

Effect of Peppermint Inhalation versus Slow-Stroke Back Massage on Chemotherapy-Induced Nausea and Vomiting among Children with Gastrointestinal Cancer

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Abstract

Background: Chemotherapy-induced nausea and vomiting are prevalent adverse effects experienced by cancer patients, particularly children undergoing treatment for gastrointestinal cancer. **Aim:** This research sought to ascertain the effect of peppermint inhalation versus slow-stroke back massage on chemotherapy-induced nausea and vomiting among children with gastrointestinal cancer. **Method:** A randomized controlled trial design (true experimental) was employed for this investigation. The study encompassed 90 children with gastrointestinal cancer undergoing chemotherapy, recruited from the Pediatric Oncology Department at the South Egypt Cancer Institute, Assiut University. Participants were randomly assigned to three groups: a peppermint inhalation group, a slow-stroke back massage group, and a control group. Data collection involved the utilization of a structured questionnaire and the Rhodes Index of Nausea and Vomiting Likert Scale. **Results:** In terms of vomiting, a significant proportion of children in the peppermint inhalation group (80%) and massage group (70%) did not experience vomiting, in stark contrast to only 3.3% in the control group. Regarding nausea, the peppermint inhalation group (86.6%) and massage group (76.7%) did not encounter nausea, contrasting starkly with only 3.3% in the control group. **Conclusion:** Peppermint inhalation and slow-stroke back massage demonstrate substantial antiemetic efficacy in mitigating chemotherapy-induced nausea and vomiting in children with gastrointestinal cancer. The study recommends the integration of peppermint inhalation and slow-stroke back massage as standard interventions for managing chemotherapy-induced nausea and vomiting in pediatric patients with gastrointestinal cancer.

Key words: Peppermint, Slow-stroke back massage, Nausea, Vomiting, Children, Chemotherapy

1. Introduction:

Epidemiological evidence suggests a notable rise in the occurrence of colorectal cancer among younger pediatric populations over the last thirty years. Furthermore, recent research indicates a parallel upward trajectory in the incidence of gastric, pancreatic, and biliary tract malignancies. Anticipated projections suggest that around 13.7 million children globally are expected to experience cancer from 2020 to 2050. Among these individuals, approximately 6.1 million may go undiagnosed, and 11.1 million could pass away, with 84% of these fatalities happening in lower-middle-income nations like Egypt. The majority of these early-onset instances are sporadic in nature and do not exhibit a hereditary or familial predisposition, suggesting a potential significant involvement of behavioral, lifestyle, nutritional, microbial, and environmental factors (**Ben-Aharon et al., 2023**).

The management of gastrointestinal cancer entails the utilization of various treatment modalities such as chemotherapy, radiotherapy, immunotherapy, and surgical interventions. Chemotherapy plays a pivotal

role in the treatment of pediatric gastrointestinal cancer by halting the proliferation of cancerous cells through either cell death or cell division inhibition, albeit often accompanied by adverse effects (**Yuliar et al., 2019**).

Chemotherapy-Induced Nausea and Vomiting (CINV) represent prevalent and debilitating adverse events associated with chemotherapy, significantly impacting the well-being of pediatric patients and potentially prompting treatment non-adherence, with grave consequences including mortality (**Badarudin et al., 2022**). Manifesting shortly following chemotherapy administration, CINV affects a substantial proportion of children, with reported incidence rates ranging from 54% to 96%. The pathophysiology of CINV involves the activation of various mechanisms such as the chemo-receptor trigger zone, autonomic nervous system, peripheral and central pathways, and psychosocial elements (**Ay et al., 2023**).

The precise extent of emesis management efficacy in routine care settings remains uncertain in the context of pediatric patients with gastrointestinal cancer. Despite

advancements in anti-emetic pharmacotherapy, CINV persist as prevalent concerns in clinical practice, with nearly half of cancer pediatric cases enduring these symptoms during treatment, instilling apprehension. Uncontrolled CINV can prompt dosage reductions, treatment non-compliance, or discontinuation, ultimately compromising patients' prospects for extended survival or recovery (Ay et al., 2023). Therefore, a comprehensive strategy integrating non-pharmacological interventions with pharmacological treatments is imperative for managing CINV in pediatric oncology from treatment commencement. Peppermint inhalation and slow-stroke back massage represent non-traditional methodologies displaying potential in mitigating nausea and vomiting across diverse clinical environments (Semerci et al., 2022).

The utilization of premium-grade natural essential oils, such as peppermint, through inhalation exhibits promise in the mitigation of CINV by influencing specific areas within the central nervous system, notably the amygdala and hippocampus. A conceivable mode of action of peppermint oil within the gastrointestinal system entails the suppression of muscular contractions

induced by serotonin and substance release. This treatment modality is safe, non-intrusive, and economically viable, involving the inhalation of essential oils derived from aromatic herbs (Vora et al., 2024). Many Preliminary studies (Badr et al., 2024; Kajencki et al., 2024; Masamitsu et al., 2023) have shown that peppermint inhalation therapy and slow-stroke back massage are one of the non-pharmacological methods with the highest level of evidence used to reduce the nausea and vomiting associated with chemotherapy in children

Peppermint inhalation therapy functions by activating olfactory receptor cells with the aromatic essence, transmitting signals to the limbic system, resulting in a positive impact (Farahani et al., 2019). Furthermore, slow-stroke back massage stands out as a commonly employed non-pharmacological nursing intervention, recognized for its simplicity, non-invasiveness, and cost-effectiveness in reducing CINV levels and averting potential complications (Ho et al., 2023).

A pediatric oncology nurse plays a pivotal role within the healthcare system by dedicating themselves to enhancing oncology practices to uphold service quality. They are instrumental in collaborating with

a multidisciplinary medical team and are considered clinical specialists in evidence-based nursing practices within their specialized field. The responsibilities of oncology nurses are progressive and current, aiming to sustain cancer patients' optimal health status. Therefore, pediatric oncology nurses are essential in managing CINV in children. They are actively involved in the ongoing assessment, monitoring, prevention, treatment, and evaluation of children's conditions related to CINV (Mora et al., 2023). Consequently, this study aims to contribute to the control of CINV, which correlates with enhanced compliance to chemotherapy regimens and reduced complications, ultimately improving the quality of life and health outcomes of pediatric patients.

Significance of the study

Chemotherapy-induced nausea and vomiting are prevalent adverse effects experienced by patient with cancer, particularly children undergoing treatment for gastrointestinal cancer around 13.7 million children globally are expected to experience cancer. It is considered one of the most distressing side effects of chemotherapy for many patients. Without

appropriate management, CINV can significantly impact a patient's quality of life, nutritional intake, treatment adherence, and overall well-being. (Badarudin et al., 2022). Therefore, finding effective and safe interventions to manage CINV is crucial to improve the well-being of pediatric cancer patients, by elucidating the potential benefits of peppermint inhalation and slow-stroke back massage, this study tries to contribute valuable insights to the field of pediatric oncology and enhancing the standard of care for children undergoing cancer treatment. The findings of this research will have the potential to inform evidence-based practices, improve symptom management protocols, and ultimately enhance the overall quality of life and treatment outcomes for pediatric patients battling gastrointestinal cancer.

Aim of the Study

This research sought to ascertain the effect of peppermint inhalation versus slow-stroke back massage on chemotherapy-induced nausea and vomiting among children with gastrointestinal cancer.

Operational definitions:

Peppermint Inhalation: It is administration of peppermint essential oil through inhalation involves the controlled exposure

of patients to the aromatic essence of peppermint oil. This intervention aims to deliver the therapeutic properties of peppermint to the patient's olfactory system.

Slow-Stroke Back Massage: It entails the application of gentle, rhythmic strokes to the patient's back region using a predetermined technique. This massage technique is characterized by slow and deliberate movements aimed at promoting CINV among children with gastrointestinal cancer.

.Chemotherapy-Induced Nausea and Vomiting (CINV): It refer to the adverse gastrointestinal symptoms experienced by pediatric patients undergoing chemotherapy treatment for gastrointestinal cancer. These symptoms include feelings of nausea, the urge to vomit, and actual vomiting episodes triggered by chemotherapy drugs.

Research Hypotheses:

H1: Children with gastrointestinal cancer who received peppermint inhalation exhibited less CINV than the control group.

H2: Children with gastrointestinal cancer who received slow-stroke back massage exhibited less CINV than the control group.

2. Materials and Methods

Study Design

A randomized controlled trial design was used in this study (true experimental design).

Study Setting

The study was conducted at the Pediatric Oncology Department at South Egypt Cancer Institute - Assiut University. It is located on the third floor. A pediatric oncology department unit contains 4 rooms; each room contains 8 beds. Patient examination room, a room for a nurse supervisor, room for resident doctor. The care for patient is introduced by 18 nurses.

Study Subjects

The study subjects were consisted of simple random sample of 90 children according to G Power Software with total children 130 child aged from 6-18 years with gastrointestinal cancer undergoing chemotherapy. The study subjects were divided equally into three groups: Study group I included children who assigned to use the peppermint inhalation intervention, study group II included children who were used the slow-stroke back massage, and a control group included children who received hospital routine care as antiemetic drug. The assignment was done by researcher based on a random selection process where, the first child assigned to

the peppermint inhalation group, the second child to the slow-stroke back massage group, the third child to the control group, and so on. Each child was included randomly in the study groups according to the following inclusion criteria: They underwent their initial chemotherapy session, were aged between 6 and 18 years, were free from chronic or acute respiratory diseases, exhibited no known nausea or vomiting in their medical history due to factors other than chemotherapy, and had intact skin in the massage area.

Sample size calculation

G Power Software version 3.1.9.7 was utilized to determine the necessary sample size for the study following the completion of the pilot study. A one-way ANOVA with fixed effects was performed, with an effect size (f) of 0.55, a significance level (α) of 0.05, and an actual power ($1 - \beta$) of 0.95. The results suggested that a minimum of 90 children were necessary to guarantee sufficient statistical power.

Tools of Data Collection

For the current study, data was gathered using two tools

Tool (1): Structure Questionnaire Sheet: It was developed by the researchers and it included two parts:-

Part I: Personal data of children such as

(age, gender, residence, level of education, and family history of oncological diseases).

Part II: Medical data such as (diagnosis, duration of cancer, stage of cancer, side effects of chemotherapy and type of chemotherapy drug).

Tool 1: Reliability and validity, with a total Cronbach's α coefficient was $r=0.87$, 98%.

Tool (2): Rhodes Index of Nausea and Vomiting Likert Scale:

It was initially developed by **Rhodes & McDaniel (1999)** to assess symptoms associated with nausea and vomiting. It was translated into Arabic and adjusted by **Hassan et al. (2011)** to evaluate Egyptian youngsters. The assessment comprises six questions utilizing a five-point Likert scale to evaluate the frequency of vomiting episodes per day, the quality and quantity of vomiting, the intensity and duration of nausea, and the distress associated with nausea and vomiting during chemotherapy induction. Scoring system: 0 = none; 1 = mild; 2 = moderate; 3 = severe; 4 = very severe. Demonstrating strong reliability and validity, with a total Cronbach's α coefficient of $r = 0.93$, 97%. The total score interpreted as the following 0=non; 1<6 mild; 6<12 moderate; 12<18 sever; 18 to 24 very sever. g

Procedure

- The researcher obtained permission from the

Ethical Committee of the Faculty of Nursing, South Valley University

- **Official approval** was obtained from the head of the Pediatric Oncology Department at the South Egypt Cancer Institute, Assiut University, to gather the necessary data for the study after a thorough explanation of the study's aims and the nature of the study.
- **A pilot study** involving 10% (9) of children with gastrointestinal cancer receiving chemotherapy was performed to evaluate the clarity and feasibility of the assessment tools, as well as to ascertain the time needed to complete each questionnaire. These children were included in the entire study cohort.
- Prior to the involvement of their children in the study, **written consent** was obtained from parents subsequent to a detailed explanation of the study's aim and nature.
- **Work field:** Researchers convened with children and their parents in the Pediatric Oncology Department of the South Egypt Cancer Institute, Assiut University. The researchers presented themselves to the parents of the children and elucidated the aim and extent of the research during the meeting. The researcher assessed the children's condition using Tools I and II for both the control and study groups. Ultimately, following the administration of

peppermint inhalation to group one and slow-stroke back massage to group two, while the control group got standard medical care, the indices of nausea and vomiting were recorded in both the study and control groups during and after receiving chemotherapy every 12 hours for two days.

- **Intervention:** Anticipatory nausea and vomiting were evaluated every 12-hour intervals during and after the administration of chemotherapy over a 48-hour period across all study groups by the researcher.

In the peppermint inhalation group, children were instructed to inhale 0.2 ml of 2% peppermint essential oil (**Arafa Badr et al., 2024**), in addition to receiving routine hospital care. The essential oil was absorbed onto a piece of cotton, and children were directed to inhale the aroma immediately before each chemotherapy session for three minutes. The cotton containing the peppermint essence was placed within reach of the child for use throughout the session as needed. This inhalation therapy was continued for four successive chemotherapy sessions.

For the slow-stroke back massage group, Children received a slow-stroke back

massage with standard medical care. Each child received a twenty-minute session of slow-stroke back massage immediately before chemotherapy, performed in a secluded and serene room furnished with a comfortable bed to guarantee the child's privacy and comfort. The child was placed in a prone posture with his clothing removed to the waist. The researcher employed unscented olive oil, pre-warmed in both palms before commencing the massage. The slow-stroke back massage comprised five separate techniques: **effleurage** (involves long, smooth, and gliding strokes typically performed with the palms of the hands. It is often used at the beginning and end of a massage session to help warm up the muscles), **petrissage** (involves kneading, squeezing, or rolling the muscles and tissues between the fingers and palms of the hands. This technique helps to release tension, improve circulation, and promote relaxation in the muscles.), **friction** (involves applying pressure with the fingertips or palms in a circular or back-and-forth motion), **tapotement** (involves rhythmic tapping, pounding, or percussion movements using the fingertips, palms, or sides of the hands.), and **vibration**, each applied for four minutes during four consecutive chemotherapy sessions. The researcher administered the

massage with soft to moderate pressure, modifying it according to the child's comfort level as indicated through feedback. Communication between the researcher and the children was sustained during the massage, and following the procedure, assistance was provided for the child to dress.

Chemotherapy-induced nausea and vomiting were monitored and recorded daily for two consecutive (two session/day) days after each chemotherapy session for all children. The data were gathered during a three-month period, from July 1, 2024, to September 30, 2024.

In the Control Group, children were provided with standard hospital care and nursing interventions for the management of CINV, which included the administration of antiemetic medications.

Ethical considerations: A research proposal was approved by the Ethical Committee of the Faculty of Nursing at South Valley University under the reference code (SVU-NUR-PED-15-8-5-2024). Following this approval, both oral assent from the children and written consent from their parents were obtained from those voluntary willing to partake in the study, with a clear explanation provided regarding the study's aim and nature. The researcher

had a 5-day training in slow-stroke back massage conducted by a physical therapist at Assiut University Hospital. The application of the research posed no risks to the study participants. Measures were taken to ensure privacy during data collection, while maintaining confidentiality and anonymity. The researchers affirmed adherence to established ethical principles in clinical research throughout the study.

Statistical analysis

The data analysis was conducted using the SPSS version 22 software package with a predetermined significance level of $p \leq 0.05$. Descriptive statistics, such as number and percentage distributions, were employed to assess the characteristics of the data. The homogeneity of the variables was evaluated through chi-square analysis and Mann-Whitney test. Independent t-tests were utilized to compare the three groups, while the Kruskal-Wallis was employed to explore the relationship between variables. A comparative analysis of the incidence of CINV was performed among three study groups to assess the impact of peppermint inhalation versus slow-stroke back massage in children with gastrointestinal cancer.

3. Results:

Table 1 illustrates that there are notable similarities among children in the three groups with respect to their personal characteristics, and no statistically significant variances were detected regarding their age, gender, residential status, educational level, and family history of oncological diseases. This uniformity is crucial for reducing bias in the study. The majority of children in all groups fell within the 6 to <12 years, with percentages of the study 1, study 2 and control groups (63.3%, 70%, and 60%) respectively. Males were more prevalent in each group, comprising 56.7%, 50%, and 60% of the children and more than two thirds of studied children were living in rural areas (80%, 76.7%, and 83.3%) respectively. Additionally, around half of the children attended preparatory school, with percentages of 53.3%, 63.3%, and 50% in each group respectively. Lastly, approximately less than one-third of children in each group had a positive family history of oncological diseases (26.7 %, 20% and 30 %) respectively.

Table 2 indicates that children in the three groups were closely matched in terms of their clinical data, with no statistically

significant differences observed in their diagnosis, duration of cancer, cancer stage, type of chemotherapy, and chemotherapy side effects. In terms of the duration of cancer, approximately one third (36.7%) of children in the peppermint inhalation group had been diagnosed 2-3 years ago, while in the massage and control groups, the majority had been diagnosed 1-<2 years ago. The most prevalent diagnosis among children in all three groups was gastric cancer (50%, 53.3% and 43.3%) respectively. The majority of children in each group were in the remission stage of cancer (83.3%, 90% and 76.7%) respectively. Fatigue, changes in appetite, nausea, and vomiting were the primary side effects of chemotherapy experienced by all children, with the majority of them receiving 5-Fluorouracil (5-FU) as their chemotherapy agent.

Table 3 reveals a statistically significant difference between both groups concerning various parameters of the Rhodes index of vomiting scale, such as the frequency, distress, and severity of vomiting ($p = 0.001$). A significant majority of children in the peppermint inhalation group (80%) and massage group (70%) did not experience vomiting, in stark contrast to only 3.3% in the control group. Similar trends were

evident regarding both the distress and severity of vomiting, with none of the children in the peppermint inhalation group and massage group reporting significant vomiting distress or high vomiting severity, in comparison to 53.3% and 26.7%, respectively, in the control group.

Table 4 illustrates a statistically significant difference between both groups concerning various parameters of the Rhodes index of nausea scale encompassing the duration, severity, and frequency of nausea ($p = 0.005$). A notable majority of children in the peppermint inhalation group (86.6%) and massage group (76.7%) did not encounter nausea, contrasting starkly with only 3.3% in the control group. Similar trends were evident regarding both the severity and frequency of nausea, with none of the children in the peppermint inhalation group and massage group reporting great or severe nausea severity and frequency, in comparison to 36.7% and 30 %, respectively, in the control group.

Figure 1 presents that the peppermint inhalation group and the massage group consistently exhibit notably lower mean scores for nausea and vomiting compared to the control group at each time interval.

Figure 2 show that a high statistical significant difference between the peppermint inhalation group , the massage group and control group in relation to frequency, distress and severity of nausea and frequency, duration and severity of vomiting at $p= 0.000$.

Table 5 indicates that there were no statistically significant difference observed among age groups, gender, and distinct disease stages ($p = 0.565, 0.147, \text{ and } 0.511$, respectively) concerning the average scores related to nausea and vomiting. Conversely, a significant difference was identified in relation to the duration of cancer and means scores of nausea and vomiting ($p = 0.021$).

4. Discussion:

This study aimed to ascertain the effect of peppermint inhalation versus slow-stroke back massage on chemotherapy-induced nausea and vomiting among children with gastrointestinal cancer. This study identified no significant differences in demographic characteristics (age, gender, residence, etc.) or clinical data (diagnosis, duration of cancer, stage of cancer) between the three groups. No statistically

significant difference was observed in the incidence or frequency of nausea and vomiting among the three groups prior to the intervention. This indicated the resemblance between the study groups.

The results of the current study showed a significant difference in the frequency, distress, duration, and severity of nausea and vomiting among the study groups through 48 hours from the beginning of chemotherapy. Nevertheless, both the intervention groups were less nausea and vomiting than the control, even in the first 12 hours of the intervention. It can be explained by the researcher as the fact that when the patient inhaled peppermint oil it act on the brain's limbic system, which is involved in emotions and memory, to potentially reduce feelings of nausea. While slow-stroke back massage can stimulate the parasympathetic nervous system, which may help in reducing nausea and vomiting by calming the body's stress response.

Numerous research corroborate our findings that peppermint can mitigate the severity and frequency of nausea and vomiting (Zorba and Ozdemir, 2018 & Eghbali et al., 2018 & Kazemi et al., 2023). Ferrington et al. (2019) evaluated the effects of aromatherapy utilizing three distinct essential oils: peppermint, ginger, and a

mixture of both, on nausea and vomiting. They found that peppermint successfully decrease severity and frequency of nausea and vomiting. Fearringtons' findings indicate that the intensity of nausea can be alleviated through aromatherapy utilizing the three types of oils, whether used individually or in conjunction, with no significant distinction observed among the three inhaler types employed. In a study conducted by Şancı et al. (2023) found that using peppermint-lemon inhalation aromatherapy proved to be beneficial in alleviating symptoms of nausea and vomiting induced by chemotherapy and improving the quality of life when compared to both the placebo and control groups.

Shabbir et al. (2020) found that unpleasant nausea and vomiting diminished in the experimental groups utilizing peppermint oil, indicating that peppermint essential oil as an adjunct treatment may enhance patient outcomes by lessening the necessity for antiemetics and their potential adverse effects. our findings were corroborated by Badr et al. (2024), as found that swedish massage and peppermint inhalation therapies may possess substantial antiemetic properties in mitigating chemotherapy-induced nausea and vomiting in children with leukemia. Additionally, align with the findings of the

study conducted by Arafa et al. (2024), which revealed that children subjected to peppermint inhalation exhibited a markedly reduced mean total score of CINV across the three examined sessions in comparison to the control groups. Additional studies have examined the advantages of peppermint for the gastrointestinal tract. Notably, prior studies indicated that patient satisfaction with aromatherapy, namely peppermint, surpassed that of anti-emetics, with 65% of participants opting for aromatherapy only to manage nausea and vomiting rather than use an antiemetic. Consequently, the majority of patients were receptive to exploring the alternative treatment modality (Shabbir et al., 2020).

While some studies find that peppermint is not effective in decreasing the frequency and severity of nausea and vomiting (Okamoto et al., 2024) as he examined the effect of aromatherapy with peppermint essential oil on the gag reflex through a randomized study. In the same direction, an assessment study done by Ahn et al., (2024) concluded that patients do not experience a reduction in nausea and vomiting while using peppermint essential oil for aromatherapy.

Our study findings indicated that slow-stroke back massage significantly decreases the incidence, frequency, and severity of

CINV. Our findings align with the study conducted by Miladinia et al. (2015) and Kajencki et al., (2024) those demonstrated that slow-stroke back massage is an effective intervention for these children, in addition to standard cancer care. Our findings align with Badr et al. (2024), who determined that swedish massage possesses strong antiemetic effects in relieving CINV in children with leukemia.

Furthermore, our findings align with the study conducted by Di Mattei et al. (2024), which demonstrated that massage treatment is an effective non-pharmacological approach for managing symptoms, including nausea, in pediatric cancer patients. The relaxation response induced by massage likely directly affects nausea. Furthermore, alleviating pain through massage therapy may indirectly mitigate nausea and vomiting generated by chemotherapy (Mora, 2023). Research indicates that discomfort is a substantial factor that exacerbates CINV (Kajencki et al., 2024). In contrast to Afrasiabifar et al. (2023), who conducted a study comparing the effects of ice massage and C-bandage on acute and delayed nausea and vomiting induced by chemotherapy, it was concluded that neither ice massage nor C-bandage alleviated nausea and vomiting in chemotherapy patients. Notwithstanding

the benefits of this strategy, few studies have assessed the effects of massage therapy on CINV in pediatric patient with cancer. Furthermore, patients readily embrace massage therapy, which can cultivate beneficial interactions between children and the attentive personnel.

Our results support that the studied children characteristics such as age, gender, and stage of disease were not had effect on severity or frequency of nausea and vomiting. While, cancer duration statistically affected on nausea and vomiting as both nausea and vomiting inversely proportional to duration of cancer. That can be caused by the adaptation mechanism of human body.

Limitations of the study

The study's scope was constrained by a limited sample size, potentially restricting the applicability of the findings to broader populations. Additionally, data collection faced challenges due to the exclusion of numerous children (40 child) experiencing adverse reactions to chemotherapy.

Implications to practice

This study advocates for the integration of peppermint inhalation and slow-stroke back massage therapies alongside conventional antiemetic treatments within pediatric oncology unit protocols to manage CINV

effectively.

5. Conclusions

Both peppermint inhalation and slow-stroke back massage exhibit noteworthy antiemetic properties in mitigating CINV in pediatric patients with gastrointestinal cancer. Furthermore, peppermint inhalation demonstrated a marginally superior efficacy compared to slow-stroke back massage in diminishing the impact of CINV.

6. Recommendations

Nurse in pediatric oncology should consider integrating peppermint inhalation and slow-stroke back massage into the supportive care strategies for children undergoing cancer treatment. These non-pharmacological interventions have shown potential in managing CINV and could complement conventional treatment approaches.

Future studies should explore the long-term effects and optimal dosing regimens of peppermint inhalation and slow-stroke back massage in pediatric patients with

gastrointestinal cancer. Additionally, investigating the comparative effectiveness of these interventions in larger cohorts may provide more robust evidence for their clinical utility.

It is recommended to educate pediatric cancer patients, their families, and nurse about the benefits of peppermint inhalation and slow-stroke back massage in managing CINV.

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RESULTS

Table (1): Personal data of studied children (N=90).

Personal data	Peppermint Inhalation Group (n= 30)		Massage Group (n= 30)		Control Group (n= 30)		X ²	p- value
	No	%	No	%	No	%		
Age (years)								
6:< 12	19	63.3	21	70	18	60	1.002	0.858
12: ≤ 18	11	36.7	9	30	12	40		
Mean± SD	12.24 ± 6.02		12.03 ± 6.07		12.07 ± 6.01			
Gender								
Male	17	56.7	15	50	18	60	0.710	0.453
Female	13	43.3	15	50	12	40		
Residence								
Rural	24	80	23	76.7	25	83.3	0.712	0.470
Urban	6	20	7	23.3	5	16.7		
Level of education								
Don't read and write	5	16.7	4	13.3	5	16.7	0.714	0.497
Preparatory school	16	53.3	19	63.3	15	50		
Secondary school	9	30	7	23.4	10	33.3		
Family history of oncological diseases								
Positive	8	26.7	6	20	9	30	0.306	0.763
Negative	22	73.3	24	80	21	70		

X² = Chi-square test

Table (2): Clinical data of studied children (N=90).

Clinical data	Peppermint Inhalation Group (n= 30)		Massage Group (n= 30)		Control Group (n= 30)		X ²	p- value
	No	%	No	%	No	%		
Diagnosis								
Hepatoblastoma	3	10	4	13.3	5	16.7	0.434	0.543
Gastric cancer	15	50	16	53.3	13	43.3		
Colorectal cancer	8	26.7	6	20	6	20		
Pancreatic cancer	1	3.3	2	6.7	1	3.3		
Small intestine cancer	3	10	2	6.7	5	16.7		
Duration of cancer								
<1 years	6	20	8	26.7	9	30	0.161	0.647
1-<2years	9	30	11	36.7	10	33.3		
2-3 years	11	36.7	9	30	7	23.4		
>3 years	4	13.3	2	6.6	4	13.3		
Stage of cancer								
Induction	3	10	2	6.7	5	16.7	0.611	0.331
Remission	25	83.3	27	90	23	76.7		
Relapse	2	6.7	1	3.3	2	6.6		
**Side effects of chemotherapy before the intervention								
Constipation or diarrhea	21	70	25	83.3	23	76.7	1.001	0.857
Nausea and vomiting	24	80	26	86.7	28	93.3		
Alopecia	19	63.3	20	66.7	18	60		
Changes in appetite	28	93.3	29	96.7	28	93.3		
Mouth sores	15	50	10	33.3	11	36.7		
Anemia	6	20	8	26.7	6	20		
Infection	9	30	7	23.4	6	20		
Fatigue	30	100	30	100	29	96.7		
**Type of chemotherapy agent								
5-Fluorouracil (5-FU)	29	96.7	30	100	27	90	0.624	0.377
Oxaliplatin	27	90	25	83.3	26	86.7		
Capecitabine (Xeloda)	24	80	26	86.7	27	90		
Irinotecan	19	63.3	15	50	14	46.7		
Cisplatin	20	66.7	17	56.7	22	73.3		
Docetaxel	11	36.7	14	46.7	10	33.3		
Gemcitabine	15	50	11	36.7	9	30.6		
Paclitaxel	16	53.3	7	23.4	9	30.6		

Table (3): Distribution of studied children according to items of Rhodes index of vomiting scale during 48 hours from beginning of chemotherapy administration (N=90).

Items	Peppermint Inhalation Group (n= 30)		Massage Group (n= 30)		Control Group (n= 30)		P1	P2	P3
	No	%	No	%	No	%			
Vomiting frequency per day:									
Non	24	80	21	70	1	3.3	0.524	0.001**	0.001**
Mild (1- 2)	4	13.4	6	20	1	3.3			
Moderate (3- 4)	1	3.3	2	6.7	12	40			
Great (5- 6)	1	3.3	1	3.3	13	43.4			
Sever (7 or more)	0	0.0	0	0.0	3	10			
Vomiting distress									
Non	26	86.7	24	80	1	3.3	0.292	0.001**	0.001**
Mild	3	10	2	6.7	1	3.3			
Moderate	1	3.3	4	13.3	17	56.6			
Great	0	0.0	0	0.0	16	53.3			
Sever	0	0.0	0	0.0	5	16.5			
Vomiting severity									
Non	25	83.3	22	73.3	0	0.0	0.322	0.001**	0.001**
Small (up to 1/2 cup)	4	13.4	6	20	1	3.3			
Moderate (1/2- 2 cups)	1	3.3	2	6.7	18	60			
Large (2-3 cups)	0	0.0	0	0.0	8	26.7			
Very large (3 cups and more)	0	0.0	0	0.0	3	10			

X² = Chi-square test.

****Highly statistical significant difference at p <0.001**

Table (4): Distribution of studied children according to items of Rhodes index of nausea scale during 48 hours from beginning of chemotherapy administration (N=90).

Items	Peppermint Inhalation Group (n= 30)		Massage Group (n= 30)		Control Group (n= 30)		P1	P2	P3
	No	%	No	%	No	%			
Nausea duration									
Non	26	86.6	23	76.7	1	3.3	0.969	0.005**	0.005**
Mild (1 hour or less)	2	6.7	4	13.3	1	3.3			
Moderate (2- 3 hours)	2	6.7	2	6.7	14	46.7			
Great (4- 5 hours)	0	0.0	1	3.3	10	33.3			
Sever (more than 6 hours)	0	0.0	0	0.0	4	13.4			
Nausea severity									
Non	27	90	25	83.3	0	0.0	0.662	0.005**	0.005**
Mild	2	6.7	2	6.7	1	3.3			
Moderate	1	3.3	3	10	16	53.3			
Great	0	0.0	0	0.0	11	36.7			
Sever	0	0.0	0	0.0	2	6.7			
Nausea frequency									
Non	24	80	23	76.6	0	0.0	0.463	0.005**	0.005**
Mild (1- 2)	5	16.7	5	16.7	1	3.3			
Moderate (3- 4)	1	3.3	2	6.7	17	56.7			
Great (5- 6)	0	0.0	0	0.0	9	30			
Sever (7 or more)	0	0.0	0	0.0	3	10			

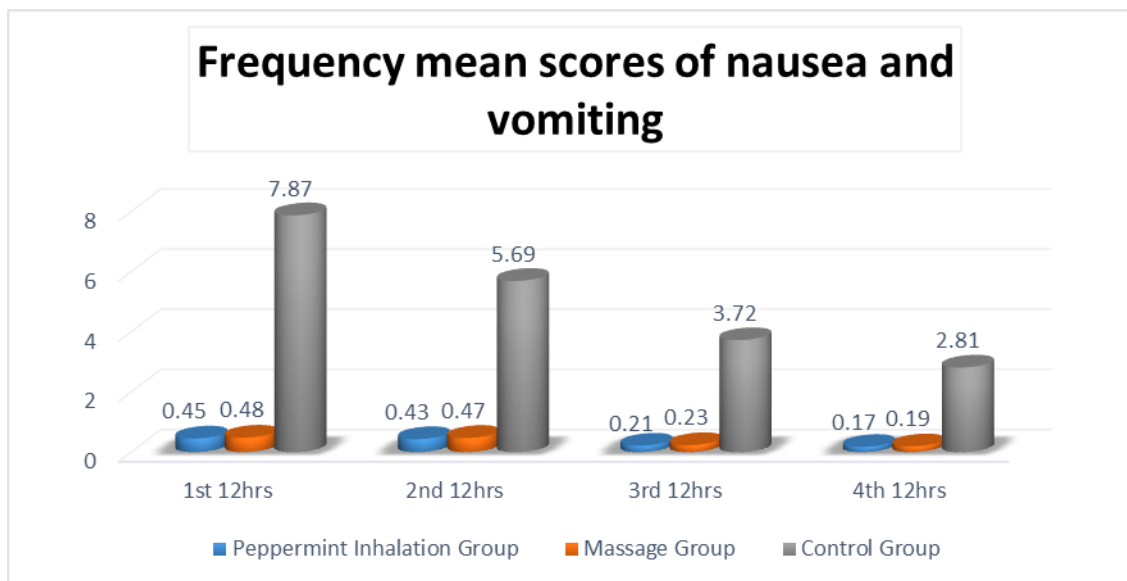
Chi-square test. **Highly statistical significant difference at p <0.001

P1 between peppermint inhalation group and massage group

P2 between peppermint inhalation group and control group

P3 between massage group and control group
Figure (1): Distribution of the studied adolescents according to sites for using electronic media.

Figure (1): Comparison between frequency mean score of studied children nausea and vomiting during 48 hours from beginning of chemotherapy administration (N=90).



Figure(2): Comparison between mean score of four measurements of Rhodes index of nausea and vomiting scale in studied children during 48 hours from beginning of chemotherapy administration (N=90).

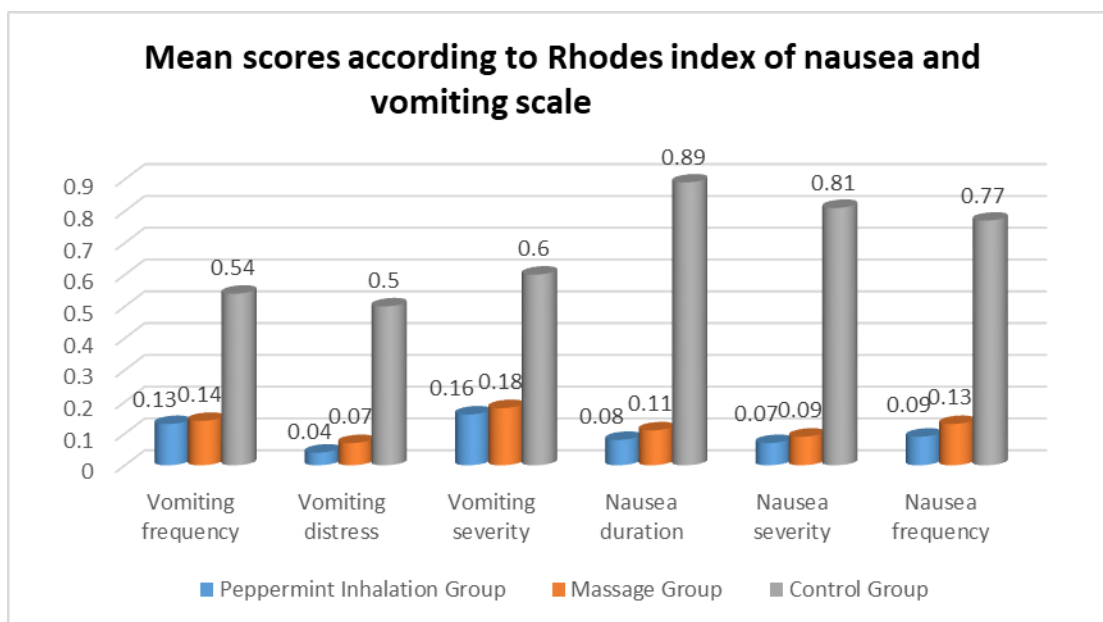


Table (5): Relation between studied children groups data and mean scores of nausea and vomiting during 48 hours from the beginning of chemotherapy administration (N=90).

Children data	Nausea and vomiting	T.test	P- value
	Mean ± SD		
Age		9.8	0.565
6:< 12years	0.41 ± 0.77		
12: ≤ 18 years	0.25 ± 0.32		
Gender		1.96	0.147
Male	0.61 ± 1.15		
Female	0.47 ± 0.81		
Stage of disease		9.6	0.511
Induction	0.14 ± 0.24		
Remission	0.76± 1.20		
Relapse	0.25± 0.50		
Duration of cancer		1.01	0.021*
<1 years	0.95± 0.50		
1-<2years	0.81± 0.50		
2-3 years	0.56± 0.50		
>3 years	0.33± 0.50		

Kruskal-Wallis and Mann-Whitney tests * Statistical significant difference at P < 0.05.

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