



## **AWARENESS AND OPINION OF DENTISTS TOWARDS SHORTENED DENTAL ARCH (SDA)**

**Abdul Hamid Nor Faharina <sup>1</sup>, Ishak Hayati <sup>1</sup>, Salleh Muhammad Firdaus <sup>2</sup>, Ahmad Amirul Qayyum <sup>2</sup>, Ahmad.Mas Suryalis <sup>3</sup>**

<sup>1</sup> Centre of Restorative Dentistry Studies, Faculty of Dentistry, Universiti Teknologi MARA, Malaysia

<sup>2</sup> Final Year Dental Student, Faculty of Dentistry, Universiti Teknologi MARA, Malaysia

<sup>3</sup> Centre of Comprehensive Care Studies, Faculty of Dentistry, Universiti Teknologi MARA, Malaysia

---

### **ABSTRACT**

**Aim:** The Shortened Dental Arch (SDA) concept, proposed as a strategy to prevent prosthodontics overtreatment, is defined as a specific type of dentition with an intact anterior region and a reduction in the occluding pairs of posterior teeth. While this concept has been accepted worldwide, little is known about such a situation in Malaysia. This study was undertaken to determine the attitudes, awareness and opinion of dentists working at the Faculty of Dentistry, Universiti Teknologi MARA Malaysia (UiTM) towards the SDA concept. **Methods and Methods:** All dentists (n=71) working at the Faculty of Dentistry, UiTM were invited to participate in a paper-based questionnaire survey to assess their attitudes, awareness and perception towards the SDA concept. **Results:** The response rate was 59% (n=42). Overall, 85.7% of respondents were aware of the Kayser's SDA concept. A majority of them (61.1%) learnt about it through undergraduate studies. Only some respondents reported patients' dissatisfaction in chewing (29.4%), appearance (8.8%) and comfort (6.3%) following application of the concept. Most participants disagreed that missing

molar teeth should be replaced in all patients (52.4%), and supported the application of SDA concept in clinical practice (88.1%). However, some would choose to replace missing molars for older patients in order to provide posterior support (90.5%), prevent anterior wear (52.4%) and improve masticatory function (83.3%). Conclusion: Respondents' awareness and support for the SDA concept suggested its acceptance as a possible strategy in patient care.

Keywords: dentist awareness, shortened dental arch, oral function

## 1. INTRODUCTION

Tooth loss is negatively perceived by most people, especially if it involves the anterior teeth [1]. Preservation of complete dentition used to be regarded as the principal goal in restorative dentistry, where it was considered compulsory to replace all missing teeth [2]. According to Witter *et al*, failure to replace teeth would result in occlusal instability and temporomandibular disorders [2].

Traditionally, missing posterior teeth had been replaced with a removable partial denture [3] until recently, when advancement in dental technology has allowed alternative treatment options, for instance implant and fixed prosthesis, to be offered to patients. The decision in replacing missing posterior teeth depends on many factors, such as patients' perceived needs for prosthesis and clinician's decision upon diagnosis [4]. Major reasons cited by patients for replacing missing teeth included aesthetics [5], social and functional needs [6].

In 1981, the Shortened Dental Arch (SDA) Concept was proposed by Kayser as one of the treatment options for missing teeth within the posterior region [7]. It is defined as a specific type of dentition with a reduced number of posterior teeth [7, 8]. According to Kayser *et al*, a minimum of 20 teeth or 10 occluding pairs of teeth required to provide a

stable occlusion could be achieved as follows: 1) the anterior region consists of six aesthetic units, 2) the premolar region and molar region consists of four occlusal units each [2].

Application of the SDA concept has been reported to have positive impact on patients' overall oral hygiene, as replacement of lost molars had been linked to causation of iatrogenic periodontal diseases [2]. Furthermore, the SDA concept has been found to provide satisfactory masticatory and oral functions [2, 9] although its' cost-effectiveness is still investigated. The SDA concept is also in line with the World Health Organization's oral health goal, which highlights the minimal number of teeth (20 teeth) in order to retain healthy, natural functioning dentition, without requiring a prosthesis [10]. The SDA concept also supports the current perception of public regarding dentistry, which is directed towards achievement of psychosocial dimension of oral health, rather than merely focusing on the need for replacement of missing teeth [4].

Dental practitioners worldwide have shown their acceptance towards this treatment approach, although its practice is yet to be achieved at wider levels [11-14]. In Malaysia, there is currently no available data that reports the acceptance and application of this concept in dental practice. This study was undertaken to investigate the attitudes of dentists in the Faculty of Dentistry, Universiti Teknologi MARA towards the SDA concept.

## **2. MATERIALS AND METHODS**

This is a descriptive, quantitative, cross sectional study using an anonymous, self-administered paper-based questionnaire. The questionnaire used in this study was developed based on an existing validated study instrument [4], which had been modified to suit the local conditions. The questionnaire consisted of two sections: 1) Socio-demographic characteristics, 2) Respondents' attitudes, perception and awareness of the SDA concept. Prior to the survey, the questionnaire underwent a content-validation process by two senior

researchers to assess its suitability for use as a study instrument. Appropriate modifications to the questionnaire were made before being utilised in the main survey.

The survey involves all staff at the Faculty of Dentistry, UiTM, who holds a degree in Dental Surgery. The paper-based questionnaire survey was distributed by-hand to all subjects by the student researchers. A collection box was placed in every Department Office and the Deans' Office on Level 8 for subjects to return the completed questionnaire. The distribution and collection of the questionnaire was done for three rounds over the period of two months, with reminders sent in-between this time to improve response rate. A plain language statement outlining the participant's information on the objectives of the study, as well as issues regarding confidentiality and consent was attached to the questionnaire. Only subjects who returned a completed questionnaire were included in this study.

Data collected in this survey was de-identified and used in aggregate form. Quantitative data were entered for computer analysis using the Statistical Package for Social Sciences software program version 23. Further analysis was undertaken using a Chi-square test, with the significance value taken as  $p < 0.05$ . Ethics approval for this project was obtained from the UiTM Human Ethics Advisory Committee 600-IRMI 5/1/6).

### **3. RESULTS**

#### **3.1 Sociodemographic characteristics**

The response rate was 59% (n=42). The sociodemographic characteristics of study respondents are depicted in Table 1. The majority of respondents were specialists from various specialties (76.2%, n=32), while some were general dental practitioners (19.0%, n=8). A small number of respondents did not indicate their specialty or clinical practice background (4.8%, n=2).

### 3.2 Dentists' awareness of SDA

It was found that a high percentage of respondents demonstrated awareness of the SDA concept (Table 2). There was no significant difference in awareness across gender, years following graduation and qualification.

### 3.3 Respondents' exposure to SDA

All respondents who were aware of the SDA concept indicated that they learnt about such approach through various media (Figure 1). Most of the respondents (75.0 %, n=27) learnt about this concept during their undergraduate studies and postgraduate training.

### 3.4 Dentists' agreement with Kayser's (1981) SDA criteria

The majority of respondents agreed with the criteria for SDA concept introduced by Kayser (1981), as illustrated in Figure 2.

### 3.5 Dentists' perception of SDA concept

Most respondents (88.1%, n =37) agreed that SDA concept was beneficial in their daily clinical practice. The majority of respondents (61.1%, n=22) only applied this concept occasionally, while some (22%, n=8) stated that they have never applied this treatment approach in their clinical practice despite being aware of this concept. Only a small percentage of respondents (16.7%, n=6) reported that they applied the SDA concept regularly in patient care.

### 3.6 Reasons for replacing missing molar

Table 3 showed the reasons cited by respondents for replacing missing molar in a patient aged more than 50 years, irrespective of their awareness of the SDA concept. The majority of respondents reported replacing missing molar on these patients to restore posterior support (90.5%), improve masticatory function (83.3%) and prevent anterior wear

(52.4%). Only a small percentage of respondents (4.8%) reported replacing missing molar for aesthetic reason.

### 3.7 Dentists' perception of patient's acceptability of the SDA concept

Only 8.3% of respondents cited that their patients objected the application of SDA concept in treatment planning. On the other hand, 41.7 % of respondents reported no objections from their patients, 27.8% of respondents complied to the SDA concept after initial objection, while 22.2 % of respondents had no opinion about their patients' acceptance. Almost half of the respondents (45.2%) felt that financial issues were the main factor for acceptance of SDA concept.

In terms of patients' acceptance of the SDA concept, the majority of respondents cited that their patients reported sufficient to satisfactory level of responses in appearance (73.5%), oral comfort (68.8%) and chewing functions (58.8%) (Table 4).

## **4. DISCUSSION**

This study was undertaken to investigate the perception and awareness of the SDA concept among dentists at the Faculty of Dentistry, UiTM. It was found that most respondents, regardless of gender and the level of qualification, were aware of the SDA concept. There was also no significant correlation in awareness of this concept amongst respondents in terms of the number of years practicing dentistry. This finding is in contrast to another study in Australia, where the younger generation of dentists (below the 20 years of experience) demonstrated better awareness of such concept [4]. The awareness of Australian younger dentists may be related to the educational exposure during university, with the SDA concept being increasingly emphasized during the undergraduate training [4]. Perhaps, the teaching of such concept in undergraduate training in Malaysian dental schools should be enhanced, in order to gauge better awareness of this treatment approach among the newer

generation of dentists. Creating awareness of the SDA concept should be instilled among younger Malaysian dentists, as such treatment approach is currently gaining recognition for application in dental practice [4].

Improvement of knowledge of SDA amongst the whole study cohort is also essential, since most of them perceived that replacement of missing teeth was indicated to improve posterior support and masticatory stability. Provision of continuing professional development (CPD) activities in this area could provide an important avenue for allowing acquisition of knowledge amongst clinicians.

The frequency of SDA application demonstrated by respondents in this study were comparable to that reported in Netherlands [13]. Although most were aware of the SDA concept, most respondents reported applying this treatment approach only occasionally, while less than a quarter of them had never applied such concept in treatment planning. Among factors involved in decision-making prior to SDA application included patients' perceptions and needs, as well as financial issue. Patients' education is therefore important to create awareness among patients of the advantages of the SDA concept, and the lack of need to replace missing posterior teeth to restore oral functions [2]. Furthermore, financial benefits following the application of the SDA concept could be emphasized to the patients, as financial factor has been quoted in this study as the main reasons for patients' acceptance of the SDA concept. Mandatory implementation of evidence-based practice in clinical settings could encourage enhanced participation of dental practitioners in applying the SDA concept in patient care.

Based on the dentists' assessment towards patients' acceptance for SDA, most patients were able to accept the SDA concept as an alternative treatment. Proper treatment planning for the management of missing posterior teeth may improve patients' acceptance for

such concept. Active engagement of clinicians in shared decision-making is also important, as some patients demonstrated willingness to accept this treatment option after being given thorough explanation by dentists. Respondents' support for the SDA concept suggested positive implications for wider application of such treatment approach in dental practice.

Application of the SDA concept, considered mainly for older adults aged 50 years and above [8], may be useful in fulfilling the treatment needs and demands of the geriatric population, which is experiencing a phenomena of global ageing [15, 16]. This is especially applicable in Malaysia, as the age of citizens living in developed countries had been reported to reach beyond 65-70 years of age [15, 16]. Besides the geriatric population, the SDA concept may also benefit individuals with special needs and those who are medically compromised who cannot tolerate complex dental procedures [4], as such treatment approach has been found to satisfactorily fulfil the functional, biological, social, and psychological needs of patients [15, 17, 18].

The study is limited by the low response rate, which could create bias to the overall findings of the study. As lack of interest towards research matter has been previously associated with low response rate [19], the validity of findings of this study may be compromised if non-respondents were to have a completely negative perception of the SDA concept. Initiatives to improve response rate among respondents need to be enhanced, such as via the use of online survey for questionnaire administration. Although it was previously reported that online survey may have resulted in low response rate, in comparison with that conducted paper-based [20, 21], such findings may differ according to groups of individuals of different backgrounds, which in this study was university health care professionals. Another limitation is the absence of sound validation of our study instrument, associated with time and financial constraints. For future research, it is suggested that a larger sample size is included, with a more systematic sampling technique applied in order to have a true

representation of the study population. Besides, a strong validation of the study instrument is also indicated to obtain stronger evidence-based findings, in addition to omission of questions that may have resulted in deterrence for participating in this study. Despite these limitations, findings of this study could provide useful initial information of the topic in general, which will subsequently lead to a shift in practice of clinical dentistry towards the SDA approach in this country. Besides this, a survey designed to observe patients' acceptability towards SDA concept is necessary to confirm the initial findings reported in this study. This is equally important as patients play an important role in providing informed consent for treatment, including cases that require application of the SDA concept.

## **5. CONCLUSION**

Respondents' awareness and support for the SDA concept, as well as patients' positive response in various functions suggested its acceptance as a possible strategy in patient care. Clinicians play an important role in indicating the appropriateness of SDA treatment approach via proper diagnosis and treatment planning, as well as advising patients on the benefits of application of the SDA concept in fulfilling patients' various needs and functions.

## **CONFLICT OF INTEREST**

The authors state that they have no conflicts of interest with respect to their authorship or the publication of this article.

## REFERENCES

1. Elias, A. and A. Sheiham, *The relationship between satisfaction with mouth and number and position of teeth*. Journal of Oral Rehabilitation, 1998. **25**: p. 649-661.
2. Witter, D.J., et al., *The shortened dental arch concept and its implications for oral health care*. Community Dentistry and Oral Epidemiology, 1999. **27**: p. 249-258.
3. Omar, R., *The evidence for prosthodontic treatment planning for older, partially dentate patients*. Medical Principles and Practice, 2003. **12**: p. 33-42.
4. Abuzar, M., A. Humplik, and N. Shahim, *The shortened dental arch concept: awareness and opinion of dentists in Victoria, Australia*. Australian Dental Journal, 2015. **60**: p. 294-300.
5. Allen, P., et al., *Attitudes and practice in the provision of removable partial dentures*. British Dental Journal, 2008. **204**: p. 1-5.
6. Graham, R., et al., *Determining 'need' for a removable partial denture: a qualitative study of factors that influence dentist provision and patient use*. British Dental Journal, 2006. **200**: p. 155-158.
7. Käyser, A., *Shortened dental arches and oral function*. Journal of Oral Rehabilitation, 1981. **8**: p. 457-462.
8. Kayser, A., *Shortened dental arch: a therapeutic concept in reduced dentitions and certain high-risk groups*. The International Journal of Periodontics and Restorative Dentistry, 1988. **9**: p. 426-449.
9. Witter, D., et al., *A 6-year follow-up study of oral function in shortened dental arches. Part I: Occlusal stability*. Journal of Oral Rehabilitation, 1994. **21**: p. 113-125.

10. Jepson, N. and P. Allen, *Conservative dentistry: Short and sticky options in the treatment of the partially dentate patient*. British Dental Journal, 1999. **187**: p. 646-652.
11. Allen, P., et al., *Shortened dental arch therapy: views of consultants in restorative dentistry in the United Kingdom*. Journal of Oral Rehabilitation, 1996. **23**: p. 481-485.
12. Sarita, P.T., et al., *The shortened dental arch concept—attitudes of dentists in Tanzania*. Community Dentistry and Oral Epidemiology, 2003. **31**: p. 111-115.
13. Witter, D., et al., *Dentists' attitudes to the shortened dental arch concept*. Journal of Oral Rehabilitation, 1997. **24**: p. 143-147.
14. Vohra, F., et al., *Knowledge and attitudes of dentists toward shortened dental arch therapy in Saudi Arabia*. Nigerian Journal of Clinical Practice, 2016. **19**: p. 380-385.
15. Kanno, T. and G.E. Carlsson, *A review of the shortened dental arch concept focusing on the work by the Käyser/Nijmegen group*. Journal of Oral Rehabilitation, 2006. **33**: p. 850-862.
16. Armellini, D. and J.A. Von Fraunhofer, *The shortened dental arch: a review of the literature*. The Journal of Prosthetic Dentistry, 2004. **92**: p. 531-535.
17. Wolfart, S., et al., *The randomized shortened dental arch study: oral health-related quality of life*. Clinical oral investigations, 2014. **18**: p. 525-533.
18. McKenna, G., et al., *Cost-effectiveness of tooth replacement strategies for partially dentate elderly: a randomized controlled clinical trial*. Community Dentistry and Oral Epidemiology, 2014. **42**: p. 366-374.
19. Cottrell, E., et al., *Maximising response from GPs to questionnaire surveys: do length or incentives make a difference?* BMC Medical Research Methodology, 2015. **15**: p. 3.

20. Couper, M.P. and T. Triplett, *A comparison of mail and e-mail for a survey of employees in US statistical agencies*. Journal of Official Statistics, 1999. **15**: p. 39.
21. Jones, R. and N. Pitt, *Health surveys in the workplace: comparison of postal, email and world wide web methods*. Occupational Medicine, 1999. **49**: p. 556-558.

### Figure Legends

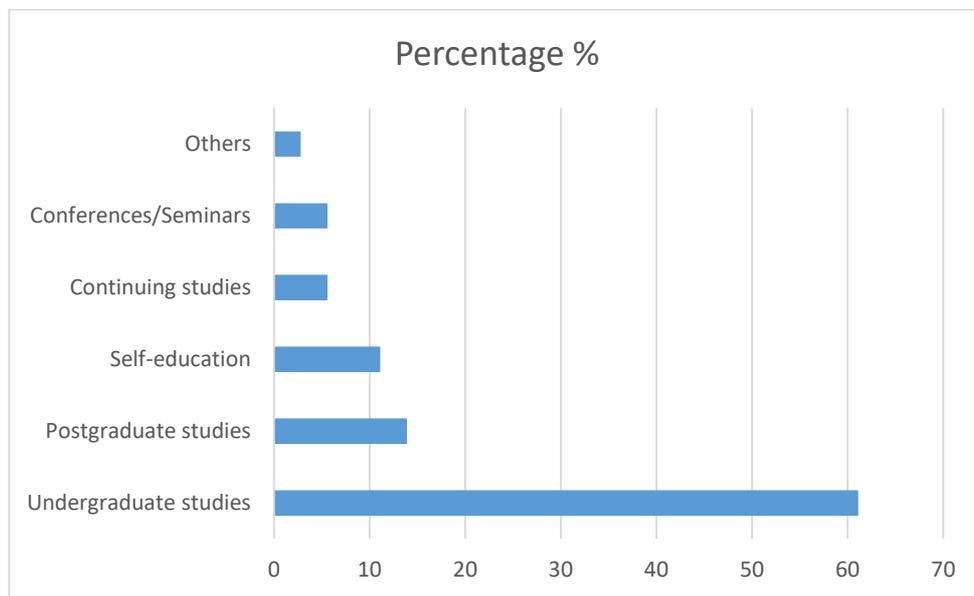


Figure 1. Respondent's exposure to SDA

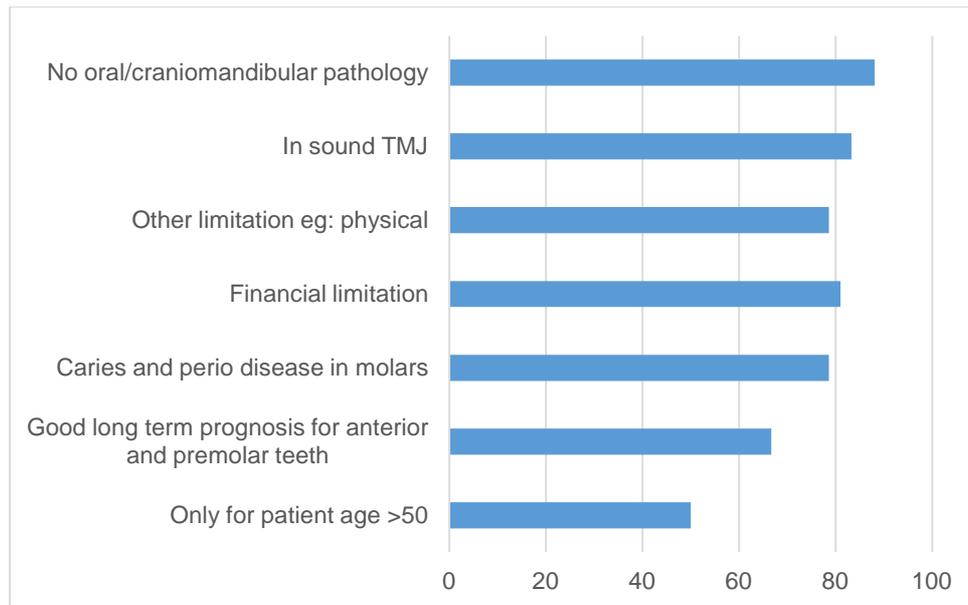


Figure 2. Percentage of dentist who agreed with Kayser's (1981) SDA criteria

**Table 1. Sociodemographic characteristics of study respondents**

| Sociodemographic characteristics | Frequencies |              |
|----------------------------------|-------------|--------------|
| Gender                           | Male        | 28.6% (n=12) |
|                                  | Female      | 71.4% (n=30) |
| Years following graduation       | 1-10 years  | 52.4% (n=22) |
|                                  | 11-20 years | 35.7% (n=15) |
|                                  | 21-30 years | 7.1% (n=3)   |
|                                  | 31-40 years | 0% (n=0)     |
|                                  | 41-50 years | 4.8% (n=2)   |
| Levels of qualification          | Degree      | 26.2% (n=11) |
|                                  | Master      | 66.7% (n=28) |

---

|     |            |
|-----|------------|
| PhD | 7.1% (n=3) |
|-----|------------|

---

**Table 2. Dentists' awareness of SDA**

---

|                               |        | Aware        | Unaware     |
|-------------------------------|--------|--------------|-------------|
| Gender                        | Male   | 91.7% (n=11) | 27.3% (n=3) |
|                               | Female | 89.3% (n=25) | 10.7% (n=3) |
| $(\chi^2 = 0.486, p=0.486).$  |        |              |             |
| Years following<br>graduation | 1-10   | 81.8% (n=18) | 18.2% (n=4) |
|                               | 11-20  | 86.7% (n=13) | 13.3% (n=2) |
|                               | 21-30  | 100% (n=3)   | 0% (n=0)    |
|                               | 31-40  | 0% (n=0)     | 0% (n=0)    |
|                               | 41-50  | 100% (n=2)   | 0% (n=0)    |
| $(\chi^2 = 1.117, p=0.773).$  |        |              |             |

---

|   |        |              |             |
|---|--------|--------------|-------------|
| Highest qualification<br><br>( $\chi^2 = 2.307, p=0.316$ ). | Degree | 72.7% (n=8)  | 27.3% (n=3) |
|   | Master | 89.3% (n=25) | 10.7% (n=3) |
|   | PhD    | 100% (n=3)   | 0% (n=0)    |

**Table 3. Reasons for replacing missing molar in patients aged more than 50 years old.**

| Reasons                      | Response (%) |
|------------------------------|--------------|
| To restore posterior support | 90.5 (n=38)  |
| Prevention of anterior wear  | 52.4(n=22)   |
| Improve masticatory function | 83.3(n=35)   |
| For patient's desire         | 38.1(n=16)   |
| To maintain health if TMJs   | 42.9(n=18)   |
| Aesthetics                   | 4.8(n=2)     |

**Table 4. Dentists' assessment of patients' responses on application of SDA**

| Patient's Response | Distribution of dentist reporting on patient function (%) |                      |                        |
|--------------------|---|----------------------|------------------------|
|                    | Chewing<br>(n=34)   | Appearance<br>(n=34) | Oral Comfort<br>(n=32) |
| Unsatisfactory     | 29.4  | 8.8                  | 6.3                    |
| Sufficient         | 29.4  | 23.5                 | 31.3                   |
| Satisfactory       | 29.4  | 50.0                 | 37.5                   |
| Don't know         | 11.8  | 17.6                 | 25.0                   |
| Total %            | 100   | 100                  | 100                    |