Review Article

Dental Anxiety Scales Used In Pediatric Dentistry: A Systematic Review And Meta-Analysis

Dr.Sachin B Mangalekar[1], Dr. Amreen Aijazuddin[2], Dr. Sultan Abdulrahman Almalki[3], Dr. Akshayraj Langaliya[4], Dr. Silpi Chatterjee[5], Santosh Kumar[6]

Abstract:

Background: An international epidemic known as dental anxiety impacts individuals of all ages worldwide. Children, adults, and society as a whole may all be significantly impacted by the disorder, which has a negative influence on quality of life related to dental health. Dental anxiety has a complex aetiology, making it difficult to treat with a single therapy, which is a major deterrent to getting dental care. The paediatric dentist can determine the best management options by properly evaluating the patient and determining their source and level of anxiety. Estimates of dental anxiety's prevalence may also be affected by the techniques employed to measure it.

Aim: This systematic review and meta analysis was carried out to evaluate the efficacy of several projective dental associated anxiety measurement tools used in children as well as evaluate the many accessible dental anxiety scales.

Methods and materials: The articles were chosen by two independent reviewers in two stages. In the first stage, each reviewer individually searched titles and abstracts according to the eligibility requirements. Articles were added to the systematic review when a third evaluator made a consensus decision in cases of disagreements. The preselected papers were subjected to full text examination by the same reviewers in phase two in order to determine eligibility and extract pertinent data. We employ the PICO framework, which compared (C) the different types of tools for measurement of anxieties like FIS, VPT, and RMS. the outcome (O) was anxiety scores in the population (P) consisting of children in the age range of 3 to 15 years, with no intervention (i) administered. For this meta-analysis, descriptive cross-sectional research were used. Two reviewers extracted the following data from the selected articles: author(s) and year of publication, design of study , objective of research, age and size of population, dental related anxiety measuring tools applied and outcome

Results: 13 studies were ultimately chosen for comprehensive assessment. The VPT and the FIS were examined on a combined total of 295 and 293 kids, respectively. In the population under investigation, there was a computed average difference between the two tools of 0.14 (95% CI: 0.27-0.49). There was no significant variance statistically (p value = 0.76), indicating that both scales are equally accurate in determining the level of anxiety in the paediatric population. There were 209 kids evaluated for the RMS and VPT tools in total. In the population under investigation, there was a computed average difference between the two tools of 0.29 (95% CI: 0.81-0.22). Both were on par, showing that both were equally reliable (p=0.33). There were 209 kids evaluated for the RMS and VPT tools in total. In the population under investigation, there was a computed average difference between the two tools of 0.29 (95% CI: 0.81-0.22).

Conclusion: We draw the conclusion that VPT, FIS, and RMS scales are the most often used projective measures in paediatric dentistry. These three tools are equally useful in determining how anxious kids are about visiting the dentist. The findings from this paper can be used by academics, clinicians, and psychologists to choose the best dental related anxiety evaluation system for their specific needs.

Keywords: Reliability, Dental anxiety, Children,Dental anxiety scales,

Bangladesh Journal of Medical Science Vol. 22: Special Issue 2023 Page : 117-126
DOI: https://doi.org/10.3329/bjms.v22i20.66319

1. Dept of Periodontology, Bharati Vidyapeeth (Deemed to be University) Dental College and Hospital, Wanlesswadi, Sangli-416414, Maharashtra
2. Pediatric Dentist, Qatar
3. Department of Preventive Dental Sciences, College of Dentistry, Prince Sattam Bin AbdulAziz University, Al-kharj 11942, Saudi Arabia.
4. Department of Conservative Dentistry and Endodontics, AMC Dental College and Hospital,
5. Department of Public Health Dentistry, Department of Public Health Dentistry, Dr. D.Y. Patil Dental College and Hospital, Dr. D.Y. Patil Vidyapeeth, Pimpri, Pune 411018, India.
6. Department of Periodontology, Karnavati School of Dentistry, Karnavati University, Gandhinagar, Gujarat, India

Correspondence: *Dr.Sachin B Mangalekar* Dept of Periodontology, Bharati Vidyapeeth (Deemed to be University) Dental College and Hospital, Wanlesswadi, Sangli-416414, Maharashtra

Introduction:

Humans experience anxiety, which involves behavioural, affective, and cognitive reactions to perceived risk.[1] Understanding anxiety not only paves the way for us to give children the greatest care possible, but more significantly, it enables us to build a solid, long-lasting relationship with them.[2] An international epidemic known as dental anxiety impacts individuals of all ages worldwide. Children, adults, and society as a whole may all be significantly impacted by the disorder, which has a negative influence on quality of life related to dental health.[1,2] Dental anxiety has a complex aetiology, making it difficult to treat with a single therapy, which is a major deterrent to getting dental care.[3]

Additionally, treating patients with dental anxiety takes more time since dentists view worried patients as being more challenging to deal with. Additionally, worried people frequently postpone dental care and regularly skip appointments, which might result in the need for more involved care.[4] Compared to kids with reduced levels of dental anxiety, kids with high levels have more decaying, missing, and filled tooth surfaces. Dental anxiety can be brought on by some dental treatments including needles, drills, or the scent of eugenol.[3,4] Between 5.7percentage and 20.2 percentage of children and adolescents report having dental anxiety. Age, sex, cultural background, socioeconomic level, the existence of dental cavities, a history of toothaches, and previous dental procedures are linked factors of dental anxiety.[5] High levels of dental anxiety in children have resulted in poor tooth brushing, increased incidence of dental caries, increased incidence of periodontal disease, and other dental issues. Additionally, underlying dental fear will make the kids recalcitrant, making the dentist's job harder and more difficult for the young patients.[6.7] The paediatric dentist can determine the best management options by properly evaluating the patient and determining their source and level of anxiety. Estimates of dental anxiety's prevalence may also be affected by the techniques employed to measure it. Before beginning any dental work, it is crucial for a paediatric dentist to evaluate the child's degree of anxiety.[6]To evaluate dental anxiety in kids and adolescents, a variety of multiitem self-report ratings and solitary checklists with result interpretation can be utilized.[5,6]Both nonprojective as well as projective approaches have been applied in the studies to evaluate dental anxiety. Non-projective approaches include self-reporting structured questionnaire like the Corah's Dental Anxiety Questionnaire and its modified version.[7] Projective methods make use of picture tests like the Venham's Photographic Tool (VPT), the Facial Indicator Score(FIS), the RMS Score, the RMS-PS, the Animated Emoji Score, and the Chotta Bheem—Chutki score to assess trait anxiety. Even though there are many scales used in the previous research to measure dental anxiety, each one has pros and cons depending on the patient's age, which puts paediatric dentists in a difficult position when choosing the right scales to use to measure children's dental anxiety prior to performing dental work.[8,9] Consequently, it is necessary to establish a body of literature that describes dental anxiety scales as a whole. In order to shed light on the many dental anxiety scales that are accessible in the previous research and determine their efficacy, this systematic review & meta-analysis is intended. The purpose of the current study is to evaluate the efficacy of several projective dental associated anxiety measurement tools used in children as well as evaluate the many accessible dental anxiety scales.

Methods and Materials

Eligibility Criteria

We employ the PICO framework, which compared (C) the different types of tools for measurement of anxieties like FIS, VPT, and RMS. the outcome (O) was anxiety scores in the population (P) consisting of children in the age range of 3 to 15 years, with no intervention (i) administered. For this meta-analysis, descriptive cross-sectional research were used.

Criteria for inclusion

- Cross-sectional descriptive research contrasting various dental associated anxiety measuring tools
- Only English-language publications on kids in the 3 to 15 year old age range.

Reason for Exclusion

This systematic review eliminated studies that did not analyse primary or secondary outcomes, were not available in English language, or were unrelated to the subject of interest. Additionally prohibited were chapters in books, letters to the editor, conference papers, and literature reviews.

Search Strategy

Medical key terms (MeSH) and text terms associated with dental related anxiety measuring tools, children and adolescents, and dental related anxiety, were used to create literature search techniques..There was extensive literature search in reliable and authentic databases like Pubmed, Scopus, Web of Sciences, Ovidsp, Cochrane Library for obtaining papers focusing on evaluation of dental related anxiety and depression in paediatric subjects. Initially papers were obtained through literature search by using keywords.Then papers which were similar and duplicate papers which were excluded. Distinct articles were selected initially. Several articles were excluded after reviewing abstracts and titles. Papers were selected for which full text was managed. Extra papers were searched manually from references. Articles with full text eligible for study were collected. Some inadequate articles were excluded in last stage screening. Studies were finally selected for systemic review and meta analysis.

Data Collection Process

The articles were chosen by two independent reviewers in two stages. In the first stage, each reviewer individually searched titles and abstracts according to the eligibility requirements. Articles were added to the systematic review when a third evaluator made a consensus decision in cases of disagreements. The preselected papers were subjected to full text examination by the same reviewers in phase two in order to determine eligibility and extract pertinent data.

Data Extraction

Two reviewers extracted the following data from the selected articles: author(s) and year of publication, design of study , objective of research, age and size of population, dental related anxiety measuring tools applied and outcome

Risk of Bias Assessment

The possibility of bias in original research of diagnostic efficacy was evaluated independently by the two review authors. Table 5 displays the anticipated critical appraisal instruments. Disagreements were settled through conversation and, if necessary, the participation of a third neutral reviewer

Statistical Analysis

It was done to create a descriptive synthesis of the study's outcome data. Quantitative information on the application of different dental related anxiety measurement tools was synthesised. Using the software namely Meta-Analyst and Review Manager software v.5.3 and the random-effect paradigm with maximal likelihood estimation, we carried out the meta-analysis. To carry out the statistical analysis, quantitative data and accuracy metrics were taken into account. The inconsistency test (I2) was used to assess heterogeneity; a value of > 50% was seen as a sign of significant heterogeneity. We took into account the 5% level of significance.

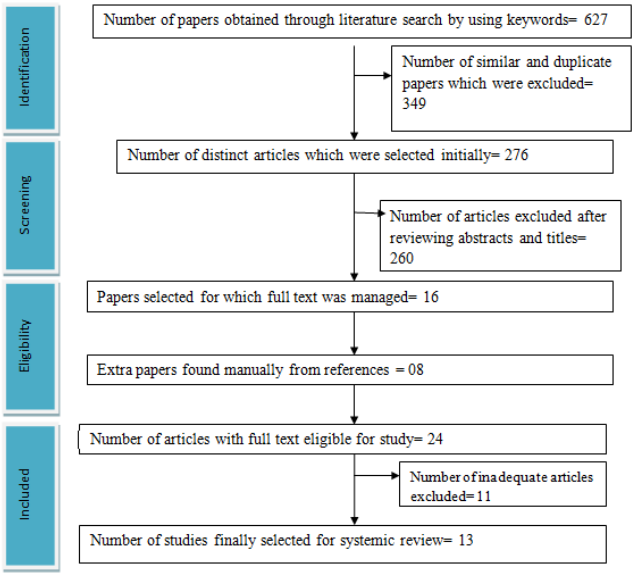

Figure 1: PRISMA representation of selection of articles for systemic review and meta analysis.

Results:

Study Selection

627 papers were obtained through literature search by using keywords.349 papers were similar and duplicate papers which were excluded. 276 distinct articles which were selected initially. Number of articles excluded

after reviewing abstracts and titles was 260. Papers selected for which full text was managed was 16. Extra papers found manually from references were 08. Number of articles with full text eligible for study was 24. Number of inadequate articles excluded was 11. Number of studies finally selected for systemic review was 13. (figure1)

Study Characteristics

The primary characteristics of the research that have been incorporated into the review are described in Table 1. All of the selected research were cross-sectional descriptive studies, and their complete texts were available in English-language journals up until January 2022. The number of participants in the sample varies greatly, from 60 to 200. Ages of the kids ranged from three to fifteen.

Risk of bias Assessment

Buchanan and Niven 2002[11], Dogan et al 2006[12], Krishnappa et al 2013[13], Shetty et al 2015[14] and Setty JV et al.2019[10] showed unclear bias. Buchanan H 2005[26], Esa et al 2015 [27], Fathima et al 2018[8] and Ilgüy D et al 2005[23] showed low risk of bias. Howard and Freeman 2007[9], Arsalan I et al 2022 [28], Sadana et al 2016[7] and Oliveira et al 2020[15] showed high risk of bias. (Table 5)

Meta-Analysis Results:

The research included in this meta-analysis contrast RMS, VPT, and FIS scales. Therefore, thirteen studies that might be usefully combined and compared using tools of measuring dental related anxiety that had equivalent units were incorporated into the meta-analysis.

FIS vs VPT

Regarding the outcome measures, we carried out the meta-analysis. Five studies were included in the study. The VPT and the FIS were examined on a combined total of 295 and 293 kids, respectively. In the population under investigation, there was a computed average difference between the two tools of 0.14 (95% CI: 0.27-0.49). There was no significant variance statistically (p value = 0.76), indicating that both scales are equally accurate in determining the level of anxiety in the paediatric population. Eighty percent heterogeneity revealed variability that might be explained by differences in age groups and methodological approaches.(Table 2,3,4)(figure 2,3,4)

VPT vs RMS

3 studies were included in the second analysis. There were 209 kids evaluated for the RMS and VPT tools in total. In the population under investigation, there was a computed average difference between the two tools of 0.29 (95% CI: 0.81-0.22). Both were on par, showing that both were equally reliable (p=0.33). 86% heterogeneity indicated large levels of variance.(Table 2,3,4) (figure 2,3,4)

RMS Scale vs FIS Scale

Third analysis included three studies to compare the RMS Scale with the FIS scale. 209 children study participants and 208 children study participants , respectively, were assessed for the RMS and FIS. In the population under investigation, there was a substantial distinction of 0.06 (95% CI: 0.42-0.52) between the two measures . Both were on par, showing that both were equally reliable (p=0.82). 83% heterogeneity indicated large levels of variance.(Table 2,3,4) (figure 2,3,4)

Table 1: Salient features of some studies included in the study

S. No	Author, year	Settings	Study design	Age	Population size	Mean DA scores	Intervention
1	Buchanan and Niven, 2002[11]	Hospital-based study	Descriptive cross-sectional study	3–15 years	100 (T) 50 (M) 50 (F)	FIS—2.2 VPT—1.4	FIS, VPT
2	Buchanan H., 2005[26]	Study setting in school	Descriptive cross-sectional study	4–10 years	241 (T) SFP 52 (F) 48 (M)	SFP—18	SFP ,MDAS. DFSS

					MDAS and DFSS 120 (F) 120 (M)		
3	Dogan et al., 2006[12]	Hospital-based study	Descriptive cross-sectional study	8–12 years	258 (T) 133 (M) 125 (F)	C-DAS—10.8 Com-DAS—11.6	CDAS, FIS, ComDAS
4	Howard and Freeman, 2007[9]	Hospital-based study	Descriptive cross-sectional study	8–10 years	287 (T) 191 (F) 96 (M)		MCDASf
5	Krishnappa et al., 2013[13]	Hospital-based study	Descriptive cross-sectional study	6–12 years	52 (T) 28 (M) 28 (F)	FIS—2.9 VPT—2.8	FIS,VPT
6	Esa et al., 2015 [27]	Study setting in school	Descriptive cross-sectional study	5–12 years	87 (T) 40 (M) 47 (F)	MCDASf—21.7 CFSS-DS—37.5	MCDASf,CFSS-DS
7	Shetty et al., 2015[14]	Hospital-based study	Descriptive cross-sectional study	4–12 years	102 (T) 59 (M) 43 (F)		RMS VPT
8	Arsalan I et al,2022 [28]	Study setting in school	Descriptive cross-sectional study	8–10 years	287 (T) 191 (F) 96 (M)		MCDASf, CFSS-DS
9	Sadana et al., 2016[7]	Hospital-based study	Descriptive crosssectional study	4–12 years	100 (T) 61 (M) 39 (F)	(M)—2.4 (F)—2.5 VPT (M)—3.8 (F)—3.9 FIS (M)—2.5 (F)—2.7	CBC, VPT, FIS, CBC
10	Setty JV et al., 2019[10]	Study setting in school	Descriptive crosssectional study	12–15 years	94 (T) 49 (M) 45 (F)		MDAS ,RMS-TS
11	Fathima et al., 2018[8]	Hospital-based study	Descriptive crosssectional study	5–12 years	50 (T) 25 (M) 25 (F)	FIS—2.7 VPT—2.6	FIS, VPT
12	Ilgüy D et al, 2005[23]	Hospital-based study	Descriptive crosssectional study	4–14 years	102 (T) 52 (M) 50 (F)	AES—1.7 FIS—1.9 VPT—1.5	MDAS, DAS
13	Oliveira et al., 2020[15]	Hospital-based study	Descriptive crosssectional study	4–9 years	30 (T) 15 (M) 15 (F)		Modified (VPT) RMS-PS FIS

Table 2: Meta analysis results for FIS vs VPT

Authors with year of publication	Effect	95% prediction	*n*	tau^2 (95% CI)	I^2 (95% CI)	*P*
Buchanan and Niven, 2002[11]	MD: 9.91 (3.62, 16.21)	−66.15, 85.98	3	25.52 (3.01, 507.80)	84% (38%, 99%)	0.002
Buchanan et al., 2005[26]	RR: 1.56 (1.23, 1.98)	0.33, 7.32	3	0 (0, 0.55)	0% (0%, 91%)	0.001
Dogan et al., 2006[12]	MD: 1.59 (−1.05, 4.22)	−31.38, 34.55	3	4.93 (0.71, 95.19)	91% (60%, 100%)	0.24
Howard and Freeman, 2007[9]	MD: 0.46 (−0.18, 1.10)	−3.68, 4.61	3	0 (0, 2.52)	0% (0%, 88%)	0.16
Total	0.14 (95% CI: 0.27-0.49)					0.76

Table 3: Meta analysis results for VPT vs RMS

Authors with year of publication	Effect	95% prediction	*n*	tau^2 (95% CI)	I^2 (95% CI)	*P*
Krishnappa et al., 2013[13]	MD: 0.78 (0.46,1.09)	−1.26, 2.81	3	0 (0, 3.77)	0% (0%, 94%)	0.14
Esa et al., 2015[27]	MD: 3.07 (0.57, 5.57)	−26.47, 32.61	3	3.78 (0.24, 79.63)	79% (19%, 99%)	0.34
Shetty et al., 2015[14]	MD: 0.99 (0.58, 1.40)	−1.66, 3.64	3	0 (0, 7.24)	0% (0%, 94%)	0.56
Arsalan I et al 2022[28]	MD: 1.81 (0.64, 2.98)	−10.25, 13.87	3	0.54 (0, 17.35)	50% (0%, 97%)	0.27
Oliveira et al., 2020[15]	MD: 0.79 (0.49, 1.10)	−1.18, 2.76	3	0 (0, 0.65)	0% (0%, 89%)	<0.001
Total	0.29 (95% CI: 0.81-0.22)					0.33

Table 4: Meta analysis results RMS Scale vs FIS scale

Authors with year	Effect	95% prediction	*n*	tau^2 (95% CI)	I^2 (95% CI)	*P*
Sadana et al., 2016[7]	MD: 0.02 (−0.16, 0.21)	−1.18, 1.22	3	0 (0, 0.74)	0% (0%, 89%)	0.82
Setty JV et al., 2019[10]	MD: 0.79 (0.49, 1.10)	−1.18, 2.76	3	0 (0, 0.65)	0% (0%, 89%)	<0.001
Fathima et al., 2018[8]	MD: −0.03 (−2.02, 1.96)	NC	2	1.72 (0, 258.55)	83% (0%, 100%)	0.98
Ilgüy D et al, 2005[23]	MD: −1.76 (−3.62, 0.10)	−19.88, 16.36	3	1.13 (0, 42.78)	41% (0%, 96%)	0.06
Total	0.06 (95% CI: 0.42-0.52)					0.82

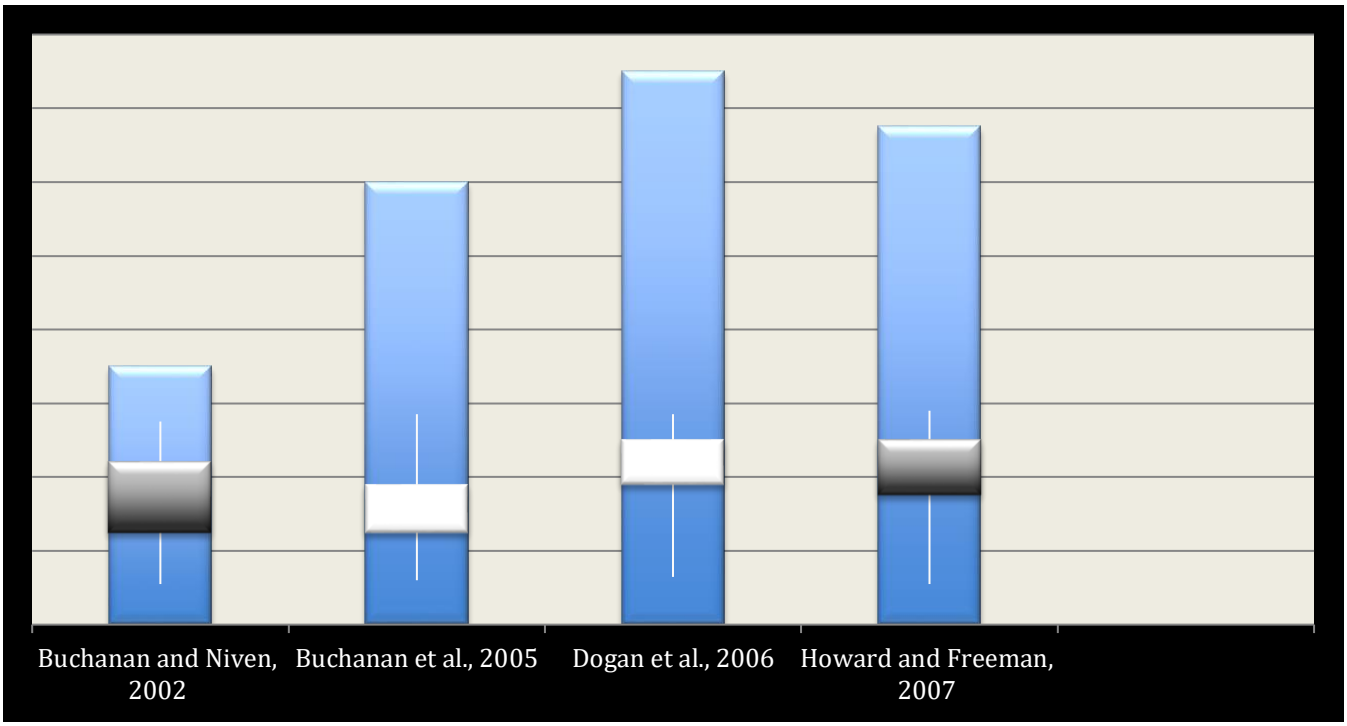

Figure 2: Box and whisker plot showing the analysis of different studies for dental anxiety assessment tools in paediatric patients

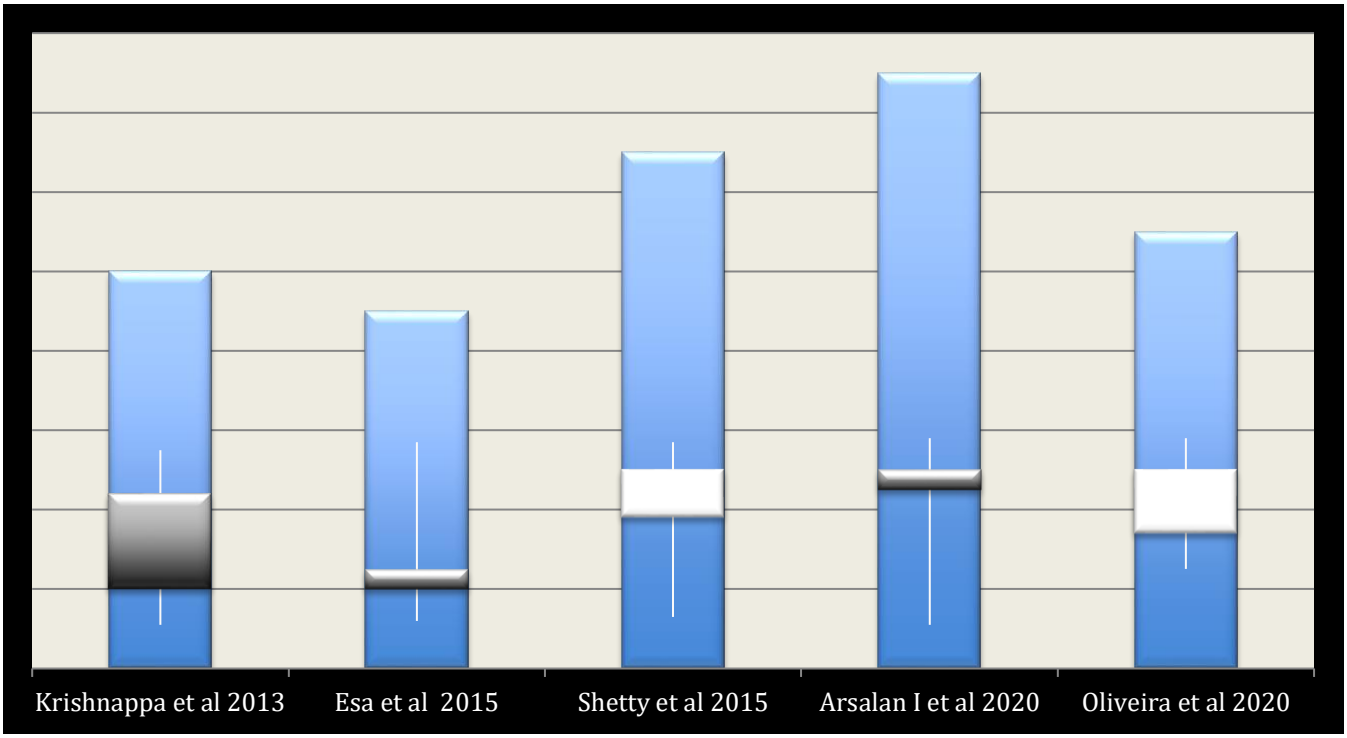

Figure 3: Box and whisker plot showing the analysis of different studies for dental anxiety assessment tools in paediatric patients

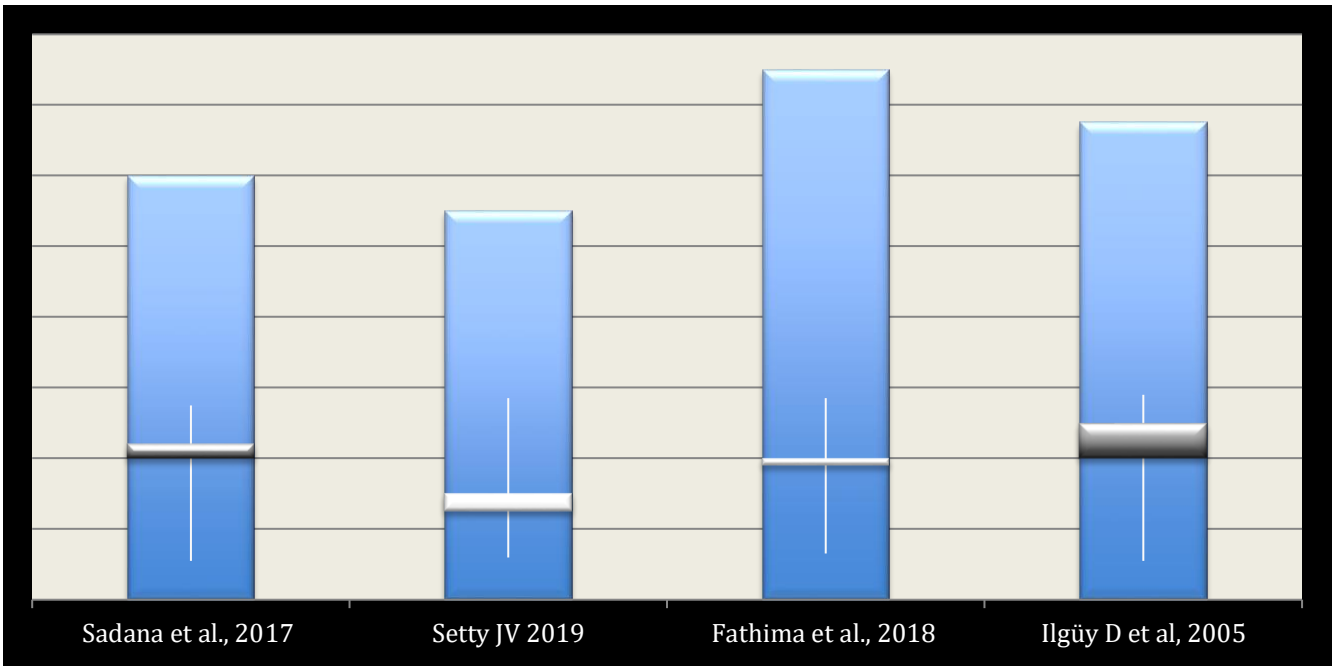

Figure 4: Box and whisker plot showing the analysis of different studies for dental anxiety assessment tools in paediatric patients

Table 5: Summary Cochrane ROB assessment for individual studies

Details of Study	Allocation concealment	Sequence generation	Blinding of outcome assessors	Blinding of participants personnel	Selective outcome reporting	Incomplete outcome data	Overall	Other sources of bias
Buchanan and Niven, 2002[11]	?	+	?	?	+	+	?	+
Buchanan H., 2005[26]	+	+	+	+	+	+	+	+
Dogan et al., 2006[12]	?	?	?	?	+	+	?	+
Howard and Freeman, 2007[9]	-	+	+	+	+	+	-	+
Krishnappa et al., 2013[13]	?	+	?	?	+	+	?	+
Esa et al., 2015 [27]	?	+	?	?	+	+	+	+
Shetty et al., 2015[14]	?	?	?	?	+	+	?	+
Arsalan I et al,2022 [28]	-	+	+	+	+	+	-	+
Sadana et al., 2016[7]	-	+	+	+	+	+	-	+
Setty JV et al., 2019[10]	?	+	?	?	+	+	?	+
Fathima et al., 2018[8]	?	+	?	?	+	+	+	+
Ilgüy D et al, 2005[23]	?	?	?	?	+	+	+	+
Oliveira et al., 2020[15]	-	+	+	+	+	+	-	+

- High Risk of Bias **+ Low Risk of Bias** **? Unclear Risk of Bias**

Discussion

For a very long time, dentists have been quite concerned about paediatric dental related anxiety. Employing different dental related anxiety measuring tools, many authors have assessed children's dental anxiety levels. Pediatric dentists frequently use scales that were specifically created for use with kids in an attempt to more precisely assess kid's anxiety levels. The first evolved photographic scale was Venham and Gaulin-Picture Kremer's Venham's Test, in which kids are shown eight pairs of photographs, each showing cartoon boys in widely differing moods.3 Despite being the earliest and most commonly utilised scale, it had some issues. All of the representations on the flashcards are boys, which could cause issues if the little child is a female. Further study in this area resulted in the creation of numerous visual scales, which are more time-consuming and harder to use with relatively young patients.[3,5,7,10] The Facial Image Scale developed by Buchanan & Niven is convenient and simple to use, necessitates reduced time to measure a child's dental fear, and the score is just a representation of the face that was selected. Five faces are arranged in a row, ranging from very pleased to to unhappy. In FIS, young children frequently have trouble understanding the depictions of facial expressions.[11-14]

A sequence of five faces in the RMS-Pictorial scale provided by Shetty et al. vary from very joyful to very dissatisfied. The child was handed a duplicate of the scale and instructed to select one of the five faces based on how they were feeling at the time in the dental office. There is no tool that can be regarded as the gold standard, according to a systematic review of methods used to evaluate dental related anxiety in

children conducted by Narkey et al. and Porritt et al, and it is necessary to continue developing an anxiety scale for kids that includes a cognitive component. The aforementioned systematic reviews were completed ten years ago, and since then, numerous additional scales have likely been established. Additionally, this particular subject has not yet been the subject of a meta-analysis.[15-19] We therefore designed this systematic review and meta-analysis with the need identified by the prior systematic reviews in mind, as well as the addition of other more recent dental anxiety scales. As a result, we examined widely employed dental related anxiety measuring tools that were published in the literature up through January 2022 in the current study. Seven research were included in the quantitative studies from the literature review, whereas 13 research were incorporated into the qualitative synthesis. These studies, which compared RMS, VPT and FIS with acceptable methodological approaches, had sufficient information to be considered for the meta-analysis. The research included in this meta-analysis contrast RMS, VPT, and FIS scales. Therefore, seven studies that might be usefully combined and compared using tools of measuring dental related anxiety that had equivalent units were incorporated into the meta-analysis.[15-22]

To evaluate the calibre of research, Downs and Black's axis tool equipment was utilised.. Regarding the outcome measures, we carried out the meta-analysis. Five studies were included in the study. The VPT and the FIS were examined on a combined total of 295 and 293 kids, respectively. In the population under investigation, there was a computed average difference between the two tools of 0.14 (95% CI: 0.27-0.49). There was no significant variance statistically (p value = 0.76), indicating that both scales are equally accurate in determining the level of anxiety in the paediatric population. Eighty percent heterogeneity revealed variability that might be explained by differences in age groups and methodological approaches. 3 studies were included in the second analysis. There were 209 kids evaluated for the RMS and VPT tools in total. In the population under investigation, there was a computed average difference between the two tools of 0.29 (95% CI: 0.81-0.22). Both were on par, showing that both were equally reliable (p=0.33). 86% heterogeneity indicated large levels of variance. Third analysis included three studies to compare the RMS Scale with the FIS scale. 209 children study participants and 208 children study participants , respectively, were assessed for the RMS and FIS. In the population under investigation, there was a substantial distinction of 0.06 (95% CI: 0.42-0.52) between the two measures . Both were on par, showing that both were equally reliable (p=0.82). 83% heterogeneity indicated large levels of variance .

The most often used scales in paediatric dentistry, according to our findings, are the VPT, FIS, and RMS. Additionally, our meta-analysis discovered that all three scales are similarly useful for evaluating children's dental anxiety.[23-25]

Conclusion

Pediatric dentists and other clinicians find it difficult to deal with children's dental phobia. An accurate estimate of dental related anxiety is required to not only ascertain its frequency but also to resolve issues with individualized diagnosis and treatment planning. Thus, based on this systematic review and meta-analysis, we draw the conclusion that VPT, FIS, and RMS scales are the most often used projective measures in paediatric dentistry. These three tools are equally useful in determining how anxious kids are about visiting the dentist. The findings from this paper can be used by academics, clinicians, and psychologists to choose the best dental related anxiety evaluation system for their specific needs. This paper sheds light on paediatric dentists' choices of acceptable dental anxiety tools to evaluate children's anxiety just before dental treatment.

Recommendations

A useful approach for evaluating children's dental anxiety is the use of projective dental anxiety scales.

- The FIS, VPT, and RMS are the three most often used dental anxiety scales.
- The RMS, VPT and FIS are all similarly efficient, quick to administer in youngsters, and time-efficient.
- Clinicians and researchers can use the RMS, VPT, and FIS to evaluate children's dental anxiety.

References

1. Bhatia MS, Goyal A. Anxiety disorders in children and adolescents: need for early detection. J Postgrad Med 2018;64(2):75–76. DOI: 10.4103/jpgm.JPGM_65_18.
2. Tarsuslu B, Sahin A, Durat G, Arikan D. An analysis of parents' perceived stress and the parent-child relationship during the COVID-19 pandemic. Bangladesh J Med Sci. 2021 Sep;20(5):97-107.
3. Zulkipli AS, Alam MK, Patel ES, Haque S. A perceptual evaluation of resonance disorders in children with repaired unilateral cleft lip and palate in Hospital UniversitiSains Malaysia. Bangladesh J Med Sci. 2018 Mar;17(2):282-9.
4. Alam MK, Zulkipli AS, Percival SE, Haque S. A perceptual evaluation of speech disorders in children with repaired unilateral cleft lip and palate in Hospital UniversitiSains Malaysia. Bangladesh J Med Sci. 2018 Jun;17(3):470-8.
5. Cianetti S, Lombardo G, Lupatelli E, et al. Dental fear/anxiety among children and adolescents. A systematic review. Eur J Paediatr Dent 2017;18(2):121–130. DOI: 10.4103/2231-0762.183108.
6. Opanasenko A, Lugova H, Mon AA, Ivanko O. Mental Health Impact of Gender-Based Violence Amid COVID-19 Pandemic: A Review. Bangladesh J Med Sci. 2021 Sep;20(5):17-25.
7. Sadana G, Grover R, Mehra M, et al. A novel Chotta Bheem–Chutki scale for dental anxiety determination in children. J Int Soc Prevent Community Dent 2016;6(3):200–205. DOI: 10.4103/2231-0762.183108.
8. Fathima F, Jeevanandan G. Validation of a facial image scale to assess child dental anxiety. Drug Invention Today 2018;10(1):2835.
9. Howard KE, Freeman R. Reliability and validity of a faces version of the modified child dental anxiety scale. Int J Paediatr Dent 2007;17:281–288. DOI: 10.1111/j.1365-263X.2006.00830.x.
10. Setty JV, Srinivasan I, Radhakrishna S, et al. Use of an animated emoji scale as a novel tool for anxiety assessment in children. J Dent Anesth Pain Med 2019;19(4):227–233. DOI: 10.17245/jdapm.2019.19.4.227.
11. Buchanan H, Niven N. Validation of a facial image scale to assess child dental anxiety. Int J Paediatr Dent 2002;12(1):47–52. PMID: 11853248.
12. Dogan MC, Seydaoglu G, Uguz S, et al. The effect of age, gender and socio-economic factors on perceived dental anxiety determined by a modified scale in children. Oral Health Prev Dent 2006;4(4):235–241. PMID: 17153645.
13. Krishnappa S, Srinath S, Vishwanath SK, et al. Evaluation of facial image scale and Venham picture test used to assess dental anxiety in children. J Indian Assoc Public Health Dent 2013;11(2):31–35. DOI: 10.17245/jdapm.2019.19.4.227
14. Shetty RM, Khandelwal M, Rath S. RMS Pictorial Scale (RMS-PS): an innovative scale for the assessment of child's dental anxiety. J Indian Soc Pedod Prev Dent 2015;33(1):48–52. DOI: 10.4103/0970- 4388.149006.
15. Oliveira MF, Stein CE, Schrör FCL, et al. Evaluation of child anxiety prior to dental care by means of Modified Venham Picture Test, RMS Pictorial Scale and Facial Image Scale Tests. Pesqui Bras Odontopediatria Clín Integr 2020;20:e5068. DOI: 10.1590/pboci.2020.052.
16. Corah NL. Development of a dental anxiety scale. SAGE publication; 1968. p. 596.
17. Wong HM, Humphris GM, Lee GTR. Preliminary validation and reliability of the modified child dental anxiety scale. Psychol Rep 1998;83:1179–1186. DOI: 10.2466/pr0.1998.83.3f.1179.
18. Cuthbert MI, Melamed BG. A screening device: children at risk for dental fears and management problems. J Dent Child 1982;49(6): 432–436. PMID: 6960031.
19. Venham LL, Gaulin-Kremer E. A self-report measure of situational anxiety for young children. Pediatr Dent 1979;1(1):91–96. PMID: 399677.
20. Tiwari N, Tiwari S, Thakur R, et al. Evaluation of treatment related fear using a newly developed fear scale for children: "Fear assessment picture scale" and its association with physiological response. Contemp Clin Dent 2015;6(3):327–331. DOI: 10.4103/0976- 237X.161871.
21. Al-Namankany A, de Souza M, Ashley P. Evidence-based dentistry: analysis of dental anxiety scales for children. Br Dent J 2012;212(5): 219–222. DOI: 10.1038/sj.bdj.2012.174.
22. Harsha L, Jeevanandan G. A scale to assess child's dental anxiety. Int J Multidisciplinary Res Modern Educ 2017;3(1):301–303. DOI: 10.5281/ zenodo.573166.
23. Ilgüy D, Ilgüy M, Dinçer S, et al. Reliability and validity of the modified dental anxiety scale in Turkish patients. J Int Med Res 2005;33(2): 252–259. DOI: 10.1177/147323000503300214.
24. Tickle M, Jones C, Buchannan K, et al. A prospective study of dental anxiety in a cohort of children followed from 5 to 9 years of age. Int J Paediatr Dent 2009;19:225–232. DOI: 10.1111/j.1365- 263X.2009.00976.x.
25. Gould D. Examining the validity of pressure ulcer risk assessment scales: development and using illustrated patient simulations to collect the data information point: visual analogue scale. J Clin Nurs 2001;10:697–706. DOI: 10.1046/j.1365-2702.2001.00525.x.
26. Buchanan H. Development of a computerised dental anxiety scale for children: validation and reliability. Br Dent J. 2005 Sep 24;199(6):359-62; discussion 351; quiz 372. doi: 10.1038/sj.bdj.4812694. PMID: 16184116.
27. Esa, R., Hashim, N.A., Ayob, Y. *et al.* Psychometric properties of the faces version of the Malay-modified child dental anxiety scale. *BMC Oral Health* 15, 28 (2015). https://doi.org/10.1186/s12903-015-0013-y
28. Arslan, I., Aydinoglu, S. Turkish version of the faces version of the Modified Child Dental Anxiety Scale ($MCDAS_f$): translation, reliability, and validity. *Clin Oral Invest* 26, 2031–2042 (2022). https://doi.org/10.1007/s00784-021-04184-0