Research Article

Pain Management by Non-Pharmacologic Therapies Among to Persons Suffer from Pain: A Systematic Review and Meta-Analysis

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Abstract

Introduction: Pain is an uncomfortable feeling of suffering for a person, specific to each individual. Pain affects in all aspects, including the physical, mental, emotional, and social. This study aims to conduct a systematic review and meta-analysis of research into the effects of Non-Pharmacologic Therapies among persons suffering from pain and to analyze the effect size of Non-Pharmacologic Therapies on patients for pain management. **Method:** A systematic literature research was conducted using the Science Direct database, Wiley Online Library, Scopus, PubMed, EBSSCO host, and the Thai-Journal Citation Index Center, seeking for randomized controlled trials between 2012 and 2022. Combined effect sizes were calculated using Review Manager Version 5.3. Eight articles met the inclusion criteria and in the effect size analysis. **Results:** Found that pain management by Non-Pharmacologic Therapies or alternative medicine, using music therapy, aromatherapy, relaxation, foot reflexology, and massage, can reduce the pain of people suffering from acute and chronic pain with significant.

Conclusion: Pain management by Non-Pharmacologic Therapies are the one kind of treatment and very necessary because it will help reduce complications by drugs, reduce treatment cost and admit time in hospital, and restore healing and improve the quality of life.

Introduction

Pain is an uncomfortable experience or feeling caused by the destruction of body tissues or by an illness that causes suffering. (International Association for the Study of PAIN (IASP), 2020) Pain affects the respiratory system, cardiovascular system, and digestive system. This causes complications such as lung atelectasis, myocardial infarction, etc. It also results in changes in

emotional behavior, such as fear, anxiety, lack of concentration, irritability, and insomnia [1]. Many factors influence pain as follows: 1) Age: Elderly people have less pain perception than other ages [2]. 2) Gender: Females have a lower pain threshold and tolerance than males. Moreover, the perception of pain is higher in women than in other genders [3]. 3) Occupation: Agriculture industry, such as textile industry (76.00%), manufacturing and assembly industry (66.20%), farmers (52.40 - 73.31%), and corn farmers (69.23%). It may be because working in the same posture, twisting, twisting, or using heavy-duty machines with vibration can cause chronic back pain and in occupations that do not require manual labor such as garbage workers (77.50%), taxi drivers (71.00%), public health personnel (65.51%), those who sat working with computers for more than 6 hours (53.14%) percent, etc., Having to sit in the same position, the back muscles repeatedly contract all the time, causing inflammation and causing chronic back pain [4]. 4) Body mass index: people with a body mass index above the criteria (BMI > 22.5 Kg/m2) (56.00%), especially those with abdominal obesity (44.20%) [5]. Furthermore, those who were overweight or obese had pain intensity levels 2.29 times higher than those with a normal BMI [6]. 5) Congenital disease: Diabetes and Hypertension (28.79%), with people with congenital disease having a greater chance of having pain than those without congenital disease [7]. Pain management is currently divided into two methods: pharmacological pain management and non-pharmacological pain management. A general approach for pain management using drugs is opioids, which are commonly used but cause side effects to patients, such as dizziness, drowsiness, nausea, vomiting, constipation, etc. [8]. Although pain management through medication is the primary method of pain relief for patients, it may cause side effects for patients. Moreover, it is not an independent role of the nurse. Therefore, nursing care for pain management without drugs is an approach that can help reduce pain. It is a method that increases the effectiveness of drug use and reduces the use of analgesic drugs. Reduce the occurrence of complications from the side effects of pain relievers. From the literature review, it was found that non-pharmacological pain management is a complement to your doctor's treatment. It is the role of nurses independently to reduce pain, such as Music therapy [9-10], Aromatherapy [11], and foot reflexology [12]. Currently, literature reviews and meta-analyses of non-medicated pain management interventions in people with pain have not been able to conclude the magnitude of the effect on non-medicated pain management, and promising interventions are best for those in pain. The researcher was therefore interested in a literature review and meta-analysis to obtain methodological characteristics and effect sizes to be used in developing an appropriate non-drug pain management program. Increase quality of life and promote the independent role of nurses more clearly.

Objective

The purpose including 1) To study a systematic literature review and analysis of research evidence related to the Effects of pain management without medication in people with pain, 2) To describe the characteristics of research related to pain management without medication among people with pain, 3) To analyze the influence of non-drug pain management methods among people with pain, and 4) To synthesize the knowledge from the study to develop a pain management program without using drugs for people with pain. In further research

Research Questions

1) How effective are non-drug pain management methods for people with pain? and 2) What is the magnitude of the influence of non-drug pain management methods among people with pain?

Materials and Methods

This quantitative analysis uses a meta-analysis research method and calculates the influence size of Glass, McGaw, and Smith. This research aims to study non-pharmacological pain management among people with acute and chronic pain. The studies were only Randomized Controlled Trials (RCTs) published in Thai or English from 2013 to 2023.

The sample group is a research report on Randomized Controlled Trials (RCT) that studies pain management methods without drugs in people with pain. By specifying properties of the sample (Inclusion criteria) as follows: sample group in each research study, there is a group of patients with acute or chronic pain. The articles are in Thai or English. The sample subjects in the research articles must be over 18. There are 2 sample groups, and quantitative research methods are used. Research that is a randomized controlled trial (Randomized Controlled Trials: RCT) only.

Data collection procedures and methods

Searching for information sources Data were collected manually by searching electronic databases including Science Direct, Wiley Online Library, Scopus, PubMed (US Library of Medicine and National Institutes of Health), EBSCOhost, Thai-Journal Citation Index Center since 2013 to 2023, define keywords such as non-pharmacological pain management complementary alternative pain groups with pain.

The researcher selects research studies by reading assessment. Subsequently, trials that met the eligibility criteria were selected in the Cochrane review- RCTs only Summary of Data and Research Characteristics for analysis and grading the certainty of the evidence according to The Joanna Briggs Institute's criteria.

Data Analysis

Analysis of research characteristics using descriptive statistics Calculate the percentage of variable data. Characteristics of research studies on pain management by non-pharmacotherapy and content analysis Influence value analysis and risk of bias using the Review Manager 5.3 program. Comparison of pain scores between the two groups and between the two periods in the same group Determined by the difference in mean pain scores. (Standardized mean difference: SMD) is shown with the 95% Confidence Interval (95% CI). Meta-analysis of differences in pain score (pre and post treatment) used the 'metan' command in a random effect model when there were differences in the values of each study (Heterogeneity) where the $I^2 \geq 25\%$ or the p value of Cochrane's (Q test) < 0.1 and use the 'metan' command in the constant influence model (fixed-effect model) when there are differences in the values of each research (Heterogeneity) at I^2 statistics < 25% or p value of Cochrane's (Q test) > 0.1. The subgroup analyzes were grouped by treatment methods, including Relaxation techniques, Music therapy, Pressure, Aromatherapy and Massage, and divided by type of pain are acute or chronic pain.

Result

Study Characteristics

Research selection that meets the criteria These were Randomized Controlled Trials (RCTs) from the flow diagram of study selection (Figure 1).
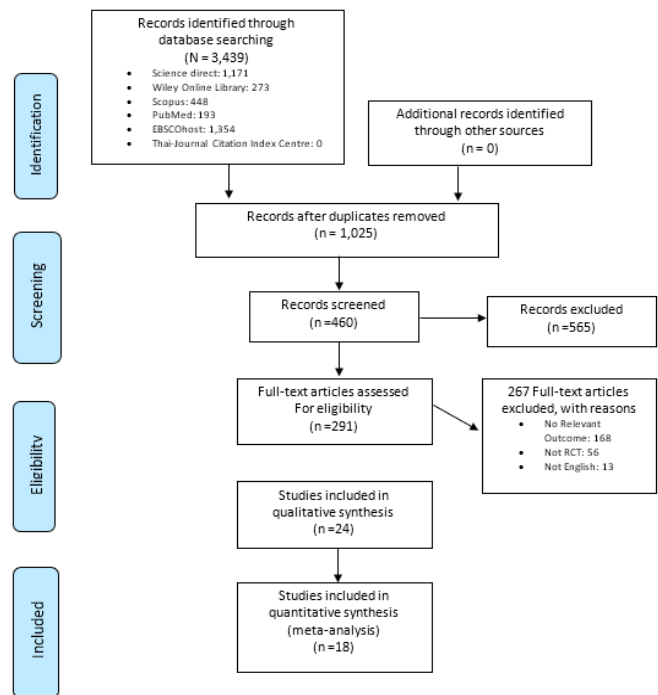
Figure 1: Flow diagram of study selection.

Table 1 shows the main characteristics of each research study obtained from the systematic literature review. There are a total of 18 studies, of which six are the most studied in Iran [13-18] Turkey, 5 cases [11,19-22] China, 3 cases [14,23,25] United States, 1 case [26], Italy, 1 case [27], Hong Kong, 1 case [28] South Korea [29] consisted of a sample group of 1,554 pain patients, divided into 814 patients with acute pain and 740 with chronic pain. Tools used for assessment the most painful symptom was the Visual Analog Scale (VAS) in 12 studies [13-14,19-20,23,28], Numeric Rating Scale (NRS) 5 studies [11,15,18,24,26] and one Behavioral Pain Scale (BPS) [21]. Study with the largest sample size of 198 people [26] and the study with the smallest sample size of 48 [29]. The average age of the sample group was between 29-77 years, with the control group being the comparison group, which consisted of 16 subjects receiving usual nursing care [7,13-14,16-27] One subject [11] received pain management with touch alone without receiving 1 case of reflexology [29] and pain management using Chinese massage without core stability exercise [25].

CAM Inter-ventions	Authors (year)	Country	n	Ages	Dropout (n, %)	Population	Intervention group (Intervention, Duration per session and Total time)	Control group	Outcome 1. Type of pain 2. Instrument
Music Therapy	Gutgsell et al. (2013)	USA	I: 99	57.45±14.76	1 (1.01%)	Palliative care patients	Intervention group listen to music for 20 minutes	Standard care alone	1. Chronic pain 2. NRS
			C: 99	54.72±15.34	1 (1.01%)				
	Burrai et al. (2014)	Italy	I: 26	64.3±12.9	0 (0.00%)	Cancer patients	A holistic nurse, played the saxophone to the patient of the intervention group. The patient listened to 5 or 6 pieces played with the saxophone for about 30 minutes.	Routine care	1. Chronic pain 2. VAS
			C: 26	64.6±12.9	0 (0.00%)				
	Aktas et al. (2019)	Turkey	I: 40	64.7±9.0	9 (22.5%)	Patients with mechanical ventilation support	Patients in the music group were provided music therapy 20 min before, during, and 20 min after endotracheal suctioning.	Routinely suctioning as usual	1. Acute pain 2. BPS
			C: 40	67.1±9.2	9 (22.5%)				
	Dai et al. (2020)	China	I: 33	53.4±12.6	0 (0.00%)	Patients after coronary artery bypass grafting	Intervention group listen to music for 30 minutes	Routine care	1. Acute pain 2. NRS
			C: 33	53.1±14.8	0 (0.00%)				
	Law et al. (2021)	Hong Kong	I: 53	50.19±11.74	0 (0.00%)	Outpatient hysteroscopy	During examination, The patient listen to music was played through a speaker.	Without music	1. Acute pain 2. VAS
			C: 50	47.88±11.04	0 (0.00%)				

CAM Inter-ventions	Authors (year)	Country	n	Ages	Dropout (n, %)	Population	Intervention group (Intervention, Duration per session and Total time)	Control group	Outcome 1. Type of pain 2. In-strument
Aromather-apy	Amirhos-seini et al. (2020)	Iran	I: 26	43.22±15.21	0 (0.00%)	Patients after percutaneous nephroli-thotomy	After the operation, the researcher soaked a sterilized gauze with three drops of the desired aromatic (clary sage) and placed it within 10 cm of the patient's nose and asked him to inhale it for 5 min.	Routine care	1. Acute pain 2. VAS
			C: 26	42.81±15.36	0 (0.00%)				
	Citlik Saritas et al. (2021)	Turkey	I: 45	49.26±14.57	0 (0.00%)	Patients undergoing ERCP	Intervention group were asked to inhale lavender oil for 30 min on the day of the ERCP procedure (At 08.00-10.00)	Routine care	1. Acute pain 2. VAS
			C: 45	50.62±14.58	0 (0.00%)				
	Sahin et al. (2021)	Turkey	I: 36	50.75±18.02	0 (0.00%)	Patients undergoing hemodialysis	Intervention group were asked to inhale lavender oil for 5 min.	Placebo group were asked to inhale olive oil at the last hour of dialysis session.	1. Acute pain 2. NRS
			C: 38	53.62±11.03	0 (0.00%)				
	Hajati et al. (2022)	Iran	I: 32	46.03±13.8	0 (0.00%)	Patients underwent Laparoscopic cholecystec-tomy	Intervention group was then asked to inhale the aroma for 2 min with five deep breaths. Afterward, a nonabsorbent tis-sue impregnated with 2% lavender essential oil was attached to the patient's clothing at a distance of 10–15 cm from the nose.	Routine care	1. Acute pain 2. VAS
			C: 32	48.38±11.43	0 (0.00%)				

CAM Interventions	Authors (year)	Country	n	Ages	Dropout (n, %)	Population	Intervention group (Intervention, Duration per session and Total time)	Control group	Outcome 1. Type of pain 2. Instrument
Relaxation techniques	Rejeh et al.(2013)	Iran	I: 62	75.22±7.72	0 (0.00%)	Patients undergoing abdominal surgery	Intervention group patients were given an audio tape containing relaxing sentences, slowly without music, using an introductory tape and earphones while they rested in bed concentrating on relaxing successive muscle groups for 10–20 min.	Routine care	1. Acute pain 2. VAS
			C: 62	77.30±7.54	0 (0.00%)				
	Rambod et al. (2004)	Iran	I: 40	49.07±13.31	0 (0.00%)	Hemodialysis patients	The intervention group underwent their Benson's relaxation technique two times a day (9 A.M and 17 P.M) each lasting for 20 min	Routine care	1. Acute pain 2. NRS
			C: 70	50.72±11.68	0 (0.00%)				
	Molazolem et al. (2021)	Iran	I: 34	30.00±9.16	6 (17.34%)	Adult Hemophilia Patients	The patients were to practice Benson's relaxation technique together with instrumental music was given to the patients twice a day (9 A.M. and 5 P.M.), each time lasting for 20 minutes.	Routine care	1. Chronic pain 2. NRS
			C: 40	29.73±7.05	0 (00.00%)				

CAM Interventions	Authors (year)	Country	n	Ages	Dropout (n, %)	Population	Intervention group (Intervention, Duration per session and Total time)	Control group	Outcome 1. Type of pain 2. Instrument
Reflexology	Baker et al. (2018)	Turkey	I: 30	50.83±12.05	0 (0.00%)	Patients with Rheumatoid arthritis	The intervention group, 30 min foot reflexology for a total of 6 times (once a week).	Routine care	1. Chronic pain 2. VAS
			C: 30	49.50±16.48	0 (0.00%)				
	Lee and Park. (2019)	South korea	I: 35	59.37±8.83	0 (0.00%)	Adults with chronic neck pain	The intervention group received acupressure at the LI4 point for 20 minutes in 10-second pressure and 2-second resting periods.	The control group, only touching was applied without any pressure in the same pattern as the intervention group.	1. Chronic pain 2. VAS
			C: 35	63.63±9.97	0 (0.00%)				
	Kapıkıran et al. (2023)	Turkey	I: 78	48.25±8.67	0 (0.00%)	Patients after abdominal surgery	The intervention group received reflexology application was complete with in 30 min.	Routine care	1. Acute pain 2. VAS
			C: 78	49.97±8.66	0 (0.00%)				

CAM Inter-ventions	Authors (year)	Country	n	Ages	Dropout (n, %)	Population	Intervention group (Intervention, Duration per session and Total time)	Control group	Outcome 1. Type of pain 2. In-strument
Massage	Zhang et al. (2015)	China	I: 42	48.71±3.89	0 (0.00%)	Patients with low back pain	The intervention group received Chinese massage in the low back for 40 min, once daily for 8 wks. In addition, The intervention group performed core stability exercises, once daily for 8 wks.	The con-trol group received Chinese massage without core stability exercises,	1. Chronic pain 2. VAS
			C: 42	51.62±4.03	0 (0.00%)				
	Ren et al. (2021)	China	I: 34	54.20±9.40	9 (20.93%)	Patients undergone cervical spine surgery	On the second day after surgery, The patients received foot massage for 10 min using sweet almond oil. The massage was conducted every other day for 4 weeks.	Routine care	1. Acute pain 2. VAS
			C: 38	52.80±12.40	5 (11.62%)				
	Sahraei et al. (2022)	Iran	I: 30	49.86±7.41	0 (0.00%)	Rheumatoid arthritis patients	The intervention group received Swedish massage for 30 min	Routine care	1. Chronic pain 2. VAS
			C : 30	51.36±6.37	0 (0.00%)				

Table 1: The characteristics of systemic review in 18 studies.

The nature of pain management without drugs in each study is different and similar, including music therapy, five studies [21,24,26-28] Aromatherapy, four studies [11,13,16,20] Relaxation techniques, three studies [15,17-18], reflexology, three studies [19,22,29] and massage Total of 3 studies [14,23,25] classified according to pain management methods without using drugs as follows.

Music therapy; 5 studies [21,24,26-28] studied in patients with 3 cases of acute pain [21,24,28] 2 cases of chronic pain [26-27] Music characteristics There are differences and similarities, including two research studies that asked samples to choose their favorite songs [24,28].The types of music are pop music, classical music, jazz music, spa music [28], light music, and relaxing music [24]. Research that had the sample listen to music from a saxophone, including one subject of pop, classical, film scores, folk, and jazz [27] listening to local Turkish Sufi music, one story [21] and 1 study using music therapy using ocean drum and harp instruments [26]. The time spent listening to music was 20- 30 minutes.

Aromatherapy: 4 studies [11,13,16,20] examined four subjects in patients with acute pain. Three studies used in aromatherapy were lavender [11,13,20], and only one study used Clary sage [16]. Most subjects were required to inhale essential oils for 2-5 minutes [13,16]. Evaporate for 30 minutes [20].

Relaxation techniques; 3 studies [15,17-18], two studies in patients with acute pain [17-18] One case of chronic pain [18] used a relaxation technique by listening to an audiotape with slow, soothing sentences without music. Furthermore, relax the muscles continuously, using 10 -20 minutes [17] and using Benson's relaxation technique, two subjects, two times a day, at 9:00 a.m. and 5:00 p.m., 20 minutes each time [15]

Reflexology: 3 studies [19,22,29] studied patients with chronic pain [22,29]. One subject on acute pain [19] 2 subjects on foot reflexology [19,22] 1 subject on ear reflexology [29].

Massage; 3 studies [14,23,25] 2 studies in patients with chronic pain [14,25] One case of acute pain [23] used Chinese massage techniques by massaging the lower back. Use for 40 minutes at a time, one time per day for eight weeks, one story [25], Swedish massage for the hands, 30 minutes for one story [14], and foot massage with oil. Sweet almond, 10 minutes at a time, for four weeks, one story [23].

Publication Bias

Unpublished data sources should have been searched.

Risk Bias

The investigator's percentage risk of bias estimates of the studies included in the meta-analysis are shown in Figures 2 and 3. Most studies were at low risk of bias
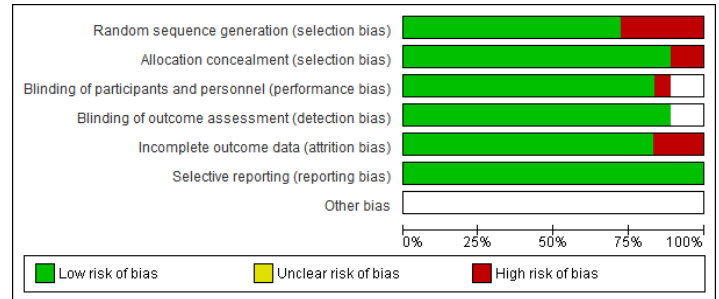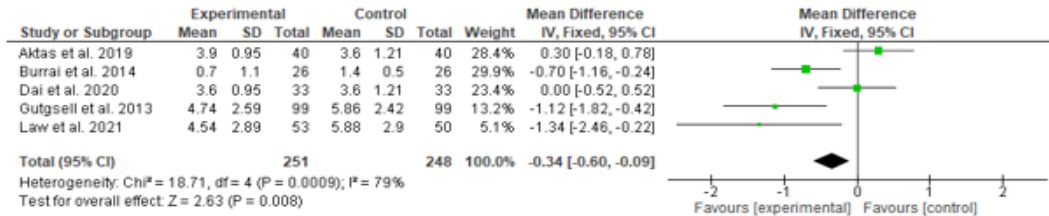

Figures 2: Risk of bias graph: review authors' judgments about each risk of bias item presented as percentages across all included studies.
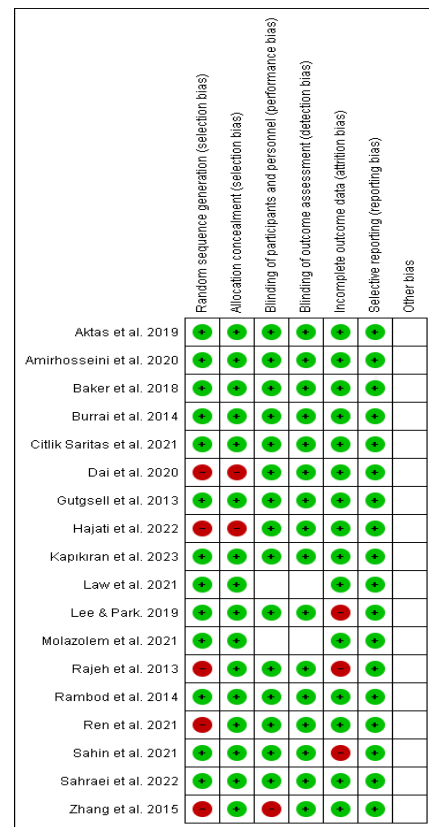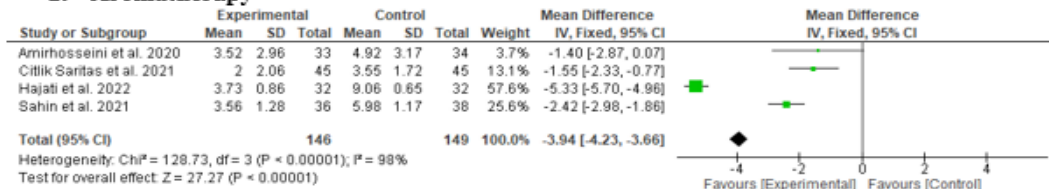

Figures 3: Risk of bias summary: review authors' judgments about each risk of bias item for each included study.
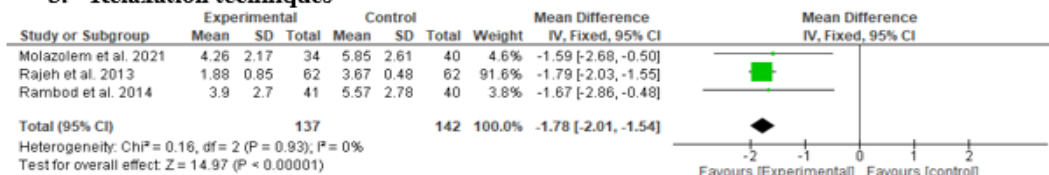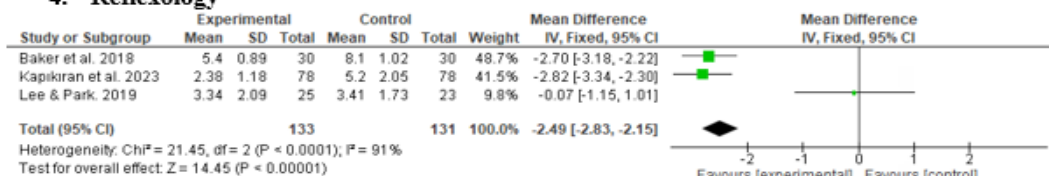
Forest Plot

1. Music therapy

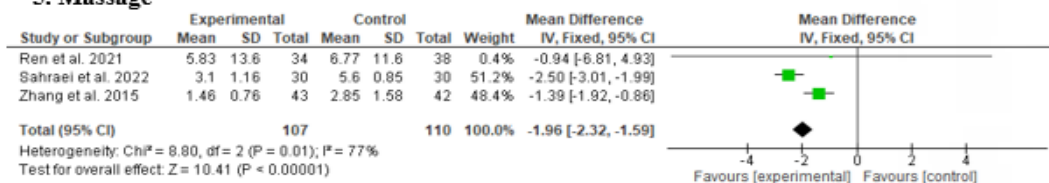

2. Aromatherapy

3. Relaxation techniques

4. Reflexology

5. Massage

Poor Result

The forest plot shows the meta-analysis, in which the author has selected only 18 Randomized Controlled Trials (RCTs). The results can be combined to get the highest quality work to use the results and develop further research. Results from 18 studies were analyzed from a total of 1,554 people in the research group, divided into an experimental group of 774 people who received non-pharmacology pain management and a control group of 780. As for the results, the author was able to compare the effect size and conclusion in 5 results, including music therapy, aromatherapy, relaxation techniques, Reflexology, and massage.

Music Therapy Techniques

Forest plot 1 The researcher has divided the influence of pain management using music therapy into five papers [21,24,26-28] all studied in patients with acute pain and chronic pain with 499 participants. From evaluating the size of the differences, there was a significant heterogeneity. ($\chi^2 = 18.71$, I2 = 79%, P = 0.0009). When combining the effect sizes between music therapy and the control group. It found a significant difference (SMD=-0.34, 95% CI: -0.60, -0.09, P=0.008).

Aromatherapy Techniques

Pain management using Relaxation techniques, which evaluates pain results among persons with acute and chronic pain by comparing the influence of four RCTs [11,13 ,16,20], all studied in patients with acute pain and chronic pain with 295 participants. When comparing the effect sizes between the aromatherapy therapy and the control group, evaluating the size of the differences was a non-significant heterogeneity ($\chi^2 = 128.73$, I2 =98%, P=0.93). It found that there was a significant difference (SMD=-3.49, 95% CI: -4.23, -3.66, P<0.00001).

Relaxation Techniques

Forest plot 3: Pain management using Relaxation techniques, which evaluates pain results among persons with acute and chronic pain by comparing the influence of three RCTs [15,17-18], all studied in patients with acute pain and chronic pain with 279 participants. When comparing the effect sizes between relaxation techniques therapy and the control group, evaluating the size of the differences was a non-significant heterogeneity ($\chi^2 = 0.16$, I2 =0%, P=0.93). It found that there was a significant difference (SMD=-1.78, 95% CI: -2.01, -1.54, P<0.00001).

Reflexology Techniques

Forest plot 4: Pain management using Reflexology, which evaluates pain results among persons with acute and chronic pain by comparing the influence of three RCTs [19,22,29] all studied in patients with acute pain and chronic pain with 264 participants. When comparing the effect sizes between the Reflexology therapy and the control group, evaluating the size of the differences was a significant heterogeneity ($\chi^2 =21.45$, I2 =91%, P<0.0001). It found that there was a significant difference (SMD=-2.49, 95% CI: -2.83, -2.15, P<0.00001)

Massage Techniques

Forest plot 5: Pain management using Massage 5, which evaluates pain results among persons with acute and chronic pain by comparing the influence of three RCTs [14,23,25], all studied in patients with acute pain and chronic pain with 217 participants. From evaluating the size of the differences, there was a significant

heterogeneity ($\chi^2 =8.80$, I2 =77%, P=0.01) When combining the effect sizes between the massage therapy and the control group. It found that there was a significant difference (SMD= -1.96, 95% CI: -2.32, -1.59, P=0.00001).

Discussion

From the literature review, it was found that Non-pharmacological pain management can help reduce pain. It is a method that increases the effectiveness of drug use and reduces the use of analgesic drugs. Reduce the occurrence of complications from the side effects of pain relievers. The report used in this literature review and meta-analysis were level 1 trials (Randomized Controlled Trials (RCTs)); 18 trials were from 7 countries, and no trials were conducted in Thailand.

From this study, it was found that There are many ways to manage pain without medication. Five methods include music therapy, aromatherapy, and relaxation techniques. Reflexology and massage, each of which helps in reducing pain. Modifying emotions and feelings causes enjoyment and concentration and affects the autonomic nervous system, stimulating the pituitary gland to release endorphins that have properties similar to morphine. Which has the effect of inhibiting the transmission of nerve impulses at the level of the spinal cord and Helps to relieve pain [30].

This is from a study of pain management methods using music therapy. The music should be soothing, with a rhythm of 60-80 beats per minute to match the heart rate. Moreover, it would help to listen to music at least two times a day, 15-30 minutes each time. The music used to reduce pain should have a steady rhythm. Prevent squeaky sounds; soft music such as nature sounds, playful music, or the patient's preferred songs are recommended.

How to manage pain through aromatherapy or essential oil inhalation: Most scents used for pain relief are lavender. The time spent inhaling essential oils for only 2-5 minutes can help reduce pain. Pain management through relaxation techniques is a way to make the patient feel calm by various means, such as listening to sound from a voice recorder, focusing attention on the pulling of the muscles following the rhythm of breathing, etc. Reflexology is an alternative medical science that can help reduce pain. It is a natural way. It does not use any equipment or pose a risk to the patient. Reflexology promotes the normal flow of energy. Help adjust the functioning of various organs. To work normally, promote blood circulation, reduce tension, reduce pain, and feel relaxed, creating balance for the body. [31] Popular locations for Reflexology include the ears, palms, and soles of the feet. Reflexology helps patients feel comfortable and relaxed [32], and massage. There are many massage techniques, such as Chinese massage, Swedish massage, foot massage with oil, etc.

Conclusion

Non-pharmacology guidelines include pain management using music therapy, aromatherapy, relaxation techniques, reflexology and massage had the same direction of effect. However, when comparing the pain scores after treatment, it was found that the pain scores of the 5 interventions were lower in the treatment group. In addition, when considering the results of subgroup analysis, all 5 treatment approaches found that pain scores of the experimental group were also significantly lower than those of the control group. Therefore, it was assumed that when starting to maintain the pain scores of both the experimental and comparison groups were equal and after receiving treatment receiving pain management using music therapy, aromatherapy, relaxation techniques, reflexology or massage makes the pain scoreless when compared to the control group.

Limitation

This literature review and meta-analysis is limited to randomized controlled trials (RCTs) and has two sample groups, resulting in a relatively small sample size in some groups. Furthermore, there may be other experimental research. The studies were not conducted as RCTs but were of high quality and produced good results. Moreover, it can be applied in further research. In addition, the researcher should have searched unpublished data sources. It may cause errors (Publication bias).

Suggestions for applying research results

1. Use the literature review results to consider non-drug pain management models for people with pain. Because it is considered a form of alternative medical treatment that gives excellent treatment results. and is currently accepted.

2. Use the literature review results to promote the effectiveness of non-drug pain management for people with pain. that are in progress to give medical personnel more confidence and promotion.

Suggestions for future research

1. The literature review results and the influence size from the meta-analysis were used in developing and designing a non-drug combined pain management program. in people with both chronic and acute pain.

2. Use the results from the literature review and the influence values from the meta-analysis to develop and design a non-drug pain management program combined with medication for patients of different ages. And adjust methods accordingly, such as types of music therapy for adults, the elderly, and children.

Acknowledgments

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