ORIGINAL ARTICLE

Assessment of dental anxiety using modified dental anxiety scale among adults with cleft lip and/or palate

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Abstract *Objectives:* This study aimed to investigate dental anxiety levels among adults with cleft lip and/or palate (CL/P) and compare to adults with no orofacial cleft. The study also intended to find out the impact of cleft severity, gender and age on the perceived dental anxiety.

Methods: The study was composed of a sample of 70 adult participants who received and completed dental treatments. After sending self-addressed envelopes with consent forms and Modified Dental Anxiety Scale (MDAS) to 192 potential participants, 35 participants with CL/P (CL/P group) and 35 participants with no CL/P (control group), agreed to participate. Data were analysed using Mann–Whitney U test. A two-tailed P-value < 0.05 was considered as statistically significant.

Results: 54.3% of adults with CL/P (23 females and 12 males, age range from 16 to 72 years) reported normal dental anxiety, while the remaining 45.7% reported moderate dental anxiety. No extreme dental anxiety were recorded in the CL/P group. These results were similar to the control group and there were no significant differences between groups (p > 0.05). Female participants recorded higher median anxiety scores than male participants in the CL/P group, and participants with cleft lip had higher median scores than participants with cleft lip and palate. However, these were not statistically significant.

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Conclusion: The results suggest that CL/P did not affect dental anxiety levels for participants with the CL/P as there were no extreme cases and their results were comparable to a general non-cleft sample.

1. Introduction

Dental anxiety defined as "an aversive emotional state of apprehension or worry in anticipation of the feared stimulus of dental treatment" (Armfield, 2010), is considered a global and oral healthcare challenge (Lin et al., 2017; Newton et al., 2012). The literature demonstrates that a high level of dental anxiety plays a pivotal role in the patient's association with poor quality of life and oral health (Armfield and Ketting, 2015; Carlsson et al., 2015). Dental anxiety is a clinically significant issue and should not be under-estimated. Dental anxiety is first and foremost an oral-health issue as it is associated with a lower frequency of dental visits and a higher prevalence of dental caries (Bui et al., 2019; Hayden et al., 2013; Seligman et al., 2017). The prevalence of significant dental anxiety seems to be around 15% of the adult population (Humphris et al., 2009; Seligman et al., 2017). Dental procedures involving the needle or drill were associated with the greatest levels of fear, and invasive procedures such as tooth extraction, root canal treatment and subgingival scaling were associated more with reported pain, particularly in those with extreme dental anxiety (Caltabiano et al., 2018; Maggirias and Locker, 2002).

Adults with cleft lip and/or palate (CL/P) are inevitably exposed to invasive medical procedures, including dental treatments, in their early life in order to repair the defects and to restore normal function and aesthetic (Antonarakis et al., 2013; Bister et al., 2011; Vogels et al., 2011). The quality of life of adults with CL/P is negatively correlated to their condition compared to adults with no CL/P (Aljohani et al., 2021; Bortoluzzi et al., 2015). It is assumed that individuals with CL/P with a high exposure to hospital environment are more likely to develop anxiety in a medical setting (Vogels et al., 2011), and therefore it is reasonable to presume that adults with CL/P will have more dental anxiety in comparison to adults without CL/P. However, the number of studies available on the level of dental anxiety in patients with CL/P is limited and these studies were based on children with CL/P rather than the adult population. The results of these studies are also inconsistent, with some studies reporting that dental and other types of anxiety, such as social anxiety, are more common in children with CL/P (Foo et al., 2012; Vogels et al., 2011). However, in a longitudinal study conducted over three years, Krikken et al. (2015) assessed the level of dental anxiety among Dutch children with CL/P, and showed that the initial levels of dental anxiety decreased to levels equivalent to normative scores of Dutch children with no orofacial clefts. Consequently, the aims of this study were –

1) To evaluate the level of dental anxiety using MDAS among adults with CL/P (CL/P group) and compare their results with adults without CL/P (control group);

2) To assess whether there were any difference in the level of dental anxiety among different genders and cleft severity levels.

2. Material and methods

MDAS is a brief, self-complete questionnaire consisting of five questions with response format, Table 1 contains the list of MDAS questions and the possible responses. Scores are added across all of the patient's responses, with the highest possible score being 25. When the scores have been totalled, a total score of ≤ 10 is considered normal, whereas those lying between 11 and 18 represent moderate anxiety, and scores ≥ 19 represents extreme anxiety (Caltabiano et al., 2018; Chowdhury et al., 2019). This cross-sectional study was conducted at the Restorative Dentistry Department, University of Manchester. This study was approved by the National Health Service (Research Ethics Committee reference: 19/SC/0463). All participants included in this study were treated by the same clinician, MPA. Age was categorized into five age groups as described by Sweiry and Willitts (2012). The age groups in years were: 1) 16–24, 2) 25–49, 3) 50–64, 4) 65–79 and 5) ≥ 80. The inclusion criteria for the participants of this study were; 1) all participants must be adult (≥ 16 years old) who were able to understand the questionnaire and provide consent; 2) adult male or female individuals had to be healthy with no associated severe medical issues; 3) all participants must have completed their dental restorative treatment; 4) for CL/P group, only participants with non-syndromic CL/P were included.

Table 1 List of Modified Dental Anxiety Scale (MDAS) questionnaire and response scale.

Items	Modified dental anxiety scale (MDAS) anxiety questionnaire	Response format
1	If you went to your dentist for treatment tomorrow, how would you feel?	1. Not anxious
2	If you were sitting in the waiting room (waiting for treatment), how would you feel?	2. Slightly anxious
3	If you were about to have a tooth drilled, how would you feel?	3. Fairly anxious
4	If you were about to have your teeth scaled and polished, how would you feel?	4. Very anxious
5	If you were about to have a local anaesthetic injection in your gum, ow would you feel?	5. Extremely anxious

2.1. Participant selection

Salud dental practice management software, was used to identify potential participants. Potential participants were selected from 4th March 2016 (start date of using Salud at the Restorative Dentistry Department) until 19th September 2019. The inclusion/exclusion criteria were applied, and then potential participants were assigned to one of two groups, the CL/P group and the control group. All potential participants were contacted by mail, which included the participant information sheet as an introduction to the research project, consent to contact and to participate forms, the MDAS questionnaire, and a self-addressed prepaid envelope. In addition, if any potential participant did not wish to take part in the study, they were provided with contact details to inform the research team of this, in which case their details were removed from the list. For those who did not reply after three months from the date of initial contact, no further contact was made, and their details were removed from the study list. As all potential participants completed their treatment, the dental restorative treatments were recorded and sorted into four categories, according to complexity; 1) tooth/teeth reshaped by enamel reduction, composite addition, veneer and/or crown, 2) tooth / teeth replaced by partial denture, complete denture and/or bridge, 3) dental implant treatment including crown, bridge, partial denture and/or complete denture, 4) palatal obturator or speech plate. In cases where a participant received more than one type of treatment, the most complex treatment was recorded.

2.2. Data analysis

The data collected was analysed using the statistical package for social sciences (SPSS 25.0). A Shapiro–Wilk test was undertaken and this indicated that the data were not normally distributed. Therefore, a non-parametric test, the Mann–Whitney U test, was used to investigate the difference between the two independent groups (CL/P and control groups). All tests were two-tailed, and a P-value < 0.05 was considered statistically significant.

3. Results

192 potential participants (86 patients with CL/P and 106 patients with no orofacial clefts) were identified. Thirty five out of 86 participants with CL/P agreed to participate (response rate: 40.7%) and they were allocated to the CL/P group, whilst 40 out of 106 patients without CL/P agreed to participates (response rate: 37.7%) and they were allocated to the control group. These participants completed and returned the questionnaires with no missing data. The chief investigator (JMY) and the principal investigator (MHA) agreed to randomly exclude 5 participants from the control group, giving both groups an equal number of participants. In the CL/P group, the median age was 47 years, with an age range of 16 to 72 years old, while the control group had a median age of 51 years, with an age range of 18 to 76 years old. In Table 2, the demographic characteristics of the participants in the CL/P and control groups are shown and include gender, age groups, cleft types and types of dental treatment.

3.1. Differences in MDAS between participants in the CL/P and control groups

The mean and median values were calculated for each question, and the total scores were determined to indicate the severity of dental anxiety in the two groups and these are shown in Table 3. When the median values were calculated, both groups had equal values except in 'Scale and Polish' and the total mean values in which the control group recorded higher scores. However, these differences were not statistically significant ($p > 0.05$). Participants with CL/P only recorded a higher mean value in response to 'Local Anaesthetic Injection' but again no significant differences were found. Overall, 54.3% of participants in both groups scored equal to or < 10 points in the total MDAS scores which, as discussed previously, is considered a normal level of anxiety, while the remaining participants in the CL/P group (45.7%) scored between 11 and 18 points, indicative of moderate anxiety, with no participant responding with a score of ≥ 19, which is an indicator for extreme anxiety. Participants in the control group had very

Table 2 Participants' characteristics in CL/P and control groups.

Participants profile		CL/P group		Control group	
		Frequency	Percent	Frequency	Percent
Gender	Male	12	34.3%	14	40%
	Female	23	65.7%	21	60%
Age groups in years	16–24	12	34.3%	7	20%
	25–49	11	31.4%	9	25.7%
	50–64	10	28.6%	14	40%
	65–79	2	5.7%	5	14.3%
Cleft types	Cleft lip	8	22.9%	–	–
	Cleft palate	0	0%	–	–
	Cleft lip and palate	27	77.1%	–	–
Types of dental treatment.	Tooth/teeth reshaped	8	22.9%	5	14.3%
	Tooth/teeth replaced	15	42.9%	6	17.1%
	Dental implant treatments	5	14.3%	24	68.6%
	Palatal obturator/speech plate	7	20%	0	0%

Table 3 Comparison of mean response values between participants in CL/P and control groups and the results of Mann-Whitney *U* test.

	Comparison between CL/P and control groups					Comparison between Females and Males in CL/P group					Comparison between different cleft severity in CL/P group				
	CL/P group (n = 35)		Control group (n = 35)		Mann-Whitney U (p-value)	Females (n = 23)		Males (n = 12)		Mann-Whitney U (p-value)	Cleft lip (n = 8)		Cleft lip and palate (n = 27)		Mann-Whitney U (p-value)
	Mean (SD)	Median (SE)	Mean (SD)	Median (SE)		Mean (SD)	Median (SE)	Mean (SD)	Median (SE)		Mean (SD)	Median (SE)	Mean (SD)	Median (SE)	
Visiting Tomorrow	1.6 (0.7)	2 (0.12)	1.89 (0.72)	2 (0.12)	505.5 (0.17)	1.57 (0.6)	2 (0.12)	1.83 (0.94)	1.5 (0.27)	120.0 (0.55)	2 (0.76)	2 (0.27)	1.56 (0.7)	1 (0.13)	72.0 (0.17)
Waiting Room	1.7 (0.8)	2 (0.14)	1.94 (0.8)	2 (0.14)	527.5 (0.29)	1.78 (0.74)	2 (0.15)	1.67 (1.00)	1 (0.28)	156.0 (0.55)	2.25 (1.03)	3 (0.37)	1.6 (0.7)	1 (0.13)	67.5 (0.11)
Tooth Drilled	2.7 (1.4)	3 (0.14)	2.77 (1.1)	3 (0.18)	612.5 (1.00)	2.78 (1.35)	3 (0.28)	2.75 (1.2)	2.5 (0.35)	138.0 (1.00)	3.25 (1.4)	4 (0.5)	2.63 (1.24)	3 (0.24)	78.0 (0.25)
Scale and Polish	1.7 (0.9)	1 (0.16)	1.94 (1.1)	2 (0.19)	556.0 (0.47)	1.91 (1.00)	2 (0.21)	1.42 (0.79)	1 (0.23)	179.5 (0.15)	1.5 (0.93)	1 (0.33)	1.8 (0.96)	2 (0.185)	131.0 (0.38)
Local Anaesthetic Injection	2.7 (1.4)	2 (0.24)	2.57 (1.15)	2 (0.19)	631.0 (0.82)	3 (1.45)	3 (0.3)	2.17 (1.19)	2 (0.345)	185.0 (0.1)	2.63 (1.51)	2 (0.53)	2.74 (1.4)	2 (0.27)	114.0 (0.83)
Mean value of total MDAS scores	10.6 (4.3)	9 (0.72)	11.11 (3.86)	10 (0.65)	549.0 (0.45)	11.04 (4.27)	10 (0.89)	9.8 (4.37)	7.5 (1.26)	162.0 (0.42)	11.63 (4.27)	13 (1.5)	10.33 (4.3)	9 (0.8)	93.5 (0.58)
Percentage scoring ≤ 10 (Normal)	54.3% (19 participants)		54.3% (19 participants)		–	52.2% (12 participants)		58.3% (7 participants)		–	37.5% (3 participants)		59.3% (16 participants)		–
Percentage scoring 11 to 18 (moderate anxiety)	45.7% (16 participants)		42.9% (15 participants)		–	47.8% (11 participants)		41.7% (5 participants)		–	62.5% (5 participants)		40.7% (11 participants)		–
Percentage scoring ≥ 19 (extreme anxiety)	0%		2.9% (1 participant)		–	0%		0%		–	0%		0%		–

Abbreviations: SD; standard deviation, SE; standard error of mean.

similar results, with 42.9% showing moderate anxiety. However one exception was that one participant in the control group recorded responses which scored 19 in the total MDAS which is an indicator for extreme anxiety.

3.2. Differences in MDAS scores between females and males participants in the CL/P group

From Table 3, females with CL/P recorded higher mean and median scores in response to questions on 'Waiting Room', 'Tooth Drilled', 'Scale and Polish', 'Local Anaesthetic Injection' and in their total MDAS scores. However, these were not statistically significant ($p > 0.05$), when compared to males in the CL/P group. Male participants recorded higher results than female participants only in response to 'Visiting Tomorrow' however, again this was not significant. Of the males in the CL/P group, 58.3% scored ≤ 10 in their total MDAS scores, which indicates normal anxiety, with the remaining 41.7% classified as being moderately anxious. Conversely, a larger proportion of females in the CL/P group exhibited moderate anxiety (47.8%) compared to males in the CL/P group, with the remaining 52.2% considered as having normal anxiety.

3.3. Differences in MDAS between participants regarding cleft severity in the CL/P group

The majority of participants with CL/P had cleft lip and palate (77.1% of participants), and the remaining had cleft lip only (22.9%). Table 3 illustrates that participants with cleft lip only recorded higher anxiety results compared to participants with cleft lip and palate in response to questions on 'Visiting Tomorrow', 'Waiting Room', Tooth Drilled', and in their total MDAS scores which indicated that adult participants with cleft lip only had more dental anxiety than adults with cleft lip and palate. However, these differences were not statistically significant ($p > 0.05$). Overall, 62.5% of adults with cleft lip had moderate anxiety and the remaining 37.5% had normal anxiety, which is in contrast to the findings for adult participants with cleft lip and palate, as almost the three-fifths (59.3%) responded as having normal anxiety, while the remaining 40.7% exhibited moderate anxiety.

4. Discussion

The aims of this study were to examine the level of dental anxiety among adult participants with CL/P using MDAS and compare their results with a control group. Additionally, we examined any gender differences and differences dependent on orofacial cleft severities associated with levels of dental anxiety. This study was a cross-sectional study, and the decision was made to select patients who had completed their dental treatments at the Restorative Dentistry Department and were treated by MPA for some reasons. Firstly, this approach reduced bias as the participants in both groups had received dental treatments in a very similar environment and under the care of the same clinician. Secondly, completion of treatment was a prerequisite in the inclusion criteria to ensure that all participants had experienced all the required types of dental interventions they needed, and therefore would have a more comprehensive judgment on the dental treatments and on their feelings throughout the entire process.

One of the steps taken to reduce bias was that participants with severe systemic or mental health conditions would be excluded from the study, and medical conditions were confirmed both through the patients' records and directly confirmed with the participants. Consequently, any medical issues that may affect the participants' ability to provide answers were ruled out or at least reduced to minimum levels. With regards to the study results, there were no statistically significant differences noted for the level of MDAS between the CL/P and control groups, nor between females and males in the CL/P group. Moreover, there were no statistically significant differences between adults with cleft lip and those with cleft lip and palate. However, it was surprising that adults with CL/P had recorded slightly lower levels of dental anxiety than the control group, and they had 54.3% of participants with CL/P reporting normal levels, and no individuals recording extreme anxiety. This may be, as Pisula et al. (2014) have discussed, a result of adults with CL/P recording better physical health and function than their healthy counterparts, and adults with CL/P exhibiting less dental anxiety may be a consequence of the history and treatment of their medical problems. It is possible in this situation that the CL/P cohort found that dental restorative treatments were less complex and less painful than previous surgical corrective interventions. Furthermore, individuals with CL/P may appreciate positive changes in their health more than their counterparts. Females with CL/P recorded higher dental anxiety than males in the CL/P group, this is consistent with many studies which reported that females had more dental anxiety than males (Saatchi et al., 2015). The reasons for this may be as discussed by Farooq and Ali (2015), that females are more responsive to a particular stimulus such as fear of needles. This parallels with the findings of this study as females with CL/P recorded the highest mean of dental anxiety in response to questions about local anaesthesia injection, generating a mean value of 3. Thereafter, the same cohort reports a mean value of 2.78 'tooth drilling', with both of these treatments involving injections and vibrating sensations, which others have reported as being associated with greater pain, particularly in the dental anxious patients (Caltabiano et al., 2018). In this study participants were grouped based on their cleft severities, and the simplest classification was used which was either cleft lip, cleft palate, or cleft lip and palate. This was done to explore the effect of or the relationship between cleft severity and dental anxiety. None of the participants had cleft palate only, therefore only two types of cleft severities were examined, cleft lip, and cleft lip and palate. The result of this study showed that participants with cleft lip only recorded higher dental anxiety than participants with cleft lip and palate, potentially supporting the earlier theory whereby participants who were exposed to more surgical corrective intervention exhibit less dental anxiety, given that they find the dental treatments to be less painful and less traumatic experiences; however, these results were not statistically significant.

5. Conclusion

The results of this study showed that there were no significant differences between adults with CL/P when compared to their

healthy counterparts, regarding the level of dental anxiety. In fact, those participants with CL/P, especially those with cleft lip and palate, recorded less dental anxiety than the control group. Almost none of the adult participants had an extreme dental anxiety, and over half of all participants had normal dental anxiety. There were some indicators that females with CL/P exhibit more dental anxiety than males in the same group. However, none of the observed signs were statistically significant.

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Declaration of Competing Interest

The authors have no conflict of interest to declare.

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