Impact of Aromatherapy Massage Application on Pain Level, comfort, and Sleep Quality among Post- Abdominal Surgeries' Children

Nema Ragab Elsayed (1), Sabra Mohamed Ahmed (2), Doaa Bahig Anwr (3), Jihan Mahmoud Farrag (4)

1Lecturer of Pediatric Nursing, Faculty of Nursing, Misr University for Science and Technology
2Assistant Professor of Pediatric Nursing, Faculty of Nursing, Sohag University, Egypt.
3Lecturer of Pediatric Nursing, Faculty of Nursing, Aswan University, Egypt
4Assistant Professor of Pediatric Nursing Department, Faculty of Nursing, Port Said University

Abstract

Background: Abdominal surgeries are considered to be one of the most painful surgical procedures which is defined as surgery about the content of the abdominal cavity. Aromatherapy massage is a non-pharmacological treatment that is both safe and effective for reducing pain, boosting comfort, and improving sleep quality. **The study** aimed to determine the impact of aromatherapy massage application on pain level, comfort, and sleep quality among post-abdominal surgery' children.**Design:** quasi-experimental. **Setting:** Sohag University Hospital's; Pediatric Surgical Department. **Subjects:** a convenience sample of 100 children post abdominal surgeries, they were divided into two equal groups, the study group, which consisted of 50 children who received massages with aromatherapy, and the control group, which consisted of 50 children who received their routine hospital care. **Data collection: Four tools** were used for data collection: The first tool was the Structured Interview Questionnaire to collect personal and clinical data of studied children, The second Tool was the Pain assessment scale, the third Tool was Comfort Questionnaire, the fourth Tool was the Pittsburgh Sleep Quality Index Scale (PSQI). **The results:** after aromatherapy massage following abdominal surgery, studied children in the intervention group experienced a considerable reduction in pain, and discomfort, and improved sleeping quality. **Conclusions:** The study group's pain level, comfort, and sleep quality have been improved after aromatherapy massage application in contrast to the control group**.Recommendation:** The study recommended using aromatherapy massage as a routine intervention to improve children's comfort and sleep disturbances, as well as to reduce postoperative pain**.**

Keywords: Aromatherapy massage, Children, Comfort, Pain, Sleep quality, Post abdominal surgeries,

Introduction

Surgical procedures related to the contents, walls, and orifices of the abdominal cavity are collectively referred to as abdominal surgeries, and they are among the most painful surgical procedures. The region between the first rib and the pelvic floor is where abdominal surgeries are performed. They can be done on the reproductive system, stomach, gallbladder, intestine, appendix, liver, spleen, or esophagus, among other abdominal organs (**Rose et al., 2020**).

3.9 million of the 48 million surgical procedures performed globally between 2005 and 2018 were abdominal surgeries, according to the National Centre for Health Statistics Analysis. Over the past ten years, a greater number of children have required abdominal surgery, which has increased the rates of these surgical procedures. In Europe and the US, abdominal surgeries are among the most popular surgical procedures (**Rabbitts & Groenewald, 2020).**

Inflammation brought on by direct nerve injury or tissue damage is the cause of acute postoperative pain. Pain following surgery can develop following relatively minor surgery as well as major surgery. Children having a variety of operations often report experiencing severe pain the day following their procedure., based on the Faces Rating Scale (FPRS) developed by **Wong-Baker (2001).** After surgery, acute discomfort is experienced by over 80% of children. Numerous children have pain following surgery, according to prior research; on the first postoperative day, 30-45% of patients report moderate to severe pain (**Mahna, et al., 2020**).

In the field of nursing, using complementary therapies to enhance patients' physical and mental health is a recent development. Aromatherapy massage is among the most often used supplementary therapies. An aromatherapy massage is the application of essential oils for medical or therapeutic purposes by absorption through the skin or olfactory system **(Mehta& MacGillivray, 2022).** It promotes the treatment of discomfort, anxiety, stress, pain, and sleep patterns. Children who have undergone surgery will feel moderate to severe pain, which can have a major effect on the patient's ability to heal, the complementary therapy that is growing at the fastest rate is aromatherapy **(Maclaren and Kain,2018).**

Insomnia, hypersomnia, altered sleep architecture, and an increase in waking frequency are characteristics of

postoperative sleep disturbances. General anesthesia-induced postoperative sleep disturbances may raise the risk of postoperative complications like postoperative fatigue (**Pérez-Carbonell et al., 2022).**

.Children undergoing surgery frequently experienced sleep disturbances, particularly in the first week following surgery. This was partially caused by disrupted melatonin secretion during the perioperative phase. It appeared that the natural circadian hormone could be supplemented with exogenous melatonin to change the melatonin level and lessen sleep disturbance (**Yilmaz & Iskesen, 2021**).

Significant surgical operations have been linked to insomnia. There was a correlation between the duration of postoperative sleep disturbance and the length of the operating procedure since the child had a critical condition and probably had more extensive surgical trauma. This is connected to the body's reaction after surgery, which includes a decrease in melatonin levels, a rise in cytokines, cortisol, and catecholamine, endocrine disturbance, inflammation, and sympathetic nerve excitation **(Haynes et al., 2021).** In addition to shortening the duration of sleep and lengthening the latency period, discomfort can also increase pain sensitivity and reduce the threshold for pain. The quality of sleep after surgery can even be used to forecast how much pain a patient will experience the next day. However, there is a dearth of knowledge regarding the short- and long-term healing after pediatric surgery, children often complain of pain for months thereafter **(Stroemel-Scheder et al., 2022).**

After surgery, pain is still very prevalent. For instance, 41% of postoperative children reported moderate to severe pain despite the use of sedative medications. A comprehensive survey revealed that out of 300 children, 86% had pain following surgery, with 75% of them experiencing moderate to severe pain in the first few days after the procedure **(Cettler et al., 2022).** Even though 88% of the participants received pain medication, 39% of them still reported moderate to severe pain, and 80% of them reported side effects, according to **Kost-Byerly et al. (2020).**

The nurse could collaborate with the medical staff to carry out a more comprehensive assessment of the pain issue, or she might be able to use aromatherapy massage to relieve post-operative pain right away **(Al-Ajarmehet al., 2022)**. To prevent unpleasant medical procedures, identify the underlying causes of pain, and proactively diagnose and treat pain, nurses are essential to teach the families and children how to use comfort measures to lessen pain as well as non-pharmacologic pain management strategies. They must evaluate how well treatment techniques work by comparing the pre-and post-treatment periods and keeping a close eye on adverse effects **(American Academy of Pediatrics, 2021).**

The nurse must assist the child's parents in doing the massage technique and make sure it is applied appropriately. nurses need to be competent in accurately assessing sleep patterns, comprehending the physiologic changes linked to sleep patterns knowing how to treat them, and being ready to address any psychosocial events that may accompany sleep patterns **(Ahmed et al., 2020).**

The study Significance

Aromatherapy massage is a complementary therapy specialty that is expanding the fastest. Complementary therapies may be important in the comprehensive management of pediatric postoperative pain**.** In addition to increasing the risk of a prolonged healing period, stress ulcers, atelectasis, pneumonia, thromboembolism, and weakened immune systems, A delayed recovery and the emergence of chronic pain syndromes after discharge are further risks associated with uncontrolled postoperative pain **(Terry, 2023).**According to Sohag University Children's Hospital Records' unpublished statistics data, 2019. 26.7% of all school-age children admitted to the pediatric surgical unit had pain following surgery. It is a viable alternative to pharmacological intervention for children experiencing postoperative pain, which is one of the most dangerous and critical postoperative concerns. Effective management of pain following surgery can lessen discomfort, cut down on the adverse consequences of painkiller usage, and improve children's satisfaction. As a result, multi-modal non-pharmacological postoperative pain care was recommended to reduce the risks related to adverse responses and drug dependence ***(Sakallı & Kara, 2022)***. Furthermore, the current study was conducted to evaluate the impact of aromatherapy massage application on pain level, comfort, and sleep quality among post-abdominal surgery children.

The Study Aim

The study aimed to evaluate the impact of aromatherapy massage application on pain level, comfort, and sleep quality among abdominal surgery children

Research Hypotheses

Following abdominal surgeries, children getting aromatherapy massages in the experimental group are expecting a more significant improvement in comfort and sleep quality, as well as a better reduction in post-

operative pain in contrast to the control group, which received just routine treatment.

Subjects & Method

Research Design
The research design used was quasi-experimental.

Setting
The study was carried out at Sohag University Hospital's; Pediatric Surgical Department.

Subjects
An equal number of fifty children who received aromatherapy massage in addition to their usual hospital ward care and fifty children who received their regular hospital ward care comprised the experimental group, which was created from a convenience sample of one hundred post-abdominal surgery children from the previous setting.

Criteria for Inclusion

1. of both sexes (Male and female).
2. Post-abdominal Surgery on children aged 6 to 12.
3. Children who could participate in the study.

Criteria for Exclusion

4. Children with foot problems.
5. Children who are under the influence of sedatives.
6. Children who had postoperative problems.

Tools of data collection:
This study's data was gathered utilizing four tools:

Tool (I): **The structured questionnaire; designed to collect data composed of two parts as follows:**

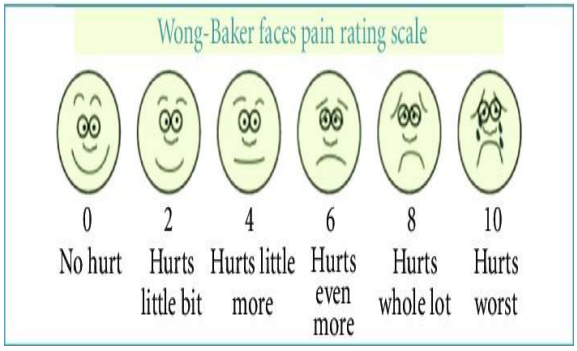
Part 1 Personal data about the studied children:

It studied children's age, gender, birth order, and education.

Part 2: Clinical data regarding the studied children

Contain the length of the hospital stay, and the type of surgeries (major, minor).

Tool (II): Pain assessment scale
The FACES Pain Rating Scale (FPRS), developed by *Wong-Baker in 2001*, each face represented a person experiencing pleasure from not having any pain or sadness from having some or a lot of pain, and the scale was used both before and after the intervention to determine the severity of the pain. The self-reporting pain assessment tool FACES was deemed valid and reliable. Due to its simplicity in identifying and reporting pain, faces were reported to be a suitable tool for children. It makes use of six faces drawn in a cartoon-like style using lines to represent the different degrees of pain that children experience (0–10).



Scoring system:

0 = No pain

2-4 = Mild pain

6-8 = Moderate pain

10 = Severe pain

Tool (III): Comfort Questionnaire

Children's post-operative comfort in terms of their physical, mental, spiritual, and social well-being is measured both before and after the intervention using a 34-item questionnaire that was taken from **Karakaplan & Yldz (2010)**. The General Comfort Scale is based on a 5-point Likert scale, where 1 represents severe disagreement and 5 represents strong agreement, the replies were rated, and the code of negative statements is reversed. The scale's lowest and highest scores range from 34 to 170. Scores near 170 indicate a high level of comfort.

Tool (IV): The PSQI (Pittsburgh Sleep Quality Index Scale) :

Sleep quality was assessed using the PSQI both before and after the intervention. The measure was created by ***(Buysse et al., 1989)*** to assess the quality of sleep and distinguish between individuals who have trouble falling asleep and others who get a restful night's sleep. Among the domains the exam covers are subjective sleep quality, subjective sleep latency, duration, habitual sleep efficiency, sleep disruptions, usage of sleep medication, and dysfunction throughout the day. The two portions of the scale consist of the five items a mother scores and the 19 self-reported questions that make up the scoring. Most of the multiple-choice questions are short, easy to understand, and offer clear answers. The scale's domains correspond to the answers obtained from the PSQI questions, with 0 denoting minimal difficulty and 3 denoting significant difficulty. The scientists report that there is a score range of 0 to 21, with a score of 5 denoting a significant sleep disruption. 5 to 10 minutes

are needed to finish the PSQI scale. The scale's reliability is considered excellent, as indicated by the 0.83 Cronbach's alpha for the overall score. Additionally, test-retest reliability is high. As compared to control subjects, patients' 89.6% sensitivity and 86.5 percent specificity show that the PSQI has strong validity, the authors conclude.

Field of the work

This research was conducted over six months, commencing at the beginning of January 2023 and ending at the last of June 2023. A professionally trained and certified aromatherapy massage practitioner, the researcher, gave the children in the experimental group aromatherapy massages. the researcher was visiting the hospital on Sunday, Monday, and Tuesday. The timeframe for collecting data was two times a day, morning and evening, in the first four to six hours after surgery (that is when the anesthesia had worn off). Children in the experimental group underwent 20 minutes of aromatherapy massage with lavender, coconut, and olive oils (5 minutes for each extremity) were needed for each child in addition to routine postoperative care at the hospital, A 35-minute to assess levels of pain, comfort, and sleep quality. A pre and post-test was given to both the experimental and control groups. Children in the experimental group who received an aromatherapy massage had their pain, comfort, and sleep quality recorded at the same intervals as those in the control group who only received routine care.

Aromatherapy massage intervention:

In addition to conventional medical treatment, aromatherapy massage was provided to children in the experimental group. Joint massage, tapping movements, effleurage, petrissage, friction, and mild to moderate pressure were all part of this massage. *Ali et al., 2023;* discovered that lavender oil was the most effective aromatherapy massage oil for reducing postoperative pain. Using the aromatherapy massage technique, place all four fingers flat on the skin and administer one or two drops of essential oil to the reflex point. Roll your fingers up with medium pressure as well. Roll your fingernails over each other and let go to advance by about a quarter inch. This should be done twice a day until the reflex point is covered *(Shahidi et al., 2023)*. Following the intervention, the outcomes of the experimental group were assessed using tools II, III, and IV. These tools were used twice: once at the start (pre-massage) and once at the end (post-massage). The children in the control group were assessed using tools II, III, and IV without the use of aromatherapy massage.

Pilot study

Before the data collection phase began, a pilot study involving 10% of the total number of children in the designated settings was carried out. This pilot study accomplished several goals, such as assessing the accuracy, applicability, and usefulness of the research instruments, estimating the time needed to complete the tools, and identifying potential difficulties with data collecting. Crucially, the pilot research participants were not included in the final study sample, protecting the integrity of the future phases of data collecting and analysis.

Validity of the tool:

Five experts; three professors of pediatric nursing and two professors of pediatric surgery, evaluated the tools' content validity as well as clarity, comprehensiveness, appropriateness, and relevance. By the panel's verdict, no changes were made to guarantee sentence clarity and content appropriateness. The content validity was present in 98.0% of the cases.

Reliability of the tools:

To evaluate the reliability of the developed tool, internal consistency was used. The value of the Cronbach's alpha coefficient was 0.889.

Ethical Considerations

Ethical considerations were essential throughout this study, and an administrative letter was obtained from the hospital director to facilitate the work of the researcher in the hospital. The research proposal had been authorized by the faculty of nursing's ethical committee, and the study subject was never at risk during the application process. This study adhered to clinical research ethics standards. Parents agreed to have their children participate in the study after learning about its objective and nature and provided written consent. anonymity and confidentiality Were maintained. Individuals taking part in the study had the option of withdrawing at any moment for any reason or declining the invitation.

Statistical analysis

The statistical design for this study involved a meticulous process of data input, validation, and analysis using the Statistical Package for the Social Sciences (SPSS) program, namely version 21, with a significance level of 0.05 as the basis for analysis. The data underwent thorough scrutiny to identify and rectify any missing values before proceeding with the analyses. In terms of descriptive analysis, quantitative data were succinctly summarized using mean and standard deviation, offering a comprehensive overview of the central tendency and variability within the dataset. Categorical data, on the other hand, were presented as frequencies and percentages, providing a clear depiction of the distribution of categorical variables. To assess the participants' descriptive features, the Chi-Square, and t-test were employed, enabling an examination of potential associations or differences among categorical variables.

Results

Table 1 indicates that 62% and 46% of studied children in both experimental and control groups were aged from 10 to 12 years respectively. In terms of gender, more than two-thirds (70% and 72%) of the children in both the experimental and control group were male respectively. More than one-third (36.0%) of the children in the experimental group were born in the first birth order while 30 of the children in the control group were born in the third birth order. Furthermore, no statistically significant differences in personal data were found between the two groups except in age p = 0.053.

Table 2 describes the surgical procedures that were done on the children in the experimental and control groups during the trial; Major surgeries were done in 56%, and 54% of both groups respectively. In terms of hospital stay duration, a greater proportion of children in the control group (46%) than in the experimental (42%) remained between two and three days in the hospital. There were no statistically significant variations between the two groups in the clinical data of the children under study**.**

Table 3 reveals that there was an improvement in the experimental group's mean scores for pain after abdominal surgery between pre and post-application of aromatherapy massage,

Figure 1 shows that in the pretest, 80% and 85% of children in the experimental and control groups respectively who had undergone abdominal surgery, reported moderate pain levels. On the posttest, in the experimental group, 100% of the children who had undergone abdominal surgery experienced slight pain, while only 70% of the control group reported mild pain.

Table 4 shows the children's comfort levels, revealing that the experimental group's mean scores were much higher than the control group, with a highly statistically significant (p.0.001) difference in all comfort dimensions and total score of PPCQ.

Table 5 indicates that there was an increase in the experimental group's mean sleep quality scores after aromatherapy massage application, in The children who had undergone abdominal surgery.

Figure 2 depicts that all post-abdominal surgery children in the experimental and control group had poor sleep quality during the pretest. Furthermore, during the posttest, 93% of the children who had undergone abdominal surgery reported having high-quality sleep in the experimental group, while all of the abdominal surgery children reported having poor-quality sleep in the control group.

Table 6 demonstrates a positive correlation between the comfort rating scale and pain level with a statistically significant difference (P=0.009). also a positive relation between sleep quality and pain level with a highly statistically significant difference (P = 0.001).

Table(1): Personal data of the studied children.

Personal data	Experimental group(n=50)		Control group(n=50)		P-value
	No.	%	No.	%	
Age /years					
6-<8 yrs	9	18.0	16	32.0	0.124
8-<10 yrs	10	20.0	11	22.0	
10–12 yrs	31	**62.0**	23	**46.0**	
Mean±SD	9.89±2.33		8.99±2.4780		0.053*
Gender					
Male	35	**70.0**	36	**72.0**	0.503
Female	15	30.0	14	28.0	
Birth order					
The first	18	**36.0**	13	26.0	0.686
The second	14	28.0	12	24.0	
The third	10	20.0	15	**30.0**	
The fourth	8	16.0	10	20.0	

****A highly significant difference in statistics at (P<0.001).**

***= significant at p<0.05 level**

NS=Non-significant,

Table (2): Clinical data of the studied children

Clinicaldata	Experimental group (n=50)		Control group (n=50)		P-value
	No.	%	No.	%	
1-The Surgery Types					
Minor operations	19	38.0	21	42.0	--
Intermediate operations	3	6.0	2	4.0	--
Major operations	28	**56.0**	27	**54.0**	0.505
2-Hospital stay length					
2-3 days	21	**42.0**	24	**46.0**	0.591
4–5days	18	36.0	21	42.0	
>5days	**11**	22.0	9	18.0	

****A highly significant difference in statistics at (P<0.001).**

***= significant at p<0.05 level**

NS=Non-significant,

Table 3: Comparison of pain levels between post-abdominal surgery children in the control group and experimental pre and post-aromatherapy massage application (N=100)

Group	N	Pain levels				X^2	p-value
		Pre-aromatherapy massage application		Post-aromatherapy massage application			
		Mean Score	SD	Mean Score	SD		
Experimental Group	50	**6.64**	1.08	**4.77**	0.89	56	7.42^{NS}
Control Group	50	5.22	1.04	4.66	0.86	56	1.98^{NS}
		X^2=58	t=1.98^{NS}	X^2=58	t=7.5		

****A highly significant difference in statistics at (P<0.001).**

***= significant at p<0.05 level**

NS=Non-significant,

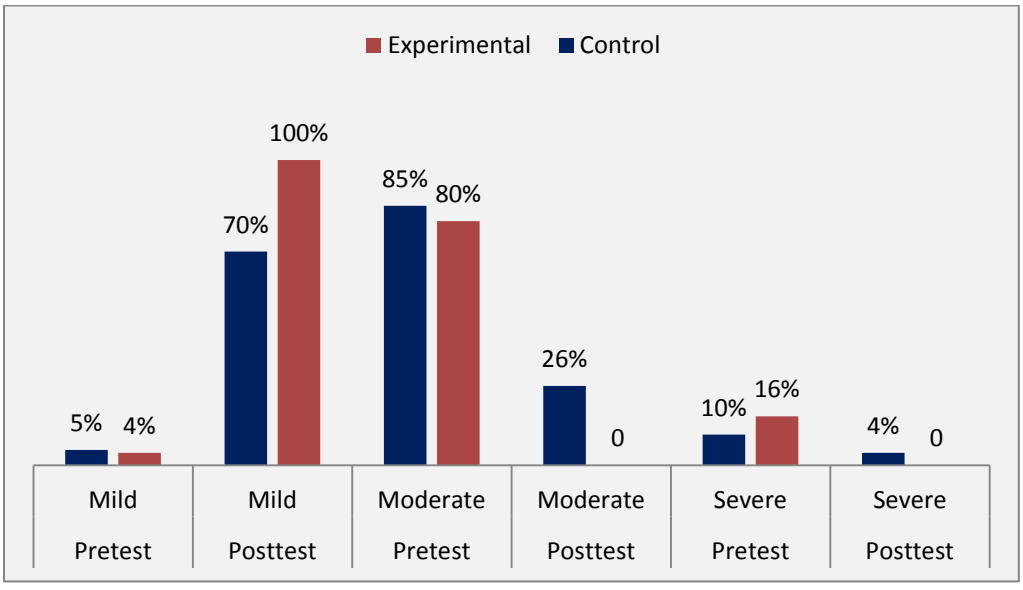


Figure 1: Post-abdominal surgery children distribution in control and experimental groups according to pain level pre and post-aromatherapy massage application (N=100)

Table (4): Comparison of comfort scores between Post abdominal surgery children in the control and experimental groups post aromatherapy massage application (N=100)

	Experimental Group(n=50)		ControlGroup (n=50)		Test	
PPCQandsub-dimensions	Lowest-Highest(Median)	Mean(SD)	Lowest-Highest(Median)	Mean(SD)	T	P
Physical comfort	47–70(62)	61.9(4.4)	30–66(47.8)	47.5(6.4)	13.400	<0.001**
Psych-spiritual comfort	46–50(50)	49.5(1.1)	41–50(49)	48.0(2.3)	4.110	<0.001**
Sociocultural comfort	40–50(45.3)	45.3(2.4)	28–42(35.7)	35.7(3.1)	18.004	<0.001**
The total score of PPCQ	139–170(156.6)	156.6(5.5)	107–151(131.1)	131.2(8.4)	18.426	<0.001**

**A highly significant difference in statistics at (P<0.001).

*= significant at p<0.05 level

NS=Non-significant,

Table 5: Comparison of quality of sleep among post-abdominal surgery children in the experimental and control group pre and post-aromatherapy massage application (N=100)

Group	N	Quality of sleep				X^2	p-value
		Pre-aromatherapy massage application		Post-aromatherapy massage application			
		Mean Score	SD	Mean Score	SD		
Experimental Group	**50**	**3.55**	1.06	2.73	1.08	58	3.67 NS
Control Group	**50**	2.77 X^2=58	1.01 NS t=0.87	2.54 NS X^2=58	0.72 NS t=19.4	58	1.71 NS

**A highly significant difference in statistics at (P<0.001).

*= significant at p<0.05 level

NS=Non-significant,

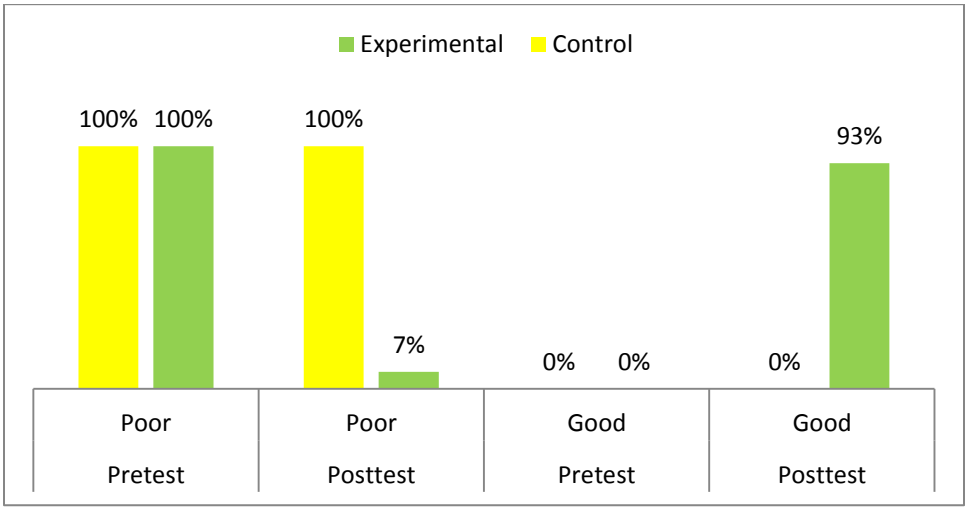


Figure (2): Post-abdominal surgery children distribution in experimental and control groups according to quality of sleep pre and post-aromatherapy massage application (N=100)

Table (6): Correlation between pain level, comfort, and sleep quality scales for experimental group post-abdominal surgery after aromatherapy massage application.

Items		ExperimentalGroup(n=50)
		Pain level
Comfort scale	R	0.479
	P value	0.009**
Sleep quality scale	R	0.696
	P value	0.001**

**A highly significant difference in statistics at (P<0.001).

Discussion

Post-abdominal surgery, children in hospitals frequently develop sleep difficulties. Unhealthy sleeping habits can hurt healing and well-being. Pain after abdominal surgery has a substantial impact on the physical and mental well-being of children. Nurses are critical in postoperative pain treatment**(Gao et al., 2019).** As a result, non-pharmacological techniques such as massage are effective in relieving postoperative pain. Even though there are adequate analgesics to reduce pain, postoperative pain management is difficult for nurses, particularly in the pediatric population. The use of complementary therapy to promote a patient's physical and emotional well-being is a new trend in nursing **(Tano et al., 2022).** Aromatherapy, one of the most popular supplementary therapies, is also one of the fastest-developing fields. It has been demonstrated to benefit children suffering from acute postoperative pain by lowering pain and improving comfort and sleep habits (**Ghaderi & Solhjou,2020).**

Aromatherapy aids in the treatment of pain, anxiety, stress, depression, and sleep disorders. After surgery, children will experience moderate to severe pain, which can significantly affect how quickly they heal. Massage of the hands and feet is one of the cheapest and most efficient techniques to help post-operative patients with pain management and better sleep patterns **(Ahmed et al., 2020).** The study aimed to evaluate the impact of aromatherapy massage application on pain level, comfort, and sleep quality among abdominal surgery children.

According to the study's findings, The majority of children in the control group and the experimental group were between the ages of ten and twelve. Boys made up the bulk of the children in both the experimental and control groups. These results are compatible with those of **Hamza et al.(2019),** who discovered no discernible differences in the features of children in the control and experimental groups. Furthermore, all of the children were in primary school, This indicated greater consistency between the two child groups.

The assumptions of this study corresponded with **Ahmed et al. (2020),** who discovered that more than half of the study and control groups were of school age. The study's findings revealed that the two groups' personal and medical information did not differ considerably. According to the researchers, this data corroborated the homogeneity of the two included child groups and demonstrated that the baseline levels of pain and sleep quality in both groups were the same before the application of aromatherapy but improved in the experimental group after intervention. Furthermore, the results agreed with those of Hamza et al. (2019), who evaluated the effect of massage on children's sleep difficulties after abdominal surgeries. According to the survey, both groups were of school age and pain improved after aromatherapy massage.

The results of this study indicated an improvement in the experimental group's mean pain scores following abdominal after aromatherapy massage. According to the researchers, using lavender oil in aromatherapy massage for relaxation had calming effects, enhanced sleep quality, and decreased discomfort, resulting in a faster recovery, and The experimental group had a shorter hospital stay. The results were consistent with that of **Bhatia, et al. (2020)**, who found that on the first postoperative day, the majority of children in both the experimental and control groups experienced significant pain. From day 1 to day 2, the experimental group's pain intensity gradually decreased to light discomfort, revealing the importance of using nonpharmacological therapy for managing post-operative pain. **Wente et al., (2019)** corroborated this finding by demonstrating a significant reduction in pain in the massage group following the intervention. **Hamza et al.(2019)** found no significant differences in pain scores between the two groups at the pretest, and **Ali et al. (2020)** discovered that, following therapy with lavender oil, the pain is relieved. Both studies validated the findings of the current investigation.

The current study showed that the post-abdominal surgery main score of pain was decreased after the application of aromatherapy **Hamza et al.(2019)** offered support for the current investigation by

demonstrating that; Compared to the mean pretest scores on postoperative day 1, the mean post-test pain scores on day 1 and day 2 (morning and evening) the pain level was significantly reduced. On days 1 and 2, there was a statistical difference in the experimental group's postoperative children's pain scores in the morning and evening. According to the researchers, this demonstrated that making massage using aromatherapy as a supplemental, non-pharmacological intervention could be crucial for improving pain management.

According to the current study's findings, the majority of post-abdominal surgery children in both the experimental and control groups had considerable discomfort during the pretest. However, the highly statistically significant results of this study showed that the children's comfort mean scores were significantly higher post-test in the experimental group compared to the control group. This showed the advantages of using aromatherapy massage in improving the study children's comfort. **El-Ghiety et al., (2021)** data confirm this explanation, showing that all post-abdominal surgery children experienced minimal discomfort following foot massage treatment during the post-test. The results of **Van et al., (2016)** study, which showed that giving postoperative patients 20 minutes of foot and hand massage greatly decreased their discomfort and anxiety on the first postoperative day, are likewise in line with this finding.

The current study found variation in the experimental group's mean pretest and posttest pain scores among individuals who had abdominal surgery. The researchers stated that it showed the safe positive effects of applying aromatherapy massage after pain alleviation. The present study's results were also in line with those of **Chen, et al. (2021)**, who investigated "the effects of massage on postoperative pain in pediatric patients who had abdominal surgery" and found that massaging the hands and feet of young patients undergoing abdominal surgery was a useful way to reduce postoperative pain. According to **Kukimoto et al. (2017),** who looked into "the effect of massage versus relaxation on postoperative back pain," children who had massage therapy showed a noticeable decrease in pain. These results are consistent with these findings, also; This result is comparable to that of **Kanaga, (2019),** who looked into how massage affected patients' pain after undergoing abdominal surgery in Delhi and found that the massage-receiving intervention group had significantly lower pain scores.

The study's findings demonstrated an improvement in the experimental group's mean scores for sleep quality before and after receiving aromatherapy massages and among the experimental, control group post-test for pediatric patients who recovering from abdominal surgery. The investigators came to the conclusion that this demonstrated how effectively aromatherapy massage enhanced the quality of sleep for those children. The results aligned with those of **Bathory & Tomopoulos, (2017),** who presented evidence confirming the beneficial efficacy of massage therapy in improving sleep standards and demonstrating that it positively influenced sleep promotion. Similarly, **Genik et al. (2020)** discovered that children who received massage treatment at least once a day for 20 minutes reported significant pain reduction and increased sleep quality. The findings of this study are supported by those of **Hamza et al. (2019)**, who reported a decrease in sleep disturbance scores after aromatherapy massage.

The current study's findings demonstrated that during the pretest, children who had undergone abdominal surgeries; in both the experimental and control groups experienced poor sleep quality. This finding is consistent with the findings of **Lorentzen et al. (2017)**, who examined the attitudes, beliefs, and pain experiences of a cohort of Danish surgery patients. It was found that both the experimental and control groups' quality of sleep patterns were generally poor. Similarly **Wojcikowski et al., (2020)** during research on "A complementary therapy in pain management; the same results were confirmed.

Finally, according to the study's findings, the majority of the experimental group's post-abdomen surgeries had a low level of pain, slept well, and high comfort rating scale during the post-test following their massages. According to the researchers, it revealed the value of massage in improving sleep quality, comfort rating scale, and decreased pain level; These results agreed with those of **Karamisefat et al. (2021)**, who discovered a statistically significant positive association between pain level and comfort scale. Furthermore, a positive statistical link was discovered between the intensity of discomfort and the quality of sleep. The researchers concluded that this demonstrated how effectively aromatherapy massage treatment may be utilized to alleviate pain, which frequently leads to increased comfort and better sleep quality.

Conclusions

The current study effectively illustrated the positive impact of aromatherapy massage application on pain level, comfort, and sleep quality among post-abdominal surgery' children. According to the current study's findings, children in the experimental group who received aromatherapy massage after abdominal

operation reported higher levels of comfort and sleep quality, as well as a lower level of postoperative pain, as compared to the control group who received standard treatment. (The findings additionally showed a statistically significant positive relationship between the degree of discomfort, the quality of sleep, and the level of pain in children who had abdominal surgeries, in the experimental groups after aromatherapy massage.

Recommendations

In light of the current study's findings, the following recommendations have been proposed:

1. Regularly providing massage treatment with aromatherapy to children to enhance their comfort, lessen their postoperative pain, and treat their sleep disturbances.
2. Developing an evaluation system for nurses' proficiency in non-pharmacological pain management strategies for children after abdominal surgeries in child surgical units to lower pain, and discomfort and improve sleep quality after any invasive surgical procedure.
3. Developing continuous training programs for nurses to improve their skills concerning the application of nonpharmacological management; based on their needs
4. Further investigation is needed to conduct a similar study with a bigger sample size in a variety of scenarios to generalize the results.

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