Original Article

The effect of massage therapy on chemotherapy-induced nausea and vomiting in pediatric cancer

Seyedreza Mazlum, Narges Toghian Chaharsoughi[1], Abdolah Banihashem[2], Hamidreza Behnam Vashani[3]

Abstract

Background: Nausea and vomiting are the most common and unpleasant side effects of chemotherapy, and they may prevent successful treatment completion. Antiemetics not only cannot control nausea and vomiting completely but also have numerous side effects. So it is necessary to find other methods for a better control. This study aimed to assess the effect of massage therapy on chemotherapy-induced nausea and vomiting in pediatric cancer.

Materials and Methods: In this randomized controlled clinical trial study, 70 patients (4-18 years of age) under chemotherapy were divided into two (massage therapy and control) groups randomly. In the massage group at 0.5 h and 24 h before and 24 h after chemotherapy, the patients were massaged (Swedish massage) for 20 min, respectively. All indices of nausea and vomiting (incidence, severity, time, and length) were assessed by Visual Analogue Scale (VAS) and BARF scales and other questionnaires and documented.

Results: The results of Mann–Whitney and chi-squire tests indicated that in the massage group, the incidence of nausea was 25.7%, the severity, length, and times of nausea were 20%, 54 min, and 0.35 times, respectively, and the severity and times of vomiting were 0.24 scores and 0.31 times lower than those of the control group ($P < 0.05$), respectively. But vomiting incidence in the two groups showed no significant difference ($P = 0.192$).

Conclusions: Massage therapy reduced chemotherapy-induced nausea and vomiting. So, nurses can use it and educate it to the patients' families. Nurses, besides using it clinically, can provide instructions to families for involving them in the treatment process and they feel they are more efficate in care of their suffering children.

Key words: Cancer, chemotherapy, massage, nausea, vomiting, paediatrics, Iran

Introduction

Despite its many advantages reported over two decades ago, chemotherapy-induced nausea and vomiting (CINV) are the most undesirable and common side effects of chemotherapy among patients undergoing cancer treatment.[1-6] The incidence of nausea and vomiting, the most common side effects, is 70-80%. They are not only improper and undesirable, but also cause pulmonary and metabolic effects, nutritional deficit,[7,5] dehydration, acute renal failure, esophageal injuries, electrolyte imbalance,[1] weakness, and also increase infection sensitivity and stop children's normal activity.[8]

PhD of Medical-Surgical Nursing and member of faculty in Nursing and Midwifery School ,[3]MS of Paediatric Nursing and Member of Faculty in Nursing and Midwifery School Nursing, [2]Haematologist and Member of Faculty of Medicine School, [1]Paediatric Nursing, Nursing and Midwifery School, Mashhad University of Medical Sciences, Mashhad, Iran

Address for correspondence:
Mrs. Narges Toghian Chaharsoughi, Number 19, Kalantar Alley, Nazar Gharbi Street, Isfahan, Iran.
E-mail: toghiann@gmail.com

CINV is an important cause of disturbing the normal pattern of cancer treatment and can influence children's willingness to continue scheduled chemotherapy.[1,2,5] It compromises patient survival and control of cancer.[5] It increases the worries and stress in the child and family.[9] These continuing challenges lead to remarkable progress in children's cancer treatment and CINV.[10] Antiemetics administration is essential and considered the proper method to reduce nausea and vomiting, but they are not useful for all patients and often cause undesirable side effects[11] including agitation, dizziness, anorexia, hypotension, arrhythmia, and rash,[5,12] which can increase the problems in the patients.[12] In recent years, complementary therapies are increasingly integrated into cancer programs and the numbers of people that use complementary and alternative medicine have increased.[13-15]

Massage therapy is one type of complementary/alternative medicine.[10,16] Different studies have shown that massage reduces anxiety, depression, eating disorders, stress, and asthma in children.[10,17-22] Most studies show that the relaxation response caused by massage is effective on nausea.[22] Wolf *et al.* found massage and acupuncture

significantly decreased postoperative pain in patients with cancer. It also reduced nausea and vomiting, but was not statistically significant.[23] Another study showed that 5-min foot massage is effective in reducing the severity of nausea.[12] Purposeful 5-min foot massage in emergency ward reduced patients' nausea.[24]

It was shown that two-session foot massages reduced nausea and heart rate and improved objective pain experiences in each session. Although massage is used for children with cancer, few studies have assessed its effectiveness on CINV in children.[25] Learning pediatric massage is technically very easy and requires cheap and little equipment. It only needs time.[26-28] By considering the fact that pediatric nurses are important members of medical — health groups and have essential role in pediatric cancer care, their skills and performances could improve the quality of the care. Therefore, this study was conducted to find the effect of massage therapy on CINV in pediatric cancer.

Materials and Methods

This study is a randomized controlled trial in which the effects of massage therapy on nausea and vomiting indices within and during 48 h after chemotherapy were assessed. This is a two-group randomized controlled trial in which randomization was done by randomized number table. The sample size, based on a pilot study, was 70 (35 each in control and intervention groups). The inclusion criteria included: diagnosed cancer by an oncologist, at least 3 days hospitalization for chemotherapy protocol, being 4-18 years old, and no history of any other health history issues or any disease other than cancer. Exclusion criteria included: diagnosed psychosomatic disorders, loss of consciousness, gastrointestinal and nervous system cancer, Wilm's tumor and any other mass or surgery in the abdominal area, patients using sedatives or opium drugs, having sore and injury in the massage area, metastasis, participants under radiation, children with port-A catheter, and having single parent. We used Swedish massage with effleurage, petrissage, friction, and tapping movements with mild to moderate pressure. In three sessions, children were massaged for 20 min, 24 and 0.5 h before chemotherapy and 24 h after chemotherapy by the therapist, who was skilled in massage therapy. The massage was provided in a private room at the Hematology/Oncology ward and blankets were available. Parents remained in the room during the child's massage, during chemotherapy, and in the ward. Based on child's preference, the therapist used unscented olive oil. No music was played during the massage. In the control group, the participants continued with the therapy they had been using when they joined the study and parents remained behind the child in the ward and during the chemotherapy program. Therapist stayed with the children in the control group 24 and 0.5 h before chemotherapy and 24 h after chemotherapy to eliminate emotional effect. We used several forms for collecting data. Barf (Baxter Animated Rating Face) scale was used for 4-9-year-old children and Visual Analogue Scale (VAS) for 9-18-year-old children to assess nausea severity. VAS is a proved device that has efficiency and precision in the assessment of nausea intensity and used in different studies.[10,29] The VAS device was easily used and understood by the patients.[29] But VAS is not good for children under 9 years of age.[30] Then we decided to use the Barf scale for 4-9-year-old children. Barf is a self-report pictorial animated rating face scale used for measuring nausea in children under 9 years of age. It has six faces depicting the levels of nausea and has good reliability ($r = 0.819$).[30,31] In our study also, it showed good reliability ($r = 0.852$). A four-item rating scale was used to assess vomiting severity. In this scale, severity of vomiting was numbered from 0 to 3 (0, no vomit no severity; 1, mild; 2, moderate; 3, severe) based on the vomiting episodes during the first 24 h and for the following 2 days after chemotherapy. The greater number showed severe vomiting. Nausea and vomiting indices were documented by a research assistant during chemotherapy and by parents after chemotherapy for 48 h. Data were analyzed by SPSS version 11.5.

Results

Seventy-four children entered in our study (massage = 37 and control = 37), but the analyses were done on 70 children because of four eliminations from the study (two in the control group due to patients not filling the forms completely and two in the massage group because of fever and neutropenia that cancelled their chemotherapy program).

Indices of nausea and vomiting

Kolmogorov — Smirnov test showed that the indices of nausea and vomiting were not normally distributed. Therefore, non-parametric statistical tests were used for the analysis. Mean age of the participants was 8.6 ± 3.3 years. Classification of age groups by Mann — Whitney (M-W) U-test was not significant. There were 60% ($n = 21$) boys in the intervention group and 51.4% ($n = 18$) in the control group. No significant differences were found between the intervention and control groups, with regard to sex on χ^2 statistical test. Acute lymphocytic leukemia was the most common type of cancer in each group (intervention = 71.4% and control = 71.4%), and chi-square Fisher's exact test showed no significant difference between the two

groups regarding the type of cancer. Chemotherapeutic agents in regard to their emetic potential are classified into three emetic risk groups: High, moderate, and low. Fisher's exact test showed no significant differences between the intervention and control groups regarding the chemotherapy emetic potential. Length, weight, economic status, location, and child birth showed no significant difference between the two groups.

χ^2 statistical test was used to analyze the incidence (yes or no) of nausea and vomiting. M-W U-test was used to analyze the frequency and severity of nausea and vomiting and also the duration of nausea. The findings showed no significant differences in the levels of nausea and vomiting during chemotherapy between the two groups. Incidence of nausea during 48 h post-chemotherapy and its overall incidence between the two groups showed significant statistical differences ($P = 0.027$). Incidence of vomiting showed no significant statistical differences in any of the above cases. Other findings such as frequency, duration, and the intensity of nausea, and the intensity and frequency of vomiting are summarized in Tables 1-3 separately.

Discussion

According to the findings of this study, nearly all indices of nausea and vomiting significantly decreased after chemotherapy by massage and showed it is as a useful method for control of CINV in children, besides the routine cancer treatment. But although massage decreased nausea and vomiting during chemotherapy, the decrease was not significant. Studies show that acute CINV occurs 1-2 h after chemotherapy by the first 24 h and delayed CINV occurs 24-72 h after chemotherapy.[6] In our study, during chemotherapy, patients had no nausea or vomiting, except those who had anticipatory type, because the effect of chemotherapeutic drugs did not start and the effect of massage was not significant during chemotherapy.

Table 1: Indices of nausea during and after chemotherapy

		Group		Results of mann — whitney
		Massage mean±SD	Control mean±SD	
During chemotherapy	Frequency (times)	0.06±0.24	0.14±0.4	*P*=0.235
	Duration (min)	0.10±0.6	0.5±1.9	*P*=0.223
	Severity (point)	4/6±18.9	10.4±27.2	*P*=0.241
Vomiting after chemotherapy	Frequency (times)	0.20±0.5	0.68±0.71	*P*=0.001
	Duration (min)	0.73±2.5	1.9±3.6	*P*=0.002
	Severity (point)	7.64±19.7	35.8±39.0	*P*=0.002
Total	Frequency (times)	0.15±0.4	0.4±0.6	*P*=0.014
	Duration (min)	0.46±1.6	1.4±2.9	*P*=0.002
	Severity (point)	8.3±26.8	28.3±40.7	*P*=0.011

Table 2: Severity of vomiting during and after chemotherapy

		Group		Results of mann — whitney
		Massage max. (>4), min. (0) mean±SD	Control max. (>4), min. (0) mean±SD	
Severity of vomiting	During chemotherapy	0.11±0.7	0.22±0.6	*P*=0.241
	After chemotherapy	0.10±0.4	0.34±0.6	*P*=0.005
	Total	0.18±0.7	0.45±0.8	*P*=0.014

Table 3: Frequency of vomiting during and after chemotherapy

		Group		Results of mann — whitney
		Massage mean±SD	Control mean±SD	
Vomiting grequency (times)	During chemotherapy	0.17±0.7	0.34±1.1	*P*=0.411
	After chemotherapy	0.22±1.0	0.60±1.2	*P*=0.013
	Total	0.20±0.88	0.51±1.0	*P*=0.014

The most important point of this study was assessing all the indices of nausea and vomiting, including intensity, frequency, and incidence of nausea and vomiting, and also nausea duration, while other studies such as that of Najafi *et al*. have only examined the nausea index and not the other indices of nausea and vomiting.[11] The results of Najafi *et al*., Dune *et al*., and Grealish *et al*. indicated a significant statistical relationship between the intensity of nausea and massage.[11,22,24] These investigations also showed that massage therapy is an effective method to reduce the CINV. But it is in contrast to the results of Wolf *et al*.[23] Billhult *et al*. also described that massage is useful for symptom management including nausea in children with cancer.[32] Wolf *et al*. found combined massage — acupressure to decrease the symptoms of children with cancer, such as nausea, but that was not significant.[33] It may be a result of the small sample size (massage = 16 and usual care = 7) in their study, and if the study had been done in a larger sample size, the effect of massage might have been significant. Since in our study massage therapy was performed in three sessions of 20 min each and two sessions of the massage were done before beginning the chemotherapy protocol, it shows the positive effect of this intervention on nausea and vomiting, and then confirms our findings. In addition, by the three-massage session, we were not only able to control acute nausea and vomiting, which starts 1-2 h after chemotherapy, but also delayed nausea and vomiting, which occurs 24-72 h after chemotherapy. Since good control of acute CINV can improve delayed and anticipatory CINV,[34] we conclude that good control of CINV in the beginning of the chemotherapy program leads to good control of CINV in the other treatment stages and improves the patient's well-being. Different studies have shown that stress and pain are two important factors that increase CINV and that massage causes relaxation, reduces stress and pain in patients, therefore massage therapy can also help to improve CINV by reducing stress and pain and enhancing psychological and physiological well-being. In addition, massage has a psychological impact on patients and the involvement of psychological phenomenon affects the limbic system, the center of people's feelings, which is connected to vomiting center by neurological fibers; so, it can be effective in improving nausea and vomiting by connecting massage signals to the limbic system and vomiting center. But additional researches need to examine the real mechanism of massage therapy on nausea and vomiting.

The results of the present study could be a guideline for nurses, which enable them to, relying on their competencies and knowledge, as well as communicating them to the parents, have a useful contribution in reducing the patients' sufferings. But as this investigation was performed in children as three sessions of 20 min each, and a child's cooperation and endurance is lower than adult's, it is suggested that further studies should examine the short-term effects of massage on nausea and vomiting indices.

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