

# Estimation of Dental Anxiety Levels Before and After Dental Visit in Children with Visual Impairment Using Modified Dental Anxiety Scale in Braille Text

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Received : 04-09-19.  
Accepted : 23-10-19.  
Published : 14-11-19.

**ABSTRACT** **Objective:** Dental anxiety and fear of dental treatment in special children has been recognized as a public health dilemma. Dental anxiety (being the fear of unknown in a dental setting) would definitely have a substantial effect on the children with visual impairment. Assessment of the dental anxiety makes it possible to design intervention programs aimed at reducing the anxiety levels in children with visual impairment. Thus, the aim of this study was to assess the dental anxiety levels before and after dental visit in children with visual impairment using Modified Dental Anxiety Scale (MDAS) printed in braille. **Materials and Methods:** A total of 144 institutionalized children with visual impairment in the age group of 6–13 years, residing at an institutionalized blind school, participated in the study. Dental anxiety was assessed pre- and post-dental-screening visit using MDAS printed in braille. Statistical analysis was performed using the Wilcoxon matched-pairs signed rank test. **Results:** Of 144 children, just before dental screening visit, 78 (54.1%) had severe dental anxiety, 52 (36.11%) had mild anxiety, and 14(9.72%) reported no anxiety, whereas after dental education, only 28 (19.44%) had severe anxiety, 22 (16.66%) had mild anxiety, and 94 (63.88%) reported no anxiety. **Conclusion:** In our study, there was a significant decrease in dental anxiety after dental screening and education. Therefore, proper behavior management techniques and dental health education programs would decrease dental anxiety in children with visual impairment.

**KEYWORDS:** Blind children, braille, dental anxiety, Modified Dental Anxiety Scale, visual impairment.

## INTRODUCTION

Fear and anxiety has been recognized as a major barrier for the use of dental services.<sup>[1]</sup> There has been an alarming increase in visual impairment globally because of local and systemic diseases. There are little data regarding dental health needs in such patients with visual impairment. Visual impairment has an adverse effect on oral hygiene with many blind patients having worse oral hygiene.<sup>[2]</sup>

Physically challenged patients are a unique population that test the knowledge and skill of the dentist. With proper training and knowledge of the underlying medical condition, and with an alteration in the dentist’s treatment protocol, these physically challenged patients can be managed well in a dental setup.<sup>[3]</sup>

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**How to cite this article:** Shivanna V, Jain Y, Valluri R, Birra V, Kumar V, Ealla KR. Estimation of dental anxiety levels before and after dental visit in children with visual impairment using Modified Dental Anxiety Scale in braille text. J Int Soc Prevent Communit Dent 2020;10:76-84.

Access this article online	
<b>Quick Response Code:</b> 	<b>Website:</b> www.jispcd.org  <b>DOI:</b> 10.4103/jispcd.JISPCD_361_19

About 285 million people are visually impaired worldwide. India is home to the largest population with visual impairment, especially children. In India, the prevalence of blindness in children under 16 years of age is estimated to be 0.8/1000, indicating that approximately 300,000 children have visual impairment or blindness. Providing comprehensive dental care for these visually challenged patients is not only rewarding but is also a community service that the dentist should accomplish.<sup>[4]</sup>

Visual impairment, because of the deficiency that comes with it, has a significant effect on the affected individuals and it reflects in their daily activities. The affected individuals assess their scenarios in a context of severe anxiety, which may result in their feeling inadequate. This perception may, in turn, be associated with anxiety responses that are both psychological and cognitive in nature. The assessment of anxiety responses in children with visual impairment enables clinician to modify treatment plan aimed at decreasing anxiety levels.<sup>[5]</sup>

Many scales have been in use to measure dental anxiety, but many researchers have proved that Modified Dental Anxiety Scale (MDAS) is the most reliable and most acceptable scale to determine dental anxiety because of its high sensitivity, positive and negative predictive values.<sup>[6]</sup> Corah Dental Anxiety Scale was also proven to be popular among dental researchers.<sup>[7]</sup> Corah Dental Anxiety Scale was found to be a simple, easy scoring, short, valid, and reliable test for determining dental anxiety.<sup>[7,8]</sup> However, Humphris *et al.*<sup>[9,10]</sup> have reproduced a new scale from the original Corah Dental Anxiety Scale, which is known as MDAS. The MDAS has been proven to be more comprehensive, highly valid, and reliable scale to determine dental anxiety.

The dental fear and anxiety is a barrier for dental treatment, and due to this fear some patients are reluctant to visit dentists.<sup>[11]</sup>

There exist numerous approaches that have been extensively addressed to overcome the barriers for dental treatment in healthy children, but there is a paucity of dental literature to overcome the aforementioned barriers in physically challenged children. No previous studies have assessed the dental anxiety both before and after dental screening in children with visual impairment, who need special care managing in the dental clinic. Hence, this study was undertaken to evaluate dental anxiety levels before and after dental screening in children with visual impairment using MDAS printed in braille.

## MATERIALS AND METHODS

### STUDY DESIGN

#### *Need for the study*

In a study that compared the oral health in patients with different levels of anxiety, a strong association had been observed between increased decayed, missing, and filled teeth/surface (DMFT-S) index and increased dental anxiety.<sup>[12]</sup> Decayed, missing, and filled surface (DMFS) scores again were observed to be higher in the visually impaired and their oral health status was poorer than those of their sighted peers. It was further reported that children with visual impairment had poorer oral hygiene index (OHI) scores, plaque index (PI) scores, and gingival index (GI) scores; it was also reported that these children visited the dentist less often.<sup>[13]</sup> This calls for a need to address this barrier of dental anxiety that hinders the children from receiving proper treatment, and removal of which may improve their use of dental health services.

#### *Type of study*

Original, Cross-sectional Study.

### SAMPLE

#### *Sample size calculation*

As there are no specifically similar studies in previous literature, the sample was selected arbitrarily.

#### *Sample collection*

Simple random selection was used to select participants of the study that consisted of 144 institutionalized children with visual impairment from the age group of 6–13 years, residing at an institutionalized blind school. Among the study participants, 90 were girls and 54 were boys.

### INCLUSION CRITERIA

Children of age group 6–13 years were selected. Children included in this study were completely blind and had never visited a dental clinic before. Children were informed a day before regarding the visit to dental clinic. The study subjects who were mentally ill were excluded from the study.

### EXCLUSION CRITERIA

Partially blind children, blind children who were also deaf, and those children who had already visited dental clinic in the past were excluded from the study.

### METHOD

The study was carried out for about one week (December 29, 2018 to January 5, 2019). The sample was collected from an institute for the visually impaired, located in Hyderabad, Telangana, India. Two investigators visited

the institute and recruited study subjects in accordance with the aforementioned inclusion and exclusion criteria, after receiving the consent from the custodian of that institute. Participation in the study by the study subjects was voluntary. Participants were also informed that they could withdraw themselves from the research at any time if they desired. Finally, 144 subjects were recruited for the study, with 90 girls and 54 boys. The subjects were explained about the MDAS scale that was printed in braille and their inputs were then taken on the questionnaire systematically. This comprised the pre-dental-visit dental anxiety assessment. The subjects were then divided into three approximately equal groups for easier mobilization to the dental college. Over the next few days, all the subjects (one group per day) were made to visit the department of pediatric dentistry in a dental college in Hyderabad, Telangana, India. Before entering the dental operator, the subjects were asked to wait in the waiting area equipped with audio-aids that provided information regarding the benefits of a dental visit, significance of good oral hygiene, setting of a dental clinic, and types of instruments used, both in English and in the local language of Telugu. Verbal dental health education was given to the group for 10 min. The children were then assisted one by one with walking into the dental operator where they were made to touch and feel the comfort of the dental chair and were made to sit on it. Tell–feel–do technique of behavior modification was used and the child was explained about the dental chair, mouth mirror, and probe and was allowed to touch and feel the instruments. This was followed by dental examination performed by a single examiner. Even during the examination, the children were explained about the benefits of maintaining a good oral hygiene and the significance of regular dental visits. Dental anxiety levels were then assessed using the MDAS printed in braille. This comprised the post-dental-visit dental anxiety assessment.

*Translation into Telugu scale.* The English version of MDAS scale was translated into Telugu version using backward and forward translation process by two independent professionals who were well versed with both the languages (English and Telugu). The obtained Telugu version was back translated to English with the help of two other independent professionals who had been blinded with respect to the original English version of MDAS questionnaire.

*Reliability of braille text scale.* Cronbach's  $\alpha$  of the Telugu version of MDAS scale was 0.779, which was acceptable for the study. The Telugu version of MDAS

scale was pretested among 30 dental patients who were not visually impaired. These patients were explained about the questions and interviewed at waiting room of dental clinic by one of the investigator while the study subjects were replying to the questionnaire. After pretesting and final interviewing, the Telugu version of the MDAS scale was obtained. This final version was referred as MDAS-T. The MDAS scale printed in braille text was pretested among 30 patients with visual impairment. These patients were explained about the questions and interviewed at waiting room of dental clinic by one of the investigator while the study subjects were replying to the questionnaire. After pretesting and final interviewing, the MDAS scale printed in braille text was obtained. This final version was referred as MDAS-braille [Tables 1–3].

*Validity of braille text scale.* The Telugu version of MDAS scale was reviewed and found to be of good standard. A group of 30 patients were asked for the clarity of the language with respect to the understanding of the questions in the scale. The face validity was good, which was obtained with the help of participants opinions related to the questionnaire served to them. Multidimensionality of the Telugu version of the MDAS scale was examined, which suggested a one factor or single-dimension solution which depicted variance of 73.2%. All questions had a high factor loading ranging from 0.77 to 0.93, so the validity was acceptable for the study [Table 4].

The study instrument used to assess anxiety level before and after dental visit was the MDAS comprising five questions [Table 5] that contained various fear promoting situations regarding dental treatments. The MDAS questionnaire was typed on braille sheet. The sentences (question and answers) were typed both in English and Telugu. The objective of the study and the questionnaire were well explained to the participants of the study. All children in the study had been asked to read the MDAS questions on the braille sheet and pick relevant answer to the question. In this study, all study subjects answered all questions without any difficulty.

The reliability of the MDAS in braille was determined after 2 h by readministering the MDAS questionnaire in braille for half of the sample. The Cronbach's coefficient<sup>[14]</sup> for the reliability of the MDAS questionnaire in braille was 0.88, which was highly acceptable.

#### THE MODIFIED DENTAL ANXIETY SCALE

The MDAS written in braille sheet comprised the following five questions (five items):

**Table 1: Modified Dental Anxiety Score (MDAS)**

Questions	Score
1. How would you feel if you were about to visit dentist tomorrow?	
(a) I would look forward to it as reasonably enjoyable experience	1
(b) I wouldn't care one way or other	2
(c) I would be a little uneasy about it	3
(d) I would be afraid that it would be unpleasant and painful	4
(e) I would be very frightened of what the dentist do	5
2. How would you feel if you were waiting at the waiting room of dental clinic?	
(a) Relaxed	1
(b) A little uneasy	2
(c) Tense	3
(d) Anxious	4
(e) So anxious that I sometimes break out in a sweat or almost feel physically sick	5
3. How would you feel if you were about to have your tooth drilled?	
(a) Relaxed	1
(b) A little uneasy	2
(c) Tense	3
(d) Anxious	4
(e) So anxious that I sometimes break out in a sweat or almost feel physically sick	5
4. How would you feel, if your teeth were about to be scaled and polished?	
(a) Relaxed	1
(b) A little uneasy	2
(c) Tense	3
(d) Anxious	4
(e) So anxious that I sometimes break out in a sweat or almost feel physically sick	5
5. How would you feel, if your gum were about to have local anesthetic injection?	
(a) Relaxed	1
(b) A little uneasy	2
(c) Tense	3
(d) Anxious	4
(e) So anxious that I sometimes break out in a sweat or almost feel physically sick	5

- Q1. How would you feel if you were about to visit dentist tomorrow?
- Q2. How would you feel if you were waiting at the waiting room of dental clinic?
- Q3. How would you feel if you were about to have your teeth drilled?
- Q4. How would you feel, if your teeth were about to be scaled and polished?
- Q5. How would you feel, if your gums were about to have local anesthetic injection?

Each question had five answers with corresponding scores for each answer, ranging from 1 (not anxious) to 5 (extremely anxious). The scores for each of the five questions were added to calculate the total dental anxiety score. The score of 19 or above had been considered to be "dentally anxious," the scores in the range of 12–19 were considered "mild dental anxiousness," and the scores in the range of 5–11 were considered "not anxious."

## STATISTICAL ANALYSIS

The obtained data were subjected to statistical analysis. Statistical analysis was performed using the Statistical Package for the Social Sciences software, version 20.0 for Windows (IBM, Armonk, NY) and the Wilcoxon matched-pairs signed rank test. A value of  $P < 0.05$  was considered statistically significant.

## RESULTS

A total of 144 children participated in the study and all of them gave complete responses to all five questions. Thus, the response rate was 100%. Among the study subjects, 90 were girls and 54 were boys.

Mean MDAS score of the total sample and of both genders is as follows: before dental screening mean MDAS score of the total sample was 17.15, whereas after dental screening and education it was found to be 12.08, which was statistically significant. In girls, before

**Table 2: Mean MDAS score, SD, and P value before and after dental visits in both genders and total sample size**

	Number	Mean MDAS score before dental screening	Mean MDAS score after dental screening	Mean difference	U value	P value
Boys	54	16.3 ± 4.9	12.1 ± 5.03	4.18	295	<0.0001 (significant)
Girls	90	17.6 ± 4.0	12.6 ± 4.2	5.60	855	<0.0001 (significant)
Total sample	144	17.15 ± 4.4	12.08 ± 4.5	5.07	2143	<0.0001 (significant)

dental education and screening, mean MDAS score was 16.3, whereas after dental screening and education it was 12.1, which was statistically significant. In girls, before dental education and screening, mean MDAS score was 17.6 whereas after dental screening and education it was 12.6, which was statistically significant [Table 6].

Mean MDAS score before and after dental screening in all age groups is as follows: In 6 years' age group, MDAS score before dental screening was 20.7 and after screening it was 15.45. In 7 years' age group, before dental education MDAS score was 20.09 and after dental screening and education, it was 15.40. In 8 years' age group, before dental education MDAS score was 19.08 and after dental screening and education, it was 10.83. In 9 years' age group, before dental education

MDAS score was 17.18 and after dental screening and education, it was 9.64. In 10 years' age group, before dental education, MDAS score was 15.80 and after dental screening and education, it was 9.20. In 11 years' age group, before dental education, MDAS score was 15.40 and after dental screening and education, it was 9.02. In 12 years' age group, before dental education MDAS score was 14.40 and after dental screening and education, it was 8.80. In 13 years' age group, before dental education, MDAS score was 12.50 and after dental screening and education, it was 8.62 [Table 7].

The highest average MDAS score before and after dental visit was observed for question 5, indicating it as the most fear inducing; the lowest average MDAS score

**Table 3: MDAS mean score values before and after dental visits in all age groups**

Age	Before	After	Mean difference	U value	P value
6	20.09 ± 0.94	15.45 ± 7.16	6.63	44	0.02
7	20.7 ± 0.82	15.40 ± 2.76	5.3	45	0.004
8	19.08 ± 3.31	10.83 ± 3.16	8.25	78	0.0005 (significant)
9	17.18 ± 2.99	9.64 ± 0.92	8.54	66	0.001 (significant)
10	15.80 ± 6.5	9.20 ± 0.79	4.90	33	0.06
11	15.40 ± 1.82	9.02 ± 1.09	7.20	15	0.06
12	14.40 ± 1.67	8.80 ± 0.45	3.60	15	0.06
13	12.50 ± 4.9	8.62 ± 0.91	2.87	24	0.11

**Table 4: Dental anxiety before and after dental visits in both genders**

Gender	Before			Total	After			Total
	No anxiety (MDAS score 5–11)	Mild anxiety (MDAS score (12–18)	Severe anxiety (MDAS score above 19)		No anxiety (MDAS score 5–11)	Mild anxiety (MDAS score 12–18)	Severe anxiety (MDAS score above 19)	
Girls	6	32	52	90	60	14	16	90
Boys	8	20	26	54	32	10	12	54
Total	14	52	78	144	94	22	28	144

**Table 5: Responses to five questions of MDAS scale by both genders before and after dental visits**

Questions	Boys		Girls	
	Average MDAS score before dental screening	Average MDAS score after dental screening	Average MDAS score before dental screening	Average MDAS score after dental screening
Q1. How would you feel if you were about to visit dentist tomorrow?	1.57(+0.041)	1.41(+0.039)	1.81(+0.061)	1.21(+0.043)
Q2. How would you feel if you were waiting at the waiting room of dental clinic?	2.37(+0.049)	1.97(+0.053)	2.69(+0.055)	1.98(+0.062)
Q3. How would you feel if you were about to have your tooth drilled?	3.21(+0.061)	2.35(+0.064)	3.40(+0.053)	2.93(+0.058)
Q4. How would you feel, if your teeth were about to be scaled and polished?	2.81(+0.057)	2.12(+0.052)	2.92(+0.070)	2.60(+0.065)
Q5. How would you feel, if your gum were about to have local anesthetic injection?	3.66(+0.066)	2.61(+0.071)	3.86(+0.073)	2.90(+0.068)

was observed for question 1, indicating it as the least fear promoting [Table 8].

Just before dental screening visit, 78 participants (54.1%) showed severe dental anxiety, 52 (36.11%) showed mild anxiety, and 14 (9.72%) showed non-dental anxiety. After dental screening and education, only 28 (19.44%) participants showed severe anxiety, 22 (16.66%) showed mild anxiety, and 94 (63.88%) showed non-anxiety, which was statistically significant ( $P < 0.001$ ) [Table 9].

### DISCUSSION

Even after improved technologies and other advances refined dentistry, the fear of unknown (i.e., anxiety) regarding dental treatment is still a major hurdle for successful dental treatment.<sup>[15]</sup> There have been numerous scales in use to measure dental anxiety. In this study, we used MDAS as the study instrument. Ilguy *et al.*<sup>[11]</sup> compared sensitivity, specificity, negative / positive values, and reliability of the MDAS and Corah's dental anxiety scale among Turkish populations. As per the study observations, it was found that both the

scales showed acceptable levels of specificity, sensitivity, positive and negative predictive values at cutoff points.

Tunc *et al.*<sup>[6]</sup> studied the reliability and validity of MDAS in 115 individuals of Turkish population and proved that its specificity was low but it showed acceptable values of sensitivity, positive and negative predictive values. He suggested that MDAS may be the most valuable tool for measuring anxiety level in dentistry among Turkish population.

In the present investigation, we used MDAS scale for measuring anxiety, which is the most convenient scale, the most reliable, and easy to assess. In this study, we used MDAS scale in braille script for the convenience of blind children and we found it to be reliable (reliable coefficient = 0.88). Shetty *et al.*<sup>[16]</sup> studied the reliability of MDAS scale in braille and found its reliable coefficient to be 0.83. In this study and in the aforementioned study, the reliability coefficient of MDAS scale in braille was acceptable. We used this scale because it is easier to frame questions, is less time-consuming, and is reliable to assess anxiety in children with visual impairment.

**Table 6: Mean MDAS score, SD, and P value before and after dental visits in both genders and total sample size**

Sex	Number	Mean MDAS <sup>a</sup> score before dental screening	Mean MDAS score after dental screening	Mean difference	U value	P value <sup>b</sup>
Boys	54	16.3 ± 4.9	12.1 ± 5.03	4.18	295	<0.0001 (significant)
Girls	90	17.6 ± 4.0	12.6 ± 4.2	5.60	855	<0.0001 (significant)
Total sample	144	17.15 ± 4.4	12.08 ± 4.5	5.07	2143	<0.0001 (significant)

<sup>a</sup>Modified Dental Anxiety Scale

<sup>b</sup>Significant at 0.05

**Table 7: MDAS mean score values before and after dental visits in all age groups**

Age	Before	After	Mean difference	U value	P value*
6 (n = 13)	20.09 ± 0.94	15.45 ± 7.16	6.63	44	0.02
7 (n = 15)	20.7 ± 0.82	15.40 ± 2.76	5.3	45	0.004
8 (n = 20)	19.08 ± 3.31	10.83 ± 3.16	8.25	78	0.0005 (significant)
9 (n = 21)	17.18 ± 2.99	9.64 ± 0.92	8.54	66	0.001 (significant)
10 (n = 25)	15.80 ± 6.5	9.20 ± 0.79	4.90	33	0.06
11 (n = 17)	15.40 ± 1.82	9.02 ± 1.09	7.20	15	0.06
12 (n = 14)	14.40 ± 1.67	8.80 ± 0.45	3.60	15	0.06
13 (n = 19)	12.50 ± 4.9	8.62 ± 0.91	2.87	24	0.11
Total (n = 144)					

\*Significant at 0.05

**Table 8: Dental anxiety before and after dental visits in both genders**

	No anxiety (MDAS score 5-11)		Mild anxiety (MDAS score 12-18)		Severe anxiety (MDAS score above 19)		No anxiety (MDAS score 5-11)		Mild anxiety (MDAS score 12-18)		Severe anxiety (MDAS score above 19)	
	f	%	f	%	f	%	f	%	f	%	f	%
Girls (n = 90)	6	6.67	32	35.56	52	57.78	60	66.67	14	15.56	16	17.78
Boys (n = 54)	8	14.81	20	37.04	26	48.15	32	59.26	10	18.52	12	22.22
Total (n = 144)	14	9.72	52	36.11	78	54.17	94	65.28	22	15.28	28	19.44

f = frequency, % = percentage rounded off to the nearest hundredths

**Table 9: Responses to five questions of MDAS scale by both genders before and after dental visits**

Questions	Boys (n = 54)		Girls (n = 90)		Total (n = 144)	
	Average MDAS score before dental screening	Average MDAS score after dental screening	Average MDAS score before dental screening	Average MDAS score after dental screening	Average MDAS score before dental screening	Average MDAS score after dental screening
Q1. How would you feel if you were about to visit dentist tomorrow?	1.57(+0.041)	1.41(+0.039)	1.81(+0.061)	1.21(+0.043)	1.69 (+0.052)	1.31 (+0.021)
Q2. How would you feel if you were waiting at the waiting room of dental clinic?	2.37(+0.049)	1.97(+0.053)	2.69(+0.055)	1.98(+0.062)	2.53 (+0.024)	1.97 (+0.041)
Q3. How would you feel if you were about to have your tooth drilled?	3.21(+0.061)	2.35(+0.064)	3.40(+0.053)	2.93(+0.058)	3.30 (+0.027)	2.64 (+0.052)
Q4. How would you feel, if your teeth were about to be scaled and polished?	2.81(+0.057)	2.12(+0.052)	2.92(+0.070)	2.60(+0.065)	2.86 (+0.035)	2.36 (+0.039)
Q5. How would you feel, if your gum were about to have local anesthetic injection?	3.66(+0.066)	2.61(+0.071)	3.86(+0.073)	2.90(+0.068)	3.76 (+0.045)	2.75 (+0.058)

Most of the studies carried out on children with visual impairment are on caries experience and oral health status but rarely studies have been carried about dental anxiety. We conducted this study to determine the dental anxiety levels in children with visual impairment before and after dental education. Assessing the dental anxiety level among children with visual impairment will focus our attention into their perspective and behavior regarding dentistry.

In this study sample of 144, the prevalence of dental anxiety (severe = 54.1% and mild = 26.11%) is 80% before dental visit and 36% after dental visit. This study showed high anxiety levels just before the dental visit in children with visual impairment, which suggested that the children have a fear of unknown about the dental visit. This study is in agreement with that of Abreau *et al.*,<sup>[17]</sup> who conducted study on 302 study subjects between 6–7-year-old children and found that dental anxiety decreased after dental visits. Decrease in anxiety levels after dental visit suggests that relevant behavior management techniques can marginally reduce anxiety levels even in children with visual impairment.

In this research, before dental visit girls showed higher aggregate MDAS score (17.6) as compared with boys (16.3) and after dental visit girls showed higher aggregate MDAS score (12.6) as compared with boys (12.1). This is in agreement with that of Fayad *et al.*,<sup>[18]</sup> who found an aggregate dental anxiety score of 8.3 among boys and 12.2 among girls. Taani *et al.*<sup>[19]</sup> and Weinstein *et al.*<sup>[20]</sup> also found that girls showed high anxiety scores as compared with boys.

The findings of this research and past research on gender disparity regarding level of dental anxiety were interpreted on the support of the study by Stecher *et al.*,<sup>[21]</sup> who indicated that girls possess high-level neuroticism as compared with boys and that anxiety is directly proportional to neuroticism.

In this study, the highest average MDAS score was observed for question 5, that is, fear of local anesthetic injection and least score was documented for question 1 (feeling of visiting of dentist tomorrow). It has been proven that fear of prick of needle is also a very anxiety-promoting procedure in children with visual impairment. This finding is in agreement with that of

Amir *et al.*,<sup>[22]</sup> who found, on normal children, that local anesthetic injection is most fear-producing procedure.

In this study, younger age group children had high MDAS score indicating that small children are more fearful. This study is in agreement with those of Raja *et al.*<sup>[23]</sup> and Ahmad *et al.*,<sup>[24]</sup> who found that younger age group children had high anxiety as compared with older age group children.

In this study, a decrease was observed in the level of anxiety soon after the dental visit as compared with that of before dental visit. During the dental screening, the study subjects were explained about dentistry, dental treatment, and its positive outcome. High dental anxiety among children with visual impairment before the dental visit (screening) indicated that the fear of unknown (in the context of a dental visit) persisted in their minds and their lack of awareness regarding the components of a dental visit enhanced this anxiety. In this study, all 144 participants had never visited a dental clinic, which indicated a lack of dental awareness in the study subjects. Moreover, no awareness-projects had reached them before. These reasons further supplemented the dental anxiety level. Fear of unknown (in the context of a dental visit) in these patients could be because of their lack of dental awareness, socioeconomic factors, lack of knowledge about dental health, and treatment procedures, because of individual personality traits (it has been observed that patients with high dental anxiety tended to also present with trait anxiety), gender differences, or peer and family influence.<sup>[25-27]</sup> All of these might have contributed to an increase in anxiety level among this study population.

Frequent visits to dental clinics might reduce the fear of dentistry. A study carried out by Aartman *et al.*<sup>[28]</sup> reported that lack of dental health knowledge is associated with high dental anxiety and it leads to poor patient's compliance.

In the present investigation, after the elucidation of the procedures in dentistry, many study subjects showed decreased anxiety. This suggests that once a patient becomes familiar with the procedure and is explained properly regarding the procedures, the fear and anxiety can be reduced. Many important factors such as good communication, awareness of dental procedures, and reassurance can help the blind children in getting relaxed.<sup>[29]</sup>

The presence of audio-aids about dental procedures in waiting area and smell–touch–tell methods in operatory can also be very helpful in allaying fear of unknown in children with visual impairment.

*Limitations of this study.* Small sample size and this study and the previous studies were carried out at separate geographical locations, so results may vary because of cultural differences and other factors. The study population belong to the same institution, so might have exposed to the same environment and this study population never visited dental clinic so we could not elicit the past dental experience to study its effect on the present dental anxiety.

## CONCLUSION

This research proved that fear of unknown was associated with high dental anxiety among children with visual impairment before dental visits. Proper behavior management techniques (smell–touch–tell), proper communication, reassurance, audio-aids, and pre-visit dental health education about the procedures are important factors to decrease the dental anxiety in children with visual impairment and hence can assure better quality of life.

## CLINICAL SIGNIFICANCE

This study is unique in the sense that no studies have been carried out previously to assess dental anxiety before and after dental visits in children with visual impairment. The prevalence of high levels of dental anxiety in the current study group before dental screening and education indicates that fear of unknown (in the context of dental visit) was persistent in the minds of blind children before the dental visit. Better communication, reassurance, and proper explaining of dental procedures have reduced the anxiety after the dental visit. Therefore, we can equip ourselves with audio-aids in waiting room and use the smell–touch–tell method during the dental visit. In addition, better communication, proper education about dental procedures and its positive outcome, and reassurance can allay fear and anxiety in children with visual impairment. This study indicates that MDAS scale in braille is highly reliable (reliability coefficient of = 0.88); hence, it can be used to measure anxiety in children with visual impairment. Moreover, it is less time-consuming and more convenient.

## ETHICAL POLICY AND INSTITUTIONAL REVIEW BOARD STATEMENT

Ethical approval for this study was obtained from the institutional ethics committee. (Protocol no. ECR/828/Ins/AP/2016, dated 19/01/2016).

## DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the author Yash Jain (yashjain171295@gmail.com).



**FINANCIAL SUPPORT AND SPONSORSHIP**

Nil.

**CONFLICTS OF INTEREST**

There are no conflicts of interest.

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