Research Article

Effect of Immersive and Conventional Audio-Visual Distraction on Self-Reported Dental Anxiety in Adult Patients Undergoing Extraction

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ABSTRACT

Background: Dental anxiety can adversely affect patient cooperation and physiological responses during tooth extraction. Distraction techniques provide a simple, non-pharmacological approach to anxiety management; however, the relative effects of audio, video, and combined audio-visual distraction in adult patients undergoing extraction require further evaluation.
Aim: To evaluate and compare the effectiveness of audio, video, and combined audio-visual distraction with conventional treatment in reducing self-reported dental anxiety and physiological stress among adults undergoing routine tooth extraction.
Materials and Methods: A single-centre, parallel-arm comparative clinical study was conducted among 80 adults undergoing routine tooth extraction under local anaesthesia. Participants were allocated equally into four groups (n=20 each): Control, Audio distraction, Video distraction, and combined Audio-Visual distraction. Anxiety and distress were assessed preoperatively and postoperatively using the Visual Analogue Scale (VAS) and Subjective Units of Distress Scale (SUDS). Systolic blood pressure, diastolic blood pressure, and heart rate were recorded as physiological indicators of anxiety.
Results: The Control group demonstrated significant increases in VAS (4.65 ± 2.25 to 6.90 ± 0.97), SUDS (53.35 ± 15.40 to 73.50 ± 9.96), and heart rate (85.30 ± 6.54 to 88.60 ± 6.71 beats/min; all $p<0.001$). In contrast, all distraction groups showed significant reductions in subjective anxiety and physiological parameters. The largest numerical reductions were observed with combined Audio-Visual distraction, with VAS decreasing by 5.20 points and SUDS by 51.75 points, accompanied by reductions of 18.05 mmHg in systolic blood pressure, 12.00 mmHg in diastolic blood pressure, and 14.90 beats/min in heart rate (all $p<0.001$). Video distraction demonstrated the next largest reductions, followed by Audio distraction.
Conclusion: Audio, video, and combined audio-visual distraction were effective in reducing subjective anxiety and physiological stress responses during routine tooth extraction. Combined Audio-Visual distraction produced the greatest numerical improvement across the assessed outcomes, suggesting that multisensory distraction may be a useful non-pharmacological adjunct for improving patient comfort during dental extraction.

Keywords: Audio-visual distraction; dental anxiety; tooth extraction; Visual Analogue Scale; Subjective Units of Distress Scale; physiological stress; distraction therapy.

INTRODUCTION

Dental anxiety remains a common and clinically relevant barrier to oral healthcare, contributing to avoidance of treatment, delayed attendance, and poorer oral health outcomes. Population evidence indicates that dental fear/anxiety affects a substantial proportion of adults globally, with prevalence estimates varying by assessment tool and case definition.(1) In routine practice, anxiety is not merely an unpleasant experience; it can reduce patient cooperation, heighten perceived pain, increase procedural time, and complicate delivery of care—especially for invasive procedures.(2)

Tooth extraction is frequently perceived as one of the most threatening dental interventions, largely because it is associated with injections, pressure sensations, and anticipated postoperative discomfort. Music and other simple distraction approaches have been explored during oral surgical procedures and have shown potential to reduce anxiety in extraction settings, offering a low-cost, non-pharmacological adjunct that is generally acceptable to patients.(3) However, conventional distraction (e.g., ambient music or chairside video) may be limited by competing operatory stimuli such as the sound of instruments, visual cues of surgery, and the patient's attentional focus on anticipated pain.

Distraction-based interventions are grounded in the principle that directing attention away from threatening stimuli can reduce the subjective experience of anxiety and pain by limiting cognitive resources available for worry and catastrophizing.(2) Audiovisual (AV) distraction systems—such as video eyewear—attempt to strengthen this attentional shift by combining visual and auditory engagement. Early clinical work in dentistry reported reductions in anxiety and pain with virtual-image AV eyeglass systems during dental procedures, supporting the feasibility of AV distraction in the dental chair.(4) Yet, many conventional AV approaches remain partially immersive and may not sufficiently "block out" the operatory environment for highly anxious patients.

Immersive virtual reality (VR) expands upon conventional AV distraction by providing a more absorbing, interactive or panoramic experience with greater sensory occlusion. Recent clinical research suggests that VR can reduce dental anxiety across procedures, including preoperative anxiety reduction trials and procedure-based applications.(5,6) Evidence is also emerging for VR use during extraction procedures, with studies in adults demonstrating reductions in anxiety and pain during primary tooth extraction,(6) and adult oral surgery contexts reporting improved anxiety outcomes during dental avulsions/extractions with VR.(7) Syntheses of the broader literature similarly indicate that VR often reduces dental anxiety and pain, while highlighting heterogeneity in protocols, outcome measures, and patient populations.8

Despite promising findings, important gaps remain. First, many studies focus on paediatric dentistry, whereas adult patients—who often present with entrenched dental fear and complex expectations—may respond differently to distraction modalities. Second, direct comparisons between immersive VR and conventional AV distraction during extraction are limited, making it difficult to determine whether the added complexity and cost of immersive systems yields clinically meaningful benefits. Finally, self-reported dental anxiety (captured using validated scales such as the Dental Anxiety Scale and the Modified Dental Anxiety Scale) remains a patient-centred outcome that can directly inform chairside decision-making and behaviour management planning.(9,10)

Accordingly, evaluating and comparing immersive versus conventional AV distraction for patients undergoing extraction can address a practical clinical need: identifying an effective, scalable, non-pharmacological strategy to reduce dental anxiety, improve patient comfort, and facilitate smoother delivery of oral surgical care.

The aim of the study is "to compare the effect of immersive audio-visual distraction with conventional Treatment procedures on self-reported dental anxiety among patients undergoing tooth extraction."

The objective of this study is to compare self-reported dental anxiety among patients undergoing tooth extraction who receive immersive audio-visual distraction versus those managed with conventional treatment procedures. The other objectives are to assess baseline dental anxiety prior to extraction using a validated anxiety scale, to determine the change in self-reported dental anxiety from pre-procedure to post-procedure within the immersive AV distraction group, to determine the change in self-reported dental anxiety from pre-procedure to post-procedure within the conventional treatment group, and to compare the magnitude of anxiety reduction between groups after accounting for baseline anxiety levels and relevant patient/procedural characteristics.

MATERIALS AND METHODS

Study design and setting

This single-centre, parallel-arm comparative clinical study will be conducted in the Saveetha Dental College and Hospitals, to evaluate the effect of distraction modalities on self-reported dental anxiety and physiological responses in adult patients undergoing routine tooth extraction under local anaesthesia.

Research question: Among patients undergoing Extraction, does immersive audio-visual distraction reduce self-reported dental anxiety more effectively than conventional treatment procedures and conventional distraction modalities?

Study population and sample size

A total of 80 adult patients indicated for routine tooth extraction will be recruited from the outpatient service and included in the study. The sample will be equally distributed into four study arms with 20 participants per group.

Group allocation and intervention protocol

Participants will be assigned into one of four groups: Group C (Conventional treatment procedures) will undergo routine extraction under standard operatory conditions without any distraction aid; G-1 (Audio distraction aid) will receive audio-only distraction; G-2 (Video distraction aid) will receive video-only distraction; and G-3 (Audio–video combined distraction aid) will receive simultaneous audio and video distraction. All participants will receive identical clinical management for extraction as per institutional protocol, including local anaesthesia and routine extraction steps, and no additional interventions beyond the assigned distraction modality will be introduced. In the distraction groups, the respective aid will be initiated after the patient is seated in the dental chair and before administration of local anaesthesia, and it will be continued throughout the procedure until completion of the extraction. Audio will be delivered through earphones/headphones at a comfortable volume as chosen by the participant, while video will be delivered through a display device positioned to maintain patient comfort and to avoid interference with operator access and visibility. For the combined audio–video group, both modalities will be provided concurrently using the same display system with integrated audio output or separate audio delivery, ensuring uninterrupted distraction for the duration of the procedure.

Outcome measures

Both subjective and objective outcomes will be recorded. Subjective outcomes will be assessed using (i) the Visual Analogue Scale (VAS) to record perceived anxiety/discomfort and (ii) the Subjective Units of Distress Scale (SUDS) to record perceived distress/anxiety, with higher scores indicating greater anxiety/distress. Objective outcomes will include blood pressure (systolic and diastolic) and heart rate, measured using calibrated automated monitoring devices to provide physiological correlates of anxiety.

Data collection procedure

All outcome measures will be recorded at two standardized time points: pre-operative (pre-op) and post-operative (post-op). For pre-operative assessment, each participant will be seated comfortably and allowed to rest for approximately 5 minutes to minimize transient variations in physiological readings. Baseline blood pressure and heart rate will then be recorded, followed by completion of VAS and SUDS ratings prior to initiating the extraction procedure. For post-operative assessment, immediately after completion of extraction (once the participant is stable and seated), blood pressure and heart rate will be recorded again, followed by completion of post-operative VAS and SUDS ratings. The same sequence (objective parameters first, then subjective scales) will be followed at both time points to maintain consistency and reduce measurement bias. All recordings will be entered into a structured proforma for each participant.

Inclusion criteria

Adults aged 18 years and above requiring routine tooth extraction under local anaesthesia will be included. Participants must be able to understand the study instructions, provide written informed consent, and complete the VAS and SUDS scales. Participants allocated to the distraction groups must be willing to use the assigned audio/video aid during the procedure.

Exclusion criteria

Patients requiring complicated or surgical extractions (e.g., impacted teeth or procedures expected to be prolonged) will be excluded to maintain procedural uniformity. Patients with significant visual impairment (limiting video viewing) or hearing impairment (limiting audio use) will be excluded. Individuals with diagnosed psychiatric illness, cognitive impairment, or those currently using anxiolytics/sedatives that could influence anxiety reporting or physiological parameters will also be excluded. Patients with uncontrolled systemic conditions or medical instability (for example, uncontrolled hypertension) that could render blood pressure/heart rate readings unreliable or increase procedural risk will be excluded.

Ethical considerations

The approval was derived from the Institutional Ethics Committee, Saveetha Dental College and Hospitals, Chennai, Tamil Nadu. Participation will be voluntary, confidentiality will be maintained throughout the study, and refusal to participate or withdrawal at any stage will not affect the patient's treatment.

RESULTS

The descriptive statistics for the subjective anxiety measures and physiological parameters across the four study groups are presented in Table 1**.** Each group comprised 20 participants. In the Control group, the mean VAS score increased from 4.65 ± 2.25 preoperatively to 6.90 ± 0.97 postoperatively, whereas

reductions were observed in all three distraction groups. The mean VAS score decreased from 6.40 ± 1.00 to 5.15 ± 0.88 in the Audio group, from 6.75 ± 0.72 to 3.70 ± 0.66 in the Video group, and from 7.35 ± 0.93 to 2.15 ± 0.37 in the Audio-Visual group. A similar pattern was observed for SUDS scores. The Control group showed an increase from 53.35 ± 15.40 to 73.50 ± 9.96, while the Audio, Video, and Audio-Visual groups showed decreases from 69.65 ± 8.71 to 55.30 ± 9.06, 74.50 ± 3.58 to 42.15 ± 7.62, and 78.10 ± 4.19 to 26.35 ± 4.45, respectively.

The physiological parameters also demonstrated a similar pattern (Table 1). In the Control group, mean systolic blood pressure increased from 130.55 ± 6.30 mmHg to 139.05 ± 3.32 mmHg, diastolic blood pressure increased from 83.70 ± 4.24 mmHg to 88.60 ± 3.27 mmHg, and heart rate increased from 85.30 ± 6.54 to 88.60 ± 6.71 beats/min. Conversely, reductions in all three physiological parameters were observed following Audio, Video, and Audio-Visual distraction. The Audio-Visual group demonstrated the largest numerical reductions, with systolic blood pressure decreasing from 140.95 ± 2.46 to 122.90 ± 1.74 mmHg, diastolic blood pressure from 90.15 ± 1.79 to 78.15 ± 1.63 mmHg, and heart rate from 94.60 ± 3.05 to 79.70 ± 3.54 beats/min.

Within-group comparisons for the Control group are presented in Table 2. The mean VAS score increased significantly from 4.65 ± 2.25 preoperatively to 6.90 ± 0.97 postoperatively, with a mean pre–post difference of −2.25 (95% CI: −2.96 to −1.54; t = −6.631; df = 19; p < 0.001). Similarly, SUDS increased significantly from 53.35 ± 15.40 to 73.50 ± 9.96, with a mean difference of −20.15 (95% CI: −25.41 to −14.89; t = −8.024; df = 19; p < 0.001). Heart rate also increased significantly from 85.30 ± 6.54 to 88.60 ± 6.71 beats/min, with a mean difference of −3.30 (95% CI: −3.93 to −2.67; t = −11.000; df = 19; p < 0.001). Although descriptive values showed increases in both systolic and diastolic blood pressure, valid pre–post paired-test statistics for these two variables were not available from the provided analysis and therefore were not interpreted inferentially.

Within-group analysis of the Audio distraction group demonstrated significant reductions in all assessed outcomes (Table 3). VAS decreased from 6.40 ± 1.00 to 5.15 ± 0.88, corresponding to a mean reduction of 1.25 (95% CI: 0.92–1.59; t = 7.804; df = 19; p < 0.001). SUDS decreased from 69.65 ± 8.71 to 55.30 ± 9.06, with a mean reduction of 14.35 (95% CI: 10.80–17.90; t = 8.471; df = 19; p < 0.001). Significant reductions were also observed in systolic blood pressure (mean difference = 5.20 mmHg; 95% CI: 2.35–8.05; p = 0.001), diastolic blood pressure (mean difference = 2.30 mmHg; 95% CI: 0.21–4.39; p = 0.033), and heart rate (mean difference = 3.75 beats/min; 95% CI: 3.49–4.01; p < 0.001).

As shown in Table 4, the Video distraction group demonstrated statistically significant pre–post reductions across all subjective and physiological parameters. Mean VAS decreased from 6.75 ± 0.72 to 3.70 ± 0.66, with a mean reduction of 3.05 (95% CI: 2.61–3.49; t = 14.441; df = 19; p < 0.001). Mean SUDS decreased from 74.50 ± 3.58 to 42.15 ± 7.62, corresponding to a mean reduction of 32.35 (95% CI: 28.73–35.97; t = 18.689; df = 19; p < 0.001). Systolic blood pressure decreased by 7.50 mmHg (95% CI: 5.79–9.22; p < 0.001), while diastolic blood pressure decreased by 3.10 mmHg (95% CI: 1.25–4.95; p = 0.002). Heart rate decreased from 93.05 ± 2.72 to 85.10 ± 2.43 beats/min, representing a mean reduction of 7.95 beats/min (95% CI: 6.30–9.60; t = 10.110; df = 19; p < 0.001).

The greatest numerical pre–post reductions were observed in the Audio-Visual distraction group (Table 5). Mean VAS decreased from 7.35 ± 0.93 to 2.15 ± 0.37, with a mean reduction of 5.20 (95% CI: 4.73–5.67; t = 23.134; df = 19; p < 0.001). Similarly, mean SUDS decreased from 78.10 ± 4.19 to 26.35 ± 4.45, representing a mean reduction of 51.75 (95% CI: 48.84–54.66; t = 37.242; df = 19; p < 0.001). Significant reductions were also observed in systolic blood pressure, which decreased by 18.05 mmHg (95% CI: 16.71–19.39; t = 28.267; df = 19; p < 0.001), and diastolic blood pressure, which decreased by 12.00 mmHg (95% CI: 10.91–13.10; t = 22.938; df = 19; p < 0.001). Heart rate decreased from 94.60 ± 3.05 to 79.70 ± 3.54 beats/min, corresponding to a mean reduction of 14.90 beats/min (95% CI: 12.55–17.25; t = 13.288; df = 19; p < 0.001).

Outcome	Group	n	Preoperative Mean ± SD	Postoperative Mean ± SD
VAS score	Control	20	4.65 ± 2.25	6.90 ± 0.97
	Audio	20	6.40 ± 1.00	5.15 ± 0.88
	Video	20	6.75 ± 0.72	3.70 ± 0.66
	Audio-Visual	20	7.35 ± 0.93	2.15 ± 0.37
SUDS score	Control	20	53.35 ± 15.40	73.50 ± 9.96
	Audio	20	69.65 ± 8.71	55.30 ± 9.06

Outcome	Group	n	Preoperative Mean ± SD	Postoperative Mean ± SD
	Video	20	74.50 ± 3.58	42.15 ± 7.62
	Audio-Visual	20	78.10 ± 4.19	26.35 ± 4.45
Systolic BP (mmHg)	Control	20	130.55 ± 6.30	139.05 ± 3.32
	Audio	20	135.05 ± 5.50	129.85 ± 1.46
	Video	20	138.40 ± 2.80	130.90 ± 1.80
	Audio-Visual	20	140.95 ± 2.46	122.90 ± 1.74
Diastolic BP (mmHg)	Control	20	83.70 ± 4.24	88.60 ± 3.27
	Audio	20	84.55 ± 3.40	82.25 ± 1.74
	Video	20	87.50 ± 3.27	84.40 ± 1.43
	Audio-Visual	20	90.15 ± 1.79	78.15 ± 1.63
Heart rate (beats/min)	Control	20	85.30 ± 6.54	88.60 ± 6.71
	Audio	20	89.35 ± 5.61	85.60 ± 5.59
	Video	20	93.05 ± 2.72	85.10 ± 2.43
	Audio-Visual	20	94.60 ± 3.05	79.70 ± 3.54

Table 1. Descriptive statistics of preoperative and postoperative anxiety and physiological parameters across the study groups

Outcome	Preoperative Mean ± SD	Postoperative Mean ± SD	Mean Difference (Pre−Post)	95% CI	t	df	p value
VAS score	4.65 ± 2.25	6.90 ± 0.97	−2.25	−2.96 to −1.54	−6.631	19	<0.001
SUDS score	53.35 ± 15.40	73.50 ± 9.96	−20.15	−25.41 to −14.89	−8.024	19	<0.001
Systolic BP (mmHg)	130.55 ± 6.30	139.05 ± 3.32	—	—	—	—	—
Diastolic BP (mmHg)	83.70 ± 4.24	88.60 ± 3.27	—	—	—	—	—
Heart rate (beats/min)	85.30 ± 6.54	88.60 ± 6.71	−3.30	−3.93 to −2.67	−11.000	19	<0.001

Table 2. Within-group comparison of preoperative and postoperative anxiety and physiological parameters in the Control group

Outcome	Preoperative Mean ± SD	Postoperative Mean ± SD	Mean Difference (Pre−Post)	95% CI	t	df	p value
VAS score	6.40 ± 1.00	5.15 ± 0.88	1.25	0.92 to 1.59	7.804	19	<0.001
SUDS score	69.65 ± 8.71	55.30 ± 9.06	14.35	10.80 to 17.90	8.471	19	<0.001
Systolic BP (mmHg)	135.05 ± 5.50	129.85 ± 1.46	5.20	2.35 to 8.05	3.817	19	0.001
Diastolic BP (mmHg)	84.55 ± 3.40	82.25 ± 1.74	2.30	0.21 to 4.39	2.299	19	0.033
Heart rate (beats/min)	89.35 ± 5.61	85.60 ± 5.59	3.75	3.49 to 4.01	30.485	19	<0.001

Table 3. Within-group comparison of preoperative and postoperative anxiety and physiological parameters in the Audio distraction group

Outcome	Preoperative Mean ± SD	Postoperative Mean ± SD	Mean Difference (Pre–Post)	95% CI	t	df	p value
VAS score	6.75 ± 0.72	3.70 ± 0.66	3.05	2.61 to 3.49	14.441	19	<0.001
SUDS score	74.50 ± 3.58	42.15 ± 7.62	32.35	28.73 to 35.97	18.689	19	<0.001
Systolic BP (mmHg)	138.40 ± 2.80	130.90 ± 1.80	7.50	5.79 to 9.22	9.156	19	<0.001
Diastolic BP (mmHg)	87.50 ± 3.27	84.40 ± 1.43	3.10	1.25 to 4.95	3.502	19	0.002
Heart rate (beats/min)	93.05 ± 2.72	85.10 ± 2.43	7.95	6.30 to 9.60	10.110	19	<0.001

Table 4. Within-group comparison of preoperative and postoperative anxiety and physiological parameters in the Video distraction group

Outcome	Preoperative Mean ± SD	Postoperative Mean ± SD	Mean Difference (Pre–Post)	95% CI	t	df	p value
VAS score	7.35 ± 0.93	2.15 ± 0.37	5.20	4.73 to 5.67	23.134	19	<0.001
SUDS score	78.10 ± 4.19	26.35 ± 4.45	51.75	48.84 to 54.66	37.242	19	<0.001
Systolic BP (mmHg)	140.95 ± 2.46	122.90 ± 1.74	18.05	16.71 to 19.39	28.267	19	<0.001
Diastolic BP (mmHg)	90.15 ± 1.79	78.15 ± 1.63	12.00	10.91 to 13.10	22.938	19	<0.001
Heart rate (beats/min)	94.60 ± 3.05	79.70 ± 3.54	14.90	12.55 to 17.25	13.288	19	<0.001

Table 5. Within-group comparison of preoperative and postoperative anxiety and physiological parameters in the Audio-Visual distraction group

DISCUSSION

The present study demonstrated that audio, video, and combined audio-visual distraction significantly reduced subjective anxiety and physiological stress during tooth extraction, whereas the control group showed increased postoperative anxiety. The greatest numerical improvement was observed with audio-visual distraction, with reductions of 5.20 points in VAS and 51.75 points in SUDS, accompanied by decreases of 18.05 mmHg in systolic blood pressure, 12.00 mmHg in diastolic blood pressure, and 14.90 beats/min in heart rate. Video distraction produced the next largest reductions, followed by audio distraction.

These findings are consistent with Maulina et al., who evaluated music intervention specifically during dental extraction and reported reduced dental anxiety with music compared with conventional treatment. The significant reduction in VAS, SUDS, blood pressure, and heart rate in the present Audio group similarly supports auditory distraction as a simple behavioural approach for reducing extraction-related anxiety. Lahmann et al. also reported that music distraction reduced dental anxiety, supporting the present finding that auditory stimulation can attenuate both perceived distress and physiological arousal.

The larger numerical reductions observed with Video and Audio-Visual distraction are comparable with the findings of Prabhakar et al., who reported greater anxiety reduction with audiovisual distraction than audio distraction alone. Although their investigation involved paediatric dental patients, the present findings demonstrate a similar pattern among adults undergoing extraction. More directly, Martínez-Martín et al. evaluated immersive virtual reality during tooth extraction and reported

significant reductions in dental anxiety, supporting the effectiveness of visually immersive distraction in an extraction setting. Lahti et al. similarly demonstrated that a short immersive virtual reality intervention reduced dental anxiety.

The present results are also consistent with the systematic review and network meta-analysis by Hao et al., which found that virtual reality, audiovisual distraction, and music-based interventions were effective non-pharmacological approaches for reducing anxiety associated with tooth extraction. The comparatively greater numerical improvement with combined Audio-Visual distraction in the present study may reflect greater sensory engagement and diversion of attention from operative sights and sounds.

The significant reduction in anxiety, blood pressure, and heart rate observed with audio distraction is supported by recent Saveetha-affiliated clinical research. Lal et al. reported lower anxiety and heart-rate values following music listening compared with conventional dental treatment, although iatrosedation produced a greater reduction.[15] Similarly, Zwiri et al. found that music therapy significantly reduced dental anxiety scores, blood pressure, and heart rate among adult dental patients.[16] The broader effectiveness of distraction is further supported by Almaeen et al., who reported greater anxiety reduction with distraction than with tell-show-do and voice-control techniques.[17] These findings correspond with the present study, in which audio distraction reduced subjective anxiety and physiological stress, while combined audio-visual distraction produced the largest numerical improvement.

CONCLUSION

The present study demonstrates that distraction-based interventions can effectively reduce dental anxiety and associated physiological stress responses among adult patients undergoing routine tooth extraction. Audio, video, and combined audio-visual distraction resulted in significant reductions in self-reported anxiety and distress, as assessed using VAS and SUDS, along with reductions in blood pressure and heart rate. In contrast, patients undergoing conventional treatment without distraction demonstrated increased postoperative anxiety and physiological arousal. Among the distraction modalities, combined audio-visual distraction produced the greatest numerical reductions across the assessed psychological and physiological parameters, followed by video and audio distraction. These findings suggest that engaging multiple sensory pathways may provide greater distraction from anxiety-provoking procedural stimuli. Considering their non-invasive nature, ease of application, and absence of pharmacological effects, distraction techniques, particularly combined audio-visual distraction, may serve as useful adjuncts for improving patient comfort and anxiety management during routine dental extractions.

Author Contributions

Author 1 conducted the study, including data collection, data analysis, interpretation of the findings, and preparation of the original manuscript, under the close guidance of Author 2. Author 2 contributed to the conceptualization and methodology of the study, guided its execution, assisted in the interpretation of the findings, and critically reviewed and revised the manuscript. Author 3 supervised the overall research process, scrutinized the study methodology and findings, and critically reviewed the manuscript for scientific and intellectual content.

Ethical Approval

The study was conducted after obtaining approval from the Institutional Ethics Committee of Saveetha Dental College and Hospitals, Chennai, Tamil Nadu, India. All procedures were performed in accordance with the approved study protocol and applicable ethical principles.

Informed Consent

Written informed consent was obtained from all participants prior to their enrolment in the study. Participants were informed regarding the nature and purpose of the study, and participation was entirely voluntary.

Funding

The authors received no external funding for this study.

Conflict of Interest

The authors declare that there are no conflicts of interest related to this study.

Data Availability

The data generated and analysed during the present study are available from the corresponding author on reasonable request, subject to institutional and ethical requirements.

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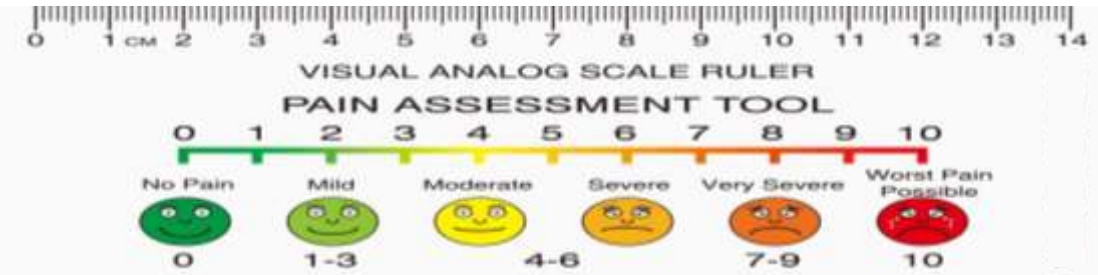
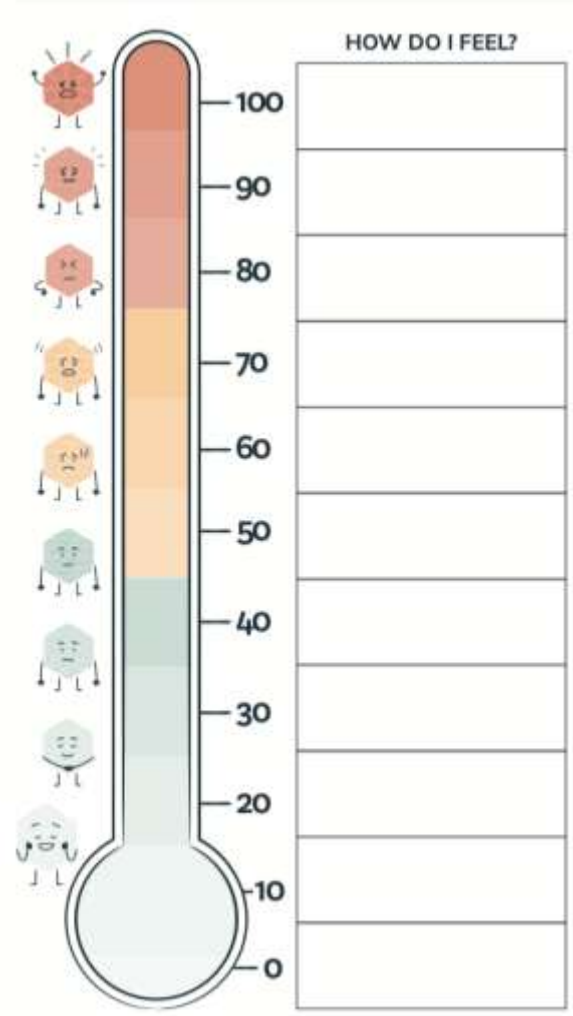
ANNEXURE

VAS 100mm scale





SUDS scale (Subjective Units of Discomfort Scales)