sarita PTN, Kreulen CM, Witter DJ, van't Hof M, Creugers NHJ. A study on occlusal stability in shortened dental arches. *Int J Prosthodont* 2003; 16: 375-380.

[13] Kanno T, Carlsson GE. A review of the shortened dental arch concept focusing on the work by the Kayser/Nijmegen group. *J Oral Rehabil* 2006; 33: 850-862.

[14] Sarita PTN. The shortened dental arch concept and its relevance for oral health care in developing countries. *Int J Contemp Dent*. 2012; 3: 89-95.

[15] Wolfart S, M€uller F, Gerb J, et al. The randomized shortened dental arch study: oral health-related quality of life. *Clin Oral Investig* 2013: 1-9.

[16] McKenna G, Allen F, Woods N, et al. Cost-effectiveness of tooth replacement strategies for partially dentate elderly: a randomized controlled clinical trial. *Community Dent Oral Epidemiol* 2014; 42: 366-374.

[17] Halse A, Molven O, Riordan PJ. Number of teeth and tooth loss of former dental school patients. Follow-up study after 10-17 years. *Acta Odontol Scand* 985; 43: 25-9.

[18] Battistuzzi P, Käyser A, Peer P. Tooth loss and remaining occlusion in a Dutch population. *J Oral Rehabil* 1987; 14: 541-7.

[19] Demirbuga S, Tuncay O, Cantekin K, Cayabatmaz M, Dincer AN, Kilinc HI, *et al*. Frequency and distribution of early tooth loss and endodontic treatment needs of permanent first molars in a Turkish pediatric population. *Eur J Dent* 2013; 7 Suppl 1: S99-104.

[20] Lahti S, Suominen-Taipale L, Hausen H. Oral health impacts among adults in Finland: competing effects of age, number of teeth, and removable dentures. *Eur J Oral Sci* 2008; 116: 260-266.

[21] Preshaw PM, Walls AW, Jakubovics NS, Moynihan PJ, Jepson NJ, Loewy Z.Association of removable partial denture use with oral and systemic health. J Dent. 2011 Nov;39(11):711-9.

[22] Yellowitz JA, Schneiderman MT. Elder's oral health crisis. J Evid Based Dent Pract 2014;14 Suppl: 191-200.

[23] Razak PA, Richard KM, Thankachan RP, et al. Geriatric oral health: a review article. *J Int Oral Health* 2014; 6(6): 110-6.

[24] Wall T, Nasseh K and Vujicic M. Most Important Barriers to Dental Care Are Financial, Not Supply Related. American Dental Associatin October 2015 research brief.

[25] Omar R. Reappraising prosthodontic treatment goals for older, partially dentate people: Part II. Case for a sustainable dentition? SADJ. 2004; 59: 228-234.

[26] World Health Organization Expert Committee. Recent Advances in Oral Health. WHO Technical Report Series. 826: 16-17 Geneva: WHO; 1992.

[27] BDA evidence summary; Shortened dental arch therapy in old age. December 2013.

[28] Witter DJ, De Haan AF, Kayser AF, Van Rossum GM. Shortened dental arches and periodontal support. *J Oral Rehabil*. 1991; 18(3): 203-12.

[29] Witter DJ, Allen PF, Wilson NH, Käyser AF. Dentists' attitudes to the shortened dental arch concept. *J Oral Rehabil* 1997; 24: 143-7. 28.

[30] Allen PF, Witter DF, Wilson NH, Kayser AF. Shortened dental arch therapy: Views of consultants in restorative dentistry in the United Kingdom. *J Oral Rehabil* 1996; 23: 481-5.

[31] Witter DJ, Allen PF, Wilson NH, Käyser AF. Dentists' attitudes to the shortened dental arch concept. *J Oral Rehabil* 1997; 24:143-7.

[32] Allen PF, Witter DJ, Wilson NH. A survey of the attitudes of members of the European Prosthodontic Association towards the shortened dental arch concept. *Eur J Prosthodont Restor Dent* 1998; 6: 165-9.

[33] Shortened dental arch therapy in old age BDA evidence summary, BDA December 2013.

[34] Sarita PT, Witter DJ, Kreulen CM, Creugers NH. The shortened dental arch concept – attitudes of dentists in Tanzania. *Community Dent Oral Epidemiol*. 2003; 31: 111-115.

[35] de Sa e Frias V, Toothaker R, Wright RF. Shortened dental arch: A review of current treatment concepts. J Prosthodont 2004; 13: 104-10.