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Impact of acupressure on anxiety and pain during local anesthetic injection in pediatric patients: A triple-blinded clinical trial

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Abstract

Background: Most dental anxiety is caused by the pain of local anesthetic injection. Techniques such as acupressure have been introduced to reduce anxiety and pain. This study aimed to investigate the effect of acupressure on the reduction of anxiety and pain during local anesthetic injection in children 5–7 years old.

Methods: This triple-blinded clinical trial was conducted on 71 children between the ages of 5 and 7. The children were divided into two groups, and acupressure was performed at key points (Yintang and Hegu) in one group and placebo points in the second group before local anesthesia. Then, the level of anxiety and pain was measured. The tools used to measure dental anxiety and injection pain were the visual analog scale (VAS-A) and FPS-R (Facial Pain Scale-Revised), respectively. Data were analyzed using SPSS version 20 software by analysis of variance and Wilcoxon test at the significance level of 0.05.

Results: The results of the present study showed that acupressure was significantly effective in reducing dental anxiety and injection pain in children (P<0.001). Also, the results showed that the acupressure technique significantly reduced pain in 5- and 6-year-old children but not in 7-year-old children (P value = 0.22). Our results indicated that acupressure at the key points significantly reduced anxiety and pain in both genders (P value < 0.05). However, the effect was not significant after applying pressure to placebo points. **Conclusion:** Based on the results of the present study, the acupressure technique is significantly effective in reducing anxiety in children 5–7 years old and injection pain in 5- and 6-year-old children in both genders. **Keywords:** Acupressure, Anxiety, Dental treatment, Injection, Pain

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Introduction

Controlling the behavior of pediatric patients for various dental treatments in the dental office is challenging, and it is related to factors such as the child's lack of development, limited cooperation skills, and fear and anxiety.¹

In pediatric dentistry, anesthesia injection is the most anxiety-provoking and painful dental procedure, increasing the level of anxiety if it is carried out repeatedly. Therefore, local anesthesia injection is one of the most difficult parts of treatment in children's dentistry.² The challenge caused by observing the injection syringe is controlled by expert pediatric dentists. However, also the pain of injection and the anxiety that comes after are challenges that have not been resolved entirely.

Dental anxiety is also defined as a psychological reaction of fear toward dental interventions because a person thinks

that these interventions are harmful and dangerous.³

Pain, which occurs in response to a specific stimulant, is not merely an emotional response. It has been clinically proven that children show predictable responses, including fear and stress, when experiencing pain.⁴

Acupuncture is currently offered as one of the conservative complementary methods in modern medicine. There is now an increasing acceptance of complementary medicine due to its safety and effectiveness; this has attracted the attention of many parents due to the side effects of many drugs used in children's dentistry.⁵⁻⁷

Acupressure is a branch of acupuncture that uses direct pressure of fingers or a bead on acupuncture points instead of inserting a needle and can be as effective as acupuncture in reducing children's anxiety.^{8,9}

Various studies have reported that children can



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benefit from the anti-anxiety and pain-relieving effects of acupressure. Anxiety can increase pain perception, so the anti-anxiety effect alone can explain the analgesic effect of this procedure.⁷ Avisa et al investigated the effect of acupressure in reducing children's anxiety. They found a significant difference between the control and acupressure groups in terms of the anxiety level and heart rate of children using the MCDAS Frankel Behavioral Rating Scale.¹⁰

Different points can be used to create the effect of acupressure on pain. One of the most famous of these points is the Hegu. The Hegu point is located in the middle of the angle between the first and second bones of the palm, between the thumb and index finger, on the back of the hand.¹¹ Serritella et al stated in a report that LI4 and ST6 point massage before orthodontic adjustment can reduce post-adjustment pain.¹²

Several points have been reported to reduce patients' anxiety. One of the most important points is the Yintang. The Yintang point (or the third eye, located between the two eyebrows and the nasal root) should be massaged in a calm environment with the index finger to reduce anxiety.¹³ Hu et al, in a meta-analysis, stated that the Yintang point immediately reduces pre-treatment anxiety.¹⁴

Acupressure has been suggested to decrease anxiety, nausea, and vomiting during pregnancy, spinal anesthesia, laparoscopic procedures, and temporomandibular joint (TMJ) disorders. It has also been suggested as a method for palliating dental anxiety in patients undergoing scaling and other restorative procedures.¹⁵ However, most of the associated studies have evaluated the anti-anxiety and pain-relieving effects of this method separately, especially in adults.¹⁶⁻²² However, regarding the paucity of data that supports the alleviating impact of acupressure in the dental treatment of children²³⁻²⁷ (including pain and anxiety control), we conducted this study to determine the effect of acupressure on anxiety and pain caused by the dental local anesthesia injection in children aged 5–7 years old.

Methods

Ethical considerations

This cross-sectional and triple-blinded clinical trial was conducted on children aged 5–7 years who need dental treatment with local anesthetic injection. This study was approved by the Research Ethics Committee of Kerman University of Medical Sciences with the ethics code IR.KMU.REC.1397.067. It also received the IRCT code number IRCT20171020036896N6.

It is noteworthy that this investigation is carried out according to the regulations of the World Medical Association Declaration of Helsinki.

Sample size and eligibility criteria

The sample size was initially estimated at 100 children on

G-power software with an effect size of 0.50 and 80% power at a significance level of 5%. However, after explaining the process and the need for two treatment sessions at an interval of one week, eight parents withdrew, and two parents also did not want to participate in the study.

Inclusion criteria

Children aged 5–7 years who needed treatment in two deciduous molars on both sides of the maxilla or mandible with local anesthetic injection had Frenkel's behavior rating scale levels of III and IV and had no wounds or scars in the acupressure points.

Exclusion criteria

Children who had a history of systemic diseases, mental retardation, any dental experience or a history of hospitalization, dental pain scores of 4–8 according to the visual analog scale (VAS-A), and acute dental infections and children who had taken painkillers or sleeping sedatives 48 hours before the study.

This age group was selected because they have a sufficient understanding to express their anxiety based on the VAS and FPS-R (Facial Pain Scale-Revised) images.

The primary outcomes of the study were the effect of acupressure on anxiety and pain caused by local anesthetic injection in pediatric dental treatment. The secondary outcomes were the effect of age and gender on anxiety and pain caused by local anesthetic injection in pediatric dental treatment.

Interventions, randomization, and allocation concealment

The study was conducted in the specialized Pediatric Ward of Kerman Faculty of Dentistry for twelve months.

This study used a simple or unlimited randomization method for sampling, and individual randomization was used. The coin toss method was used as the study had two groups.

The child and the parent were first guided to the examination room of the specialized pediatric ward.

Then, the study's goals, benefits, and methods were fully explained to the parents by the research resident, and their questions were answered. They were also assured that this study would not harm their child and that they could withdraw from the study whenever they wanted. Then, written informed consent was obtained from all parents.

In the next step, based on the Spence Children's Anxiety Scale (SCAS) standard questionnaire, the children's anxiety level was measured in a quiet environment (the same examination room); parents read the question to the child and marked the child's response in the questionnaire form. Children with anxiety disorders were excluded from the study (n=8 children) to make sure that the results of this study would not be affected by the primary and intrinsic anxiety of children.28

The remaining 82 children were randomly divided into two groups (n = 41 people per group). The allocation ratio was 1:1. The children's names were all placed in separate envelopes, and the gender of each child was written on the back of the envelope. Then, the assistant randomly divided the 41 children between the experiment and control groups, equally distributing the males and females. For both groups, the child's demographic information, such as age, gender, number of teeth, and the type of treatment, was recorded in a separate form.

For both groups, the child's anxiety level was measured before acupressure as well as before performing any dental procedure in the examination room (a quiet and separate environment) using a visual analog scale for anxiety (VAS-A). To this end, six images numbered from one to ten to show the anxiety severity were shown to the child by a dental assistant, and the child showed the image representing their anxiety level.^{3,29} The diagram of the study protocol is demonstrated in Figure 1.

The research resident first put pressure on the Yintang point (or the third eye, located between the two eyebrows and the nasal root) (Figure 2) with a circular movement in the examination room in the first group with his index finger. This procedure was performed 20–25 times per minute for about 4–5 minutes.²⁹ The child was again asked by a dental assistant to choose one of the images based on

their anxiety level.²⁹ A week later, the same method was performed at the placebo or sham point (external corner of the eyebrow). Placebo point stimulation was performed in the first session in the second group, and Yintang point stimulation was performed in the second session.

In order to investigate the effect of acupressure on the pain caused by local anesthesia injection, children who had two similar molars on both sides of one jaw (split mouth) and who needed inferior alveolar or posteriorsuperior alveolar nerve block anesthesia were selected. No children were excluded at this stage.

First, the research resident applied pressure for 7 seconds on the Hegu point (located in the middle of the angle between the first and second bones of the palm, between the thumb and index finger, on the back of the hand) (Figure 3) of the first group in the examination room. Then, the finger pressure was stopped for 7 seconds; and this process was repeated for 3–4 minutes. This point is located where the energy flow is closer to the skin surface, and it can be easily stimulated by pressure, needles, or extreme cold.^{30, 31}

Afterward, the child entered the treatment room, and another resident carried out the injection. First, 10% benzocaine gel was placed on the injection site for one minute. Then, after needle aspiration, the local anesthetic was injected with an injection length of one minute. The injection was performed using a 27-gauge Septoject



Figure 1. CONSORT flow diagram of recruitment of subjects, randomization, allocation, completion, and analysis



Figure 2. Pressing the Yintang point to reduce anxiety

needle, 2% lidocaine anesthetic, and 1.80000 epinephrine. Immediately after the injection, the child was asked by a dental assistant to choose one of the images in the FPS-R based on their perceived pain.

FPS-R is a valid pain assessment tool for children aged 4 to 12. This scale consists of six faces drawn without gender and race and scored from 0 to A week later, acupressure was performed on the same children at the placebo point, and pressure was applied to the soft part of the thumb for 3–4 minutes with a sequence of 7 seconds of pressure and 7 seconds of pause to simulate the previous state. After the local anesthesia injection, the child was asked again to choose the image showing their pain level using the FPS-R scale.²⁹ Eleven children were excluded from the study with regard to the child's unwillingness to undergo another dental treatment, one week later on the next session. Finally, the study was completed with 71 children.

The data analyst did not know the type of intervention delivered in the groups, and codes were used to present the data to him.

Statistical analysis

Data analysis was done using one-way repeated measurement analysis of variance and Friedman and Wilcoxon statistical tests in SPSS version 22. Also, in order to control type I error (α) in subgroup analysis, Bonferroni correction was used.

Results

In this cross-sectional clinical trial, 71 children aged 5–7 completed the study. The mean (SD) of the children's age was 6.13 ± 0.87 years. The number of participating girls and boys was 39 (55%) and 32 (45%), respectively. The mean (SD) of age in the boys and girls was 6.36 ± 0.75 and 5.95 ± 0.93 years, respectively.

The anxiety level of children before and after the application of acupressure at the acupressure and placebo



Figure 3. Pressing the Hegu point to relieve pain

points was compared using the repeated measures analysis of variance test. The results showed that the anxiety level was significantly different, with a confidence level of 95% before and after the application of acupressure at the key points. However, anxiety levels were not significantly different before and after the application of the acupressure technique on the placebo point (Table 1).

In order to investigate the effect of acupressure on children's pain, the Wilcoxon statistical test was used. The results showed that applying acupressure at the key points significantly reduced pain after local anesthesia injection (Table 1).

Also, using the repeated measures analysis of variance test to investigate the effect of gender on the level of anxiety, the results showed that the use of acupressure at the key points significantly reduced anxiety in both girls and boys (Table 2).

The Wilcoxon test was used to investigate the effect of the acupressure technique on the reduction of pain caused by local anesthetic injection in children by gender. The results showed that acupressure at the key points significantly reduced pain in both girls and boys (P=0.005 and P=0.01, respectively) (Table 3).

In order to investigate the effect of age on children's anxiety levels, first, the children were divided into three groups based on their age (5 years old, six years old, and 7 years old). The results of the Wilcoxon test showed that the application of acupressure at the key points reduced the children's level of anxiety in all three age groups. However, the use of the acupressure technique at the placebo point had no effect in reducing children's anxiety (Table 2).

Concerning the effect of acupressure on the reduction of pain caused by the local anesthesia injection in children of different age groups, it can be stated that the acupressure technique reduced pain in 5- and 6-year-old children but not in 7-year-old children (Table 3). Table 1. Comparing children's pain and anxiety levels before and after applying acupressure at the key and placebo points

No. 111	Mean±SD		Pvalue	
variable	Before	After	Within group	
Anxiety level after acupressure at the key point	2.12 ± 0.67	1.21 ± 0.44	< 0.001	
Anxiety level after acupressure at the placebo point	1.72 ± 0.89	1.67 ± 0.88	0.18	
Pain level after acupressure at the key point	1.64	0.001		
Pain level after acupressure at the placebo point	2.04 ± 0.95		< 0.001	

Table 2. Comparing the effect of acupressure in reducing children's anxiety by gender and age

Sex	Anviety loval	Mear	<i>P</i> value		
	Anxiety level	Before	After	Within group	
Female	Acupressure at the key point	2.17 ± 0.64	1.25 ± 0.49	< 0.001	
	Acupressure at the placebo point	1.79 ± 0.93	1.71 ± 0.92	0.13	
P value	Between group	0.03	0.009		
Male	Acupressure at the key point	2.06 ± 0.71	1.15 ± 0.36	< 0.001	
	Acupressure at the placebo point	1.65 ± 0.82	1.62 ± 0.83	0.66	
P value	Between-group	0.04	0.005		
Age		Mear	P value		
	variable	Before	After	Within group	
5 years	Acupressure at the key point	2.20 ± 0.41	1.20 ± 0.41	< 0.001	
	Acupressure at the placebo point	1.85 ± 0.74	1.75 ± 0.78	0.04	
P value	Between-group	0.07	0.009		
6 years	Acupressure at the key	2.12 ± 0.74	1.25 ± 0.44	< 0.001	
	Acupressure at the placebo point	1.83 ± 1.09	1.79 ± 1.06	0.31	
P value	Between-group	0.28	0.02	0.02	
7 years	Acupressure at the key point	2.07 ± 0.78	1.18 ± 0.48	< 0.001	
	Acupressure at the placebo point	1.52 ± 0.77	$1.48 \pm 0.0.77$	0.20	
P value	Between-group	0.01	0.12		

Table 3. Comparing the effect of acupressure in reducing the level of pain caused by local anesthetic injection in children regarding age and gender

	Variable	Treatment	Mean	Standard deviation	Z statistic	P value
Age						
5	Pain level	Key point	1.55	0.76	-2.64	0.008
		Placebo point	1.90	0.85		
6	Pain level	Key point	1.66	0.86	-2.80	0.005
		Placebo point	2.29	1.08		
7	Pain level	Key point	1.70	0.99	1.01	0.22
		Placebo point	1.92	0.89	-1.21	
Gender						
Female	Pain level	Key point	1.64	0.95	-2.83	0.005
		Placebo point	2.07	1.02		
Male	Pain level	Key point	1.65	0.78	-2.40	0.01
		Placebo point	2.00	0.88		0.01

Discussion

Acupressure is a non-aggressive form of acupuncture that can be applied by direct finger pressure or using a bead or pellet on the pressure points; in the current study, finger pressure was used. Concerning the importance of pain and anxiety control during local anesthetic injection and the paucity of studies that investigate the effect of acupressure on dental anxiety and pain in children, this study was conducted to evaluate the effectiveness of this alternative non-invasive method.

The present study also showed a significant difference in anxiety caused by dental treatments in the acupressure group compared to the control group, which was consistent with the study by Hoffmann et al,¹¹ who investigated the effect of acupressure on pain and anxiety levels. The results of this study showed that acupressure is a complementary treatment with high satisfaction that can significantly reduce the level of perceived pain and anxiety. Avisa et al¹⁰ suggested that acupressure administration using beads with a piece of adhesive strip significantly reduces dental anxiety and improves child cooperation during restorative procedures, which was also confirmed by Kumar et al²³ The results of these three studies are entirely in line with those of the present study. Also, Sisodia et al²⁴ found that three-point acupressure therapy with acupressure beads could significantly reduce dental anxiety during local anesthetic injection, which confirms our results. Another study by Soares et al²⁵ concluded that acupressure applied with mustard seeds significantly reduced heart rate in children undergoing restorative dental procedures, but the children's anxiety did not decrease significantly. These results are not in line with our study, and they might be associated with the different acupressure methods and the scale used for measuring children's anxiety, i.e., the modified Venham Picture Test.

The present study showed significantly lower pain caused by the local anesthesia injection in the group that had received acupressure at the key point than in the control group. Stimulating the LI4 point reduces pain in the orofacial area, effectively reducing the needle insertion pain. Also, this reduction in pain will reduce the child's anxiety during dental procedures. In this regard, Gurharikar et al²⁶ suggested that acupressure applied using beads during inferior alveolar nerve block injection could significantly reduce the pain of injection, which is in line with our results and has been confirmed by Avisa et al¹⁰ Sisodia et al²⁴ concluded that acupressure improves child cooperation during dental procedures, which is in line with our study. Another study by Pushpasanthy et al²⁷ also confirmed that acupressure by Aculief acupressure device significantly reduces the pain during local anesthetic injection. Furthermore, Müller et al21 concluded that acupuncture significantly reduces acute dental pain intraoperatively and postoperatively and in the efficacy of local anesthesia, which confirms our results.

Taymour et al evaluated the effect of acupressure on reducing the need for dental injections during the placement of fixed prostheses. They stated that acupressure can reduce pain, and local anesthesia is needed in the sessions for testing metal-ceramic coatings.¹⁶ In this study, the points specifically considered for each tooth were used as acupressure points, which differed from those in the present study. The similar results of both studies can be due to the presence of meridians in the body.³²⁻³⁵

This research revealed the significant role of age in reducing anxiety and pain caused by local anesthesia.

Acupressure at the key points reduced the pain caused by local anesthesia in 5- and 6-year-old children. However, acupressure did not have a significant effect in reducing pain in 7-year-old children. Nascimento et al³⁵ investigated the effect of acupressure in reducing pain, anxiety, nausea, and vomiting in children with cancer following hematopoietic stem cell transplantation. They also investigated the effect of age by classifying children into the two groups of 5-9 years and 10 years and above. They considered better intervention results in the 10-year age group and older. They justified this finding by stating that a better acupressure outcome is expected as children's level of understanding increases with age. In this regard, Soares et al²⁵ suggested that the variable of age does not significantly alter the pain-relieving effect of acupressure, which is not in line with our results. This difference is attributed to the different methods of acupressure used in the study mentioned above.

The acupressure technique has a positive effect on distracting the child. In younger children, distraction occurs more efficiently, leading to less sensation of needle insertion.²⁶ Seven-year-old children can see the needle, and then more pain can be expected.

The present study also showed that gender plays no significant role in reducing anxiety and pain caused by local anesthesia in children.

Boys and girls are different in their psychological and hormonal factors. These differences might influence the response to dental anxiety and experimental pain. Felemban et al indicated that girls have more anxiety levels than boys.³⁶ Also, the girls can express their anxiety more verbally.³ However, in this study, both genders had the same reduced anxiety response to Yintang point stimulation.

Gender seems to play a role in pain perception, even though this effect is unclear.^{35,37,38} In our research, both genders had the same response, which is consistent with the study by Bussell³² They investigated the effect of acupuncture on anxiety and memory function. Similar to the present study, they found no difference between the two genders and between different ages. This can be justified considering that the subjects of both studies were healthy and that the acupuncture/acupressure points stimulate the endogenous opioid system, which is not affected by hormones and gender.^{35,39}

Numerous clinical studies have been conducted on the effect of acupressure in reducing anxiety and pain in the medical field. However, there are very few studies in the dental field and the simultaneous examination of both anxiety and pain, especially in children.

One of the limitations of this research was the noncooperation of some children during the acupressure procedure; therefore, attempts were made to improve their cooperation by establishing proper communication with them. Also, another limitation was the non-cooperation of the parents in attending the following week's session on time or insisting on performing treatment on the adjacent tooth or the opposite jaw in some cases.

Conclusion

Based on the results of the present study, the acupressure technique had a significant effect in reducing anxiety and pain caused by local anesthetic injection in children of both genders aged 5–7 years old. Considering that acupressure is a simple, low-cost method that can be performed in dental offices, it can be suggested as one of the practical methods to reduce pain and anxiety in dental sessions.

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Authors' Contribution

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Competing Interests

None declared.

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References

- 1. Vagnoli L, Bettini A, Amore E, De Masi S, Messeri A. Relaxation-guided imagery reduces perioperative anxiety and pain in children: a randomized study. Eur J Pediatr. 2019;178(6):913-21. doi: 10.1007/s00431-019-03376-x.
- 2. Arane K, Behboudi A, Goldman RD. Virtual reality for pain and anxiety management in children. Can Fam Physician. 2017;63(12):932-4.
- Nowak AJ, Christensen JR, Mabry TR, Townsend JA, Wells M. Pediatric Dentistry: Infancy Through Adolescence. 6th ed. Philadelphia, PA: Elsevier; 2019.
- Shetty V, Suresh LR, Hegde AM. Effect of virtual reality distraction on pain and anxiety during dental treatment in 5 to 8-year-old children. J Clin Pediatr Dent. 2019;43(2):97-102. doi: 10.17796/1053-4625-43.2.5.
- Dehghanmehr S, Sargazi GH, Biabani A, Nooraein S, Allahyari J. Comparing the effect of acupressure and foot reflexology on anxiety and depression in hemodialysis patients: a clinical trial. Med Surg Nurs J. 2019;8(4):e100386. doi: 10.5812/

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msnj.100386.

- Chen SR, Hou WH, Lai JN, Kwong JSW, Lin PC. Effects of acupressure on anxiety: a systematic review and metaanalysis. J Integr Complement Med. 2022;28(1):25-35. doi: 10.1089/jicm.2020.0256.
- Eachempati P, Kumbargere Nagraj S, Kiran Kumar Krishanappa S, George RP, Soe HH, Karanth L. Management of gag reflex for patients undergoing dental treatment. Cochrane Database Syst Rev. 2019;2019(11):CD011116. doi: 10.1002/14651858. CD011116.pub3.
- Koç Özkan T, Balcı S. The effect of acupressure on acute pain during venipuncture in children: implications for evidencebased practice. Worldviews Evid Based Nurs. 2020;17(3):221-8. doi: 10.1111/wvn.12437.
- Mousavi FS, Golmakani N, Mohebbi-Dehnavi Z, Barzanooni S, Hormati A, Abdi H. The effect of auriculotherapy on nausea, vomiting, and anxiety in patients undergoing elective cesarean section with spinal anesthesia: a clinical trial study. Iran J Nurs Midwifery Res. 2023;28(5):587-92. doi: 10.4103/ ijnmr.ijnmr_463_20.
- Avisa P, Kamatham R, Vanjari K, Nuvvula S. Effectiveness of acupressure on dental anxiety in children. Pediatr Dent. 2018;40(3):177-83.
- Hoffmann B, Erwood K, Ncomanzi S, Fischer V, O'Brien D, Lee A. Management strategies for adult patients with dental anxiety in the dental clinic: a systematic review. Aust Dent J. 2022;67(Suppl 1):S3-13. doi: 10.1111/adj.12926.
- Serritella E, Impellizzeri A, Liguori A, Galluccio G. Auriculotherapy used to manage orthodontic pain: a randomized controlled pilot study. Dental Press J Orthod. 2021;26(6):e2119381. doi: 10.1590/2177-6709.26.6.e2119381.oar.
- Kwon CY, Lee B. Acupuncture or acupressure on *Yintang* (EX-HN 3) for anxiety: a preliminary review. Med Acupunct. 2018;30(2):73-9. doi: 10.1089/acu.2017.1268.
- Hu N, Soh KL, Japar S, Li T. Ear-marking relief: a meta-analysis on the efficacy of auricular acupressure in alleviating anxiety disorders. Complement Med Res. 2024;31(3):266-77. doi: 10.1159/000537734.
- Sun D, Reziwan K, Wang J, Zhang J, Cao M, Wang X, et al. Auricular acupressure improves habit reversal treatment for nail biting. J Altern Complement Med. 2019;25(1):79-85. doi: 10.1089/acm.2018.0063.
- Taymour N, Nawasrah A, El Zayat M, Rifaat S. Evaluation of acupressure effect on reducing the need for dental injection in fixed prosthodontics. J Dent Health Oral Disord Ther. 2019;10(5):268-70.
- Xie W, Ye F, Yan X, Cao M, Ho MH, Kwok JYY, et al. Acupressure can reduce preoperative anxiety in adults with elective surgery: a systematic review and metaanalysis of randomised controlled trials. Int J Nurs Stud. 2023;145:104531. doi: 10.1016/j.ijnurstu.2023.104531.
- Dellovo AG, Souza LM, de Oliveira JS, Amorim KS, Groppo FC. Effects of auriculotherapy and midazolam for anxiety control in patients submitted to third molar extraction. Int J Oral Maxillofac Surg. 2019;48(5):669-74. doi: 10.1016/j. ijom.2018.10.014.
- Hasanin ME, Elsayed SH, Taha MM. Effect of acupressure on anxiety and pain levels in primiparous women during normal labor: a randomized controlled trial. J Integr Complement Med. 2024;30(7):654-61. doi: 10.1089/jicm.2023.0072.
- Yan Z, MuRong Z, Huo B, Zhong H, Yi C, Liu M, et al. Acupuncture as a complementary therapy for cancerinduced bone pain: a systematic review and meta-analysis. Front Pain Res (Lausanne). 2022;3:925013. doi: 10.3389/ fpain.2022.925013.

- Müller M, Schmucker C, Naumann J, Schlueter N, Huber R, Lederer AK. Acupuncture in management of acute dental pain

 a systematic review and meta-analysis. Jpn Dent Sci Rev. 2023;59:114-28. doi: 10.1016/j.jdsr.2023.02.005.
- 22. Elshehaby M, Ali Tawfik M, Montasser MA. Acupressure versus NSAID for relief of orthodontic pain. J Orofac Orthop. 2023. doi: 10.1007/s00056-023-00476-0.
- 23. Kumar S, Bhattad D, Sajjanar A, Wasnik M, Rojekar N, Shukla H, et al. Effect of acupressure to reduce the dental anxiety in 8-12 year children: randomized control trial. Ann Rom Soc Cell Biol. 2021;25(5):3141-9.
- Sisodia M, Kaur H, Garg N, Choudhary R, Yeluri R. The effect of three-point acupressure therapy on anxiety levels in children undergoing dental procedures. Int J Clin Pediatr Dent. 2024;17(2):136-42. doi: 10.5005/jp-journals-10005-2738.
- Soares MEC, de Souza Araújo A, Pinto IC, Barbosa LS, Borsatto MC, Galo R. Effect of acupressure on dental anxiety in children: a pilot study for a randomized clinical trial. J Acupunct Meridian Stud. 2022;15(5):307-13. doi: 10.51507/j. jams.2022.15.5.307.
- Gurharikar AS, Nagpal D, Yadav PS, Chaudhari P, Hotwani K, Lamba G. Effect of acupressure on pain during inferior alveolar nerve block injection in children aged 5-10 years old an experimental study. J Acupunct Meridian Stud. 2023;16(4):127-32. doi: 10.51507/j.jams.2023.16.4.127.
- Pushpasanthy M, Ephraim R, Ayilliath A, Dhanya KB. Effectiveness of Aculief acupressure device on pain perception during local anesthesia in children: a double-blinded study. J Indian Soc Pedod Prev Dent. 2023;41(4):309-15. doi: 10.4103/jisppd_jisppd_370_23.
- Ahlen J, Vigerland S, Ghaderi A. Development of the Spence Children's Anxiety Scale - short version (SCAS-S). J Psychopathol Behav Assess. 2018;40(2):288-304. doi: 10.1007/s10862-017-9637-3.
- 29. Mathias FB, Cademartori MG, Goettems ML. Factors associated with children's perception of pain following dental treatment. Eur Arch Paediatr Dent. 2020;21(1):137-43. doi: 10.1007/s40368-019-00456-2.
- Ye J, Zhang Y, Wang X, Yang H, Xiao QW, Shen C, et al. [The sensitization phenomena and regularity of Hegu (LI 4) based on bibliometrics]. Zhongguo Zhen Jiu. 2019;39(4):453-6. doi:

10.13703/j.0255-2930.2019.04.029. [Chinese].

- 31. Vieira A, Sousa P, Moura A, Lopes L, Silva C, Robinson N, et al. The effect of auriculotherapy on situational anxiety trigged by examinations: a randomized pilot trial. Healthcare (Basel). 2022;10(10):1816. doi: 10.3390/healthcare10101816.
- 32. Bussell J. The effect of acupuncture on working memory and anxiety. J Acupunct Meridian Stud. 2013;6(5):241-6. doi: 10.1016/j.jams.2012.12.006.
- 33. Alhusamiah B, Almomani J, Al Omari A, Abu Attallah A, Yousef A, Alshraideh JA, et al. The effectiveness of P6 and auricular acupressure as a complimentary therapy in chemotherapy-induced nausea and vomiting among patients with cancer: systematic review. Integr Cancer Ther. 2024;23:15347354241239110. doi: 10.1177/15347354241239110.
- Fallahi Khesht-Masjedi M, Shokrgozar S, Abdollahi E, Habibi B, Asghari T, Saber Ofoghi R, et al. The relationship between gender, age, anxiety, depression, and academic achievement among teenagers. J Family Med Prim Care. 2019;8(3):799-804. doi: 10.4103/jfmpc.jfmpc_103_18.
- Nascimento MG, Kosminsky M, Chi M. Gender role in pain perception and expression: an integrative review. BrJP. 2020;3(1):58-62. doi: 10.5935/2595-0118.20200013.
- Felemban OM, Alshamrani RM, Aljeddawi DH, Bagher SM. Effect of virtual reality distraction on pain and anxiety during infiltration anesthesia in pediatric patients: a randomized clinical trial. BMC Oral Health. 2021;21(1):321. doi: 10.1186/ s12903-021-01678-x.
- 37. Sajadi FS, Farokh-Gisour E, Khosravi S, Khosravi S, Asadipour E. The evaluation of dentistry services according to the SERVQUAL model in the dentistry school of Kerman medical sciences university. J Oral Health Oral Epidemiol. 2024;12(4):176-82. doi: 10.34172/johoe.2023.30.
- Sajadi FS, Farokh-Gisour E, Sadeghi F, Iranpour A. Effect of education on the parents' awareness and attitude to the role of space maintainers in the child's mouth. J Oral Health Oral Epidemiol. 2024. doi: 10.34172/johoe.2309-1592.
- Sajadi FS, Torabi M, Salari Z, Shamsolmaali B. Effect of socialbehavioral factors on dental caries in 3-6-year-old children in Kerman, Iran. J Oral Health Oral Epidemiol. 2018;7(4):182-90. doi: 10.22122/johoe.v7i4.400.