



www.bioinformation.net
Volume 21(10)



Research Article

Received October 1, 2025; Revised October 31, 2025; Accepted October 31, 2025, Published October 31, 2025

DOI: 10.6026/973206300213843

SJIF 2025 (Scientific Journal Impact Factor for 2025) = 8.478

2022 Impact Factor (2023 Clarivate Inc. release) is 1.9

Declaration on Publication Ethics:

The author's state that they adhere with COPE guidelines on publishing ethics as described elsewhere at <https://publicationethics.org/>. The authors also undertake that they are not associated with any other third party (governmental or non-governmental agencies) linking with any form of unethical issues connecting to this publication. The authors also declare that they are not withholding any information that is misleading to the publisher in regard to this article.

Declaration on official E-mail:

The corresponding author declares that lifetime official e-mail from their institution is not available for all authors

License statement:

This is an Open Access article which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly credited. This is distributed under the terms of the Creative Commons Attribution License

Comments from readers:

Articles published in BIOINFORMATION are open for relevant post publication comments and criticisms, which will be published immediately linking to the original article without open access charges. Comments should be concise, coherent and critical in less than 1000 words.

Disclaimer:

Bioinformation provides a platform for scholarly communication of data and information to create knowledge in the Biological/Biomedical domain after adequate peer/editorial reviews and editing entertaining revisions where required. The views and opinions expressed are those of the author(s) and do not reflect the views or opinions of Bioinformation and (or) its publisher Biomedical Informatics. Biomedical Informatics remains neutral and allows authors to specify their address and affiliation details including territory where required.

Edited by P Kanguane

Citation: Ramji *et al.* Bioinformation 21(10): 3843-3846 (2025)

Effectiveness of art therapy on pain and anxiety in children undergoing invasive medical procedures

Bhasara Kalpana Ramji¹, B. Mahalakshmi^{1,*} & N. Siva Subramanian²

¹Department of Pediatric Nursing, Nootan College of Nursing, Sankalchand Patel University, Visnagar, Gujarat - 384315, India;

²Department of Psychiatric Nursing, Nootan College of Nursing, Sankalchand Patel University, Visnagar, Gujarat - 384315, India;

*Corresponding author

Affiliation URL:

<https://ncn.spu.ac.in/>

Author contacts:

Bhasara Kalpana Ramji - E-mail: kalpanabhasara@gmail.com

B. Mahalakshmi - E-mail: mb.fn@spu.ac.in

N. Siva Subramanian - E-mail: sn.fn@spu.ac.in

Abstract:

The effectiveness of art therapy in reducing pain and anxiety in children aged 3-12 undergoing invasive medical procedures is of interest. Hence, a one-group pretest-posttest design involved 41 participants receiving a 20-25 minute art therapy session. Results showed significant reductions in pain (mean scores from 8.90 to 5.22) and anxiety (mean scores from 9.24 to 5.27) post-intervention. Severe pain levels decreased from 97.6% to 12.2%, while severe anxiety dropped from 90.2% to 26.8%. Thus, we show art therapy as a beneficial non-pharmacological intervention in pediatric care.

Keywords: Art therapy; pediatric pain; anxiety; invasive medical procedures; non-pharmacological intervention

Background:

Hospitalization and medical procedures can be profoundly distressing experiences for children. The unfamiliar environment, separation from parents and fear of pain often evoke significant anxiety and discomfort, particularly during invasive procedures [1]. In pediatric healthcare, addressing procedural pain and anxiety is vital not only for the child's immediate well-being but also for long-term psychological outcomes. Unmanaged procedural distress can lead to medical trauma, treatment noncompliance and increased sensitivity to pain in future encounters [2]. Non-pharmacological interventions like art therapy have gained attention as holistic, child-centered strategies to alleviate procedural distress [3]. Art therapy engages children in creative processes such as drawing, painting, or coloring, providing distraction and an expressive outlet for emotions. This modality is particularly suitable for pediatric care due to its accessibility, low cost and developmental appropriateness [4]. Numerous studies have documented the efficacy of art-based interventions in managing pain and anxiety in pediatric populations. For example, a randomized controlled trial using the TICK-B coloring intervention demonstrated significant reductions in venipuncture-related pain and anxiety in children aged 6-12. Similarly, scoping reviews suggest consistent emotional benefits, including reductions in stress, fear and pain intensity [5]. Art therapy has also shown promise across diverse medical settings. For example, in pediatric oncology, integrative approaches such as art, music and play therapies were associated with meaningful symptom control during chemotherapy and surgery [6]. Another review found that over 80% of cancer patients experiencing pain turned to complementary interventions like art therapy to manage symptoms [7]. Despite growing support, studies on art therapy in procedural contexts remain limited in pediatric populations. Many focus on chronic conditions or emotional health outcomes rather than acute procedural anxiety and pain [8]. The present study aims to contribute to this field by evaluating the impact of a short, structured art therapy session on pain and anxiety in children undergoing invasive medical procedures. Therefore, it is of interest to describe the effectiveness of art therapy on pain and anxiety in children undergoing invasive medical procedures.

Methodology:

Research design and setting:

The study employed a one-group pretest-posttest design to assess the effectiveness of art therapy on reducing pain and anxiety among children undergoing invasive medical procedures. The study was conducted in the pediatric units of Sneh Children Hospital, Modhera Chokadi, Mehsana and Krishna Children Hospital, Radhanpur Road, Mehsana.

Population and sample:

The population included children aged 3-12 years undergoing invasive medical procedures. A total of 41 children were enrolled using convenience sampling.

Intervention:

The intervention consisted of a 20-25 minute art therapy session where children were encouraged to draw or color freely using provided materials. The researcher facilitated the process but did not influence creativity. Sessions were conducted just before or during procedures, functioning both as distraction and emotional expression.

Data collection instruments:

- [1] Demographic profile of children and parents.
- [2] Pain measurement: Wong-Baker Faces Pain Rating Scale (0-10), categorized into mild, moderate and severe.
- [3] Anxiety measurement: Observational Scale of Behavioral Distress (Jay & Elliott, 1984) scored 0-10 and categorized as mild, moderate, or severe.

Data analysis:

Data were analyzed using SPSS. Descriptive statistics summarized demographic variables. Paired t-tests compared pre- and post-test scores, with significance set at $p < 0.05$. Results showed a significant reduction in mean pain (8.90 → 5.22) and anxiety (9.24 → 5.27), confirming the effectiveness of art therapy. Ethical clearance was obtained from the institutional review board. Informed consent was taken from parents and assent from children when possible. Confidentiality and voluntary participation were assured throughout.

Table 1: Frequency and percentage distribution of demographic variables of children undergoing invasive medical procedure in art therapy group (N = 41)

Variable	Category	Frequency (f)	Percentage (%)
Age (years)	3-5	16	39.0
	6-8	15	36.6
	9-12	10	24.4
Gender	Male	23	56.1

	Female	18	43.9
Education	Play group	12	29.3
	1st-4th Std	17	41.5
	5th-7th Std	12	29.3
Order of Child	First	18	43.9
	Second	20	48.8
	Third & above	3	7.3
Primary Caregiver	Mother	38	92.7
	Father	2	4.9
	Others	1	2.4
Religion	Hindu	30	73.2
	Muslim	7	17.1
	Christian	2	4.9
	Others	2	4.9
Residence	Urban	26	63.4
	Rural	15	36.6
Family Income (₹/month)	< 20,000	6	14.6
	20,000-50,000	14	34.1
	50,000-1,00,000	18	43.9
	> 1,00,000	3	7.3
Parent Education	Elementary	11	26.8
	Secondary	14	34.1
	Higher Secondary	9	22.0
	Degree	7	17.1
History of Hospitalization	Yes	15	36.6
	No	26	63.4
History of Surgery	Yes	8	19.5
	No	33	80.5

Table 2: Association of post-test pain and anxiety with demographic variables among children in the art therapy group (N = 41)

Variable	Post-test Pain χ^2 (df, p-value)	Significance	Post-test Anxiety χ^2 (df, p-value)	Significance
Age	12.880 (6, p = 0.042)	Significant	5.210 (6, p = 0.515)	NS
Gender	3.210 (2, p = 0.210)	NS	7.421 (2, p = 0.025)	Significant
Education	4.112 (4, p = 0.391)	NS	2.259 (4, p = 0.688)	NS
Order of Child	9.324 (6, p = 0.095)	Borderline	2.826 (6, p = 0.830)	NS
Caregiver	3.136 (4, p = 0.535)	NS	8.112 (4, p = 0.087)	Borderline
Religion	4.228 (6, p = 0.646)	NS	5.529 (6, p = 0.478)	NS
Residence	0.268 (2, p = 0.875)	NS	1.408 (2, p = 0.495)	NS
Family Income	7.881 (6, p = 0.048)	Significant	8.220 (6, p = 0.222)	NS
Parent Education	11.922 (6, p = 0.064)	Borderline	6.955 (6, p = 0.325)	NS
Hospital History	8.921 (2, p = 0.012)	Significant	3.955 (2, p = 0.138)	NS
Surgical History	1.084 (2, p = 0.582)	NS	9.214 (2, p = 0.010)	Significant

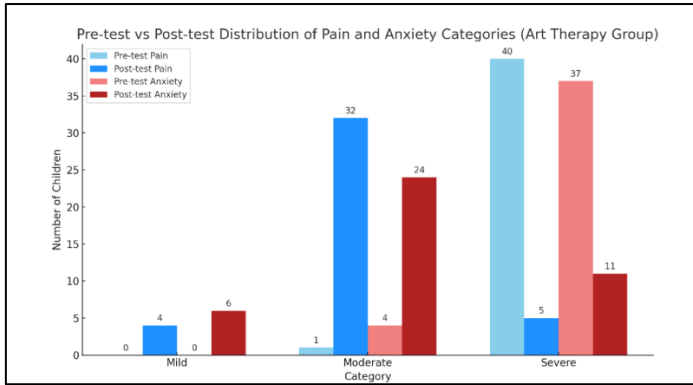


Figure 1: Pre-test vs post-test pain and anxiety categories

Results:

Table 1 shows the demographic profile of children in the art therapy group, where the majority were aged 3-5 years (39.0%), males (56.1%) and mostly cared for by mothers (92.7%). **Table 2** demonstrates the associations between demographic variables and post-test outcomes, with age ($\chi^2=12.880$, $p=0.042$), family income ($\chi^2=7.881$, $p=0.048$) and hospitalization history ($\chi^2=8.921$,

$p=0.012$) significantly related to pain reduction, while gender ($\chi^2=7.421$, $p=0.025$) and surgical history ($\chi^2=9.214$, $p=0.010$) were significantly associated with anxiety reduction. **Figure 1** depicts the pre-test and post-test distribution of pain and anxiety categories, showing that severe pain (97.6%) and anxiety (90.2%) before therapy reduced to 12.2% and 26.8% after therapy, with most children shifting into moderate or mild categories, confirming the positive effect of art therapy.

Discussion:

This study demonstrated that art therapy significantly reduced both pain and anxiety in children undergoing invasive medical procedures. Severe pain levels dropped from 97.6% to 12.2% and severe anxiety from 90.2% to 26.8%, highlighting the effectiveness of art therapy as a non-pharmacologic intervention. Our results align with prior evidence. In an RCT, art-based distraction during venipuncture reduced pain and anxiety significantly [9]. Adolescents treated with art therapy in emergency care also showed 23-28% reductions in pain and anxiety [10]. In post-operative care, art therapy lowered anxiety and behavioral distress compared to routine care [11]. These outcomes align closely with existing scientific literature. Mersal

et al. (2025) demonstrated that art-based play interventions during venipuncture substantially reduced both physiological and emotional stress markers in hospitalized children [12]. Similarly, Olaizola *et al.* (2024) conducted a scoping review that confirmed art therapy's positive role in pediatric pain modulation and emotional resilience [5]. Goren *et al.* (2023) found that creative modalities including music, play and art meaningfully alleviated pain and anxiety in hospitalized pediatric patients [13]. Chiang *et al.* (2023) showed that art and play interventions helped mitigate trauma-related distress in children with chronic or acute medical histories [14]. In a landmark study, Favara-Scacco *et al.* (2001) observed reduced psychological trauma and pain perception in children undergoing painful procedures such as lumbar punctures, following structured art therapy sessions [15]. Lastly, Tsze and Bifano (2024) reported 20-30% reductions in procedural pain and anxiety scores following art therapy exposure in pediatric emergency departments [10]. Together, these studies strongly validate our findings, reinforcing that art therapy is a low-risk, high-impact intervention capable of significantly reducing procedural pain and anxiety in pediatric care. Its simplicity, affordability and adaptability across settings make it especially valuable in both high- and low-resource medical environments. In pediatric oncology, combined art and music therapy improved mood, coping and social outcomes [16], while art therapy improved emotional resilience and communication in long-term cancer care. Creative tasks reduce attention to pain via distraction mechanisms. Expression through art also helps children externalize fears they cannot verbally articulate [17]. In cancer settings, art therapy was shown to improve treatment compliance and reduce emesis, pain and anxiety [18]. We found stronger responses among younger children, those with no prior hospitalizations and from lower-income backgrounds-groups often more susceptible to procedural distress. This supports similar findings on integrative therapies benefiting underserved populations. Girls and first-time surgical patients also showed greater anxiety reduction, matching evidence that such populations are more responsive to distraction-based therapy [19]. Emerging digital tools like tablet-based art apps also show promise as alternatives or adjuncts to traditional therapy. Music and virtual reality therapies have shown parallel effects in reducing cortisol and stabilizing vital signs during procedures [20]. Goren *et al.* (2023) found high-certainty evidence supporting play therapy and moderate support for music in pain and anxiety reduction [13]. Art therapy offers a low-cost,

accessible and effective solution to procedural pain and anxiety in children. It is especially beneficial for younger, vulnerable, or first-time patients and should be integrated into pediatric procedural protocols. Future research should compare art therapy to other modalities, explore long-term outcomes and examine mechanisms of change through mixed methods.

References:

- [1] Abazari L *et al.* *BMC Pediatr.* 2025 **25**:183. [PMID: 40069687]
- [2] González LP *et al.* *Rev Lat Am Enfermagem.* 2023 **31**:e3828. [PMID: 36888793]
- [3] Niyonkuru E *et al.* *Pain Ther.* 2025 **14**:121. [PMID: 39681763]
- [4] Bosgraaf L *et al.* *Front Psychol.* 2020 **11**:584. [PMID: 33132993]
- [5] Olaizola S *et al.* *Children.* 2024 **11**:619. [PMID: 38929199]
- [6] Cole D.M *et al.* *J Adv Pract Oncol.* 2024 **15**:265. [PMID: 39301100]
- [7] Seiter A *et al.* *Topics in Pain Management.* 2022 **37**:1. [DOI: 10.1097/01.TPM.0000832076.13432.13]
- [8] Motlagh E.G *et al.* *J Res Med Sci.* 2023 **28**:13. [PMID: 37064791]
- [9] Suleman S.K *et al.* *Complement Ther Clin Pract.* 2022 **48**:101597 [PMID: 35512482]
- [10] Bifano S.M *et al.* *CJEM.* 2024 **26**:564. [PMID: 39102150]
- [11] Bosman J.T *et al.* *Support Care Cancer.* 2021 **29**:2289. [PMID: 33188476]
- [12] Mersal F.A *et al.* *J Pediatr Nurs.* 2025 **85**:22. [PMID: 40674855]
- [13] Goren K *et al.* *Paediatr Child Health.* 2023 **28**:218. [PMID: 37287483]
- [14] Chiang C.Y *et al.* *Hu Li Za Zhi.* 2023 **70**:19. [PMID: 37259647]
- [15] Favara-Scacco C *et al.* *Med Pediatr Oncol.* 2001 **36**:474. [PMID: 11260571]
- [16] Avola M *et al.* *Healthcare (Basel).* 2025 **13**:1851. [PMID: 40805884]
- [17] Zhang B *et al.* *Clinics (Sao Paulo).* 2024 **79**:104. [PMID: 38936289]
- [18] Lu M.C *et al.* *J Integr Complement Med.* 2024 **30**:371. [PMID: 37824754]
- [19] Wigley I.L.C. M *et al.* *J EMDR Pract Res.* 2019 **13**:163. [DOI: 10.1891/1933-3196.13.3.163]
- [20] Singh N *et al.* *Cureus.* 2024 **16**:e63017 [PMID: 39050331]