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The clinical management of chemotherapy-induced nausea and vomiting with adjuvant progressive muscle relaxation training and imagery techniques in breast cancer patients

Key Messages

1. Progressive muscle relaxation training as adjuvant therapy can effectively decrease the duration and frequency of chemotherapy-related nausea and vomiting in cancer patients receiving moderately emetogenic chemotherapy and may decrease psychological distress during cancer therapy.
2. Use of metoclopramide (Maxolon) as an antiemetic treatment is not effective on its own in the majority of patients receiving moderately high emetogenic chemotherapy.
3. Non-pharmacological pre-treatment factors partly predict the development of post-chemotherapy nausea and vomiting and should be carefully assessed in patients before a decision is made on the type of antiemetic to be used.
4. The most common pre-treatment factors predicting development of nausea and vomiting include a history of labyrinthitis, susceptibility to motion sickness, and expectation of the development of nausea and vomiting.
5. A comprehensive pre-chemotherapy evaluation and use of relaxation techniques during chemotherapy should be part of the care plan for patients receiving chemotherapy in order to decrease side-effects and potentially improve quality of life.

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Introduction

Nausea and vomiting (NV) are common, distressing side-effects of anti-cancer therapy. They usually begin 1 to 2 hours after chemotherapy and can last 6 to 12 hours for several days. The related physical and psychosocial problems are numerous, including electrolyte imbalance, dehydration, nutritional deficiencies, increased susceptibility to infections, and decreased renal elimination of drugs.[1] Antiemetics are not effective for all patients and may have undesirable side-effects, ranging from dizziness, gastrointestinal symptoms, and drug hypersensitivity.[2] Non-pharmacological interventions have been advocated for relieving nausea and stress-related side-effects associated with chemotherapy since the late 1970s. Progressive muscle relaxation training (PMRT) has been the most effective intervention, reducing the distress of chemotherapy and preventing or considerably delaying the onset of conditioned responses.[3] In Hong Kong, PMRT has never been applied to cancer chemotherapy patients. For such patients, relaxation techniques may be used as a vehicle to develop an inner peace and stability. Relaxation enhances the control of negative emotions.

Aims and objectives

The aim of this study was to evaluate the effectiveness of PMRT for managing NV related to chemotherapy, and reducing anxiety and depression, and to identify pre-treatment non-pharmacological factors that contribute to the development of NV post-chemotherapy.

Materials and methods

This study was conducted from July 1998 to January 2000. A randomised controlled trial was designed to examine the effectiveness of PMRT in a group of breast cancer patients in Hong Kong. Data collected by means of interview and standardised questionnaires included: information derived using the Chinese version of the State-Trait Anxiety Inventory, Profile of Mood States, and the Morrow Assessment of Nausea and Emesis (MANE) scale as well as age, marital status, religion, and education. Information about prior surgery (mastectomy) or radiation therapy prior to chemotherapy, stage of the disease, and Karnofsky score was obtained from the medical records. Information was also collected on prior use of video and/or cassette players at home; use of PMRT in the past to cope with stressful life events; other practices used to control/decrease their NV (ie herbal teas); and use of metoclopramide (oral Maxolon) in the post-chemotherapy days. Participants' heart rates and blood pressure were measured 30 min before and after the PMRT to assess whether physiological arousal decreased in the experimental subjects (reflecting successful relaxation).

Questionnaires were completed before chemotherapy (baseline data), post-chemotherapy at day 7 and day 14. Nausea and vomiting were assessed daily for 7 days. In addition, the subjects in the experimental group were taught

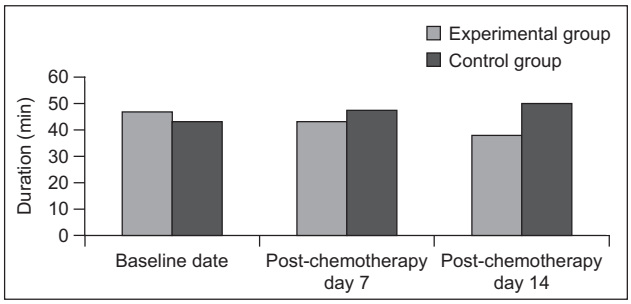

Fig 1. Duration of nausea in the experimental and control groups over time

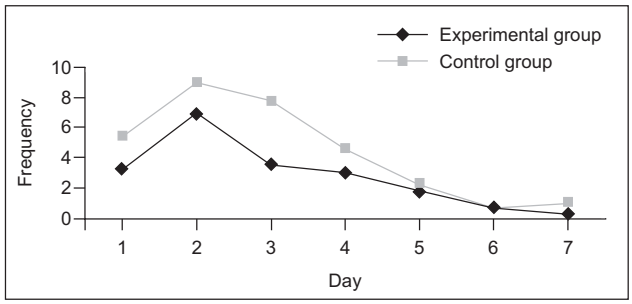

Fig 2. Frequency of nausea in the experimental and control groups over time

the PMRT technique individually and given a 30-minute video teaching programme to use at home. The control group received the standard antiemetic protocol 30 minutes before chemotherapy administration and was prescribed oral Maxolon 10 mg as necessary (PRN). Every afternoon, for the first 6 post-chemotherapy days, the control patients completed the MANE scale (self-report assessing frequency, intensity, and duration of NV). The experimental group received a PMRT session by the therapist 1 hour before chemotherapy administration (at hospital) and on each subsequent day for 5 days (at the patients' home) [six PMRT sessions in total]. Experimental group patients also received the standard intravenous antiemetic protocol 30 min before chemotherapy administration and were prescribed oral Maxolon 10 mg PRN. They also completed the same MANE scales at the same time as the control subjects.

Results

Socio-demographic characteristics

The sample consisted of 71 subjects (38 in the experimental group, 33 in the control group). Their mean age was 45.03 (standard deviation [SD], 6.73; range, 30-59) years. The mean age of the experimental subjects was 45.42 (SD, 6.22) years and 44.6 (SD, 7.34) years in the control subjects ($P>0.05$). Most were married (91.6%), reported no religious beliefs (56.3%), and did not complete secondary school (71.8%). All but three had a mastectomy prior to the chemotherapy and all but one received no radiation therapy. Most were at the second stage of the disease (77.5%) with 21.1% at the third stage, and one (1.4%) at the first stage of the malignancy. All subjects were fully mobile and independent in their daily activities, achieving a Karnofsky score of 100. Only four (5.6%) subjects had used PMRT prior to this project. A goodness-of-fit test between the socio-demographic/medical characteristics of the experimental and control subjects revealed no significant differences between the two groups in any of the characteristics examined ($P>0.05$).

Effects of progressive muscle relaxation training on nausea

The mean duration, frequency, and intensity of nausea between the two groups were analysed using R-ANOVA (Fig 1). There were significant between-subject differences in the two groups ($P<0.05$). The experimental group reported fewer episodes of nausea compared with the control group, especially in the first 4 days post-chemotherapy, a period in which the results were significant ($P<0.05$, Fig 2). There was no difference in the intensity of nausea between groups ($P>0.10$).

Effects of progressive muscle relaxation training on vomiting

The mean duration of vomiting in the experimental group was 8 minutes on the first day, decreasing steadily in subsequent days. There was no reported vomiting by day 7 post-chemotherapy. In the control group, vomiting was present for a mean of 40.3 minutes on the first day also decreased in subsequent days. There was no reported vomiting by day 7 post-chemotherapy. There were significant between-subject differences in the two groups ($P=0.016$, Fig 3). The experimental group reported fewer episodes of vomiting compared with the control group, especially in the first 4 days post-chemotherapy ($P<0.05$, Fig 4). There was no difference in the intensity of vomiting between groups ($P>0.10$).

Mood states and anxiety

There were no baseline differences in the overall mood disturbance levels between the two groups ($P>0.05$). The mood disturbance score decreased in the experimental group in the assessments at day 7 and day 14 post-chemotherapy, whereas it increased significantly in the control group ($P=0.05$, Fig 5). Tension, depression, anger, and fatigue were similar in the two groups over time. Confusion and anger-hostility decreased in the experimental group. There were no significant changes over time with respect to state anxiety between the two groups. When trait anxiety was used as a covariate in the analysis, it significantly affected the state anxiety results over time ($P<0.001$). The use of PRN Maxolon was similar in the two groups ($P>0.05$).

Acute nausea and vomiting

The multi-variance analysis suggested that NV when drinking coffee/tea, a later stage of the disease, and the presence (or a history) of labyrinthitis contributed to longer duration of acute nausea post-chemotherapy. The frequency of nausea was explained by the combined effects of a higher expectation of developing NV post-chemotherapy, a later stage of the disease, and younger age. Predictors for acute vomiting were eating fruit or drinking coffee/tea, not

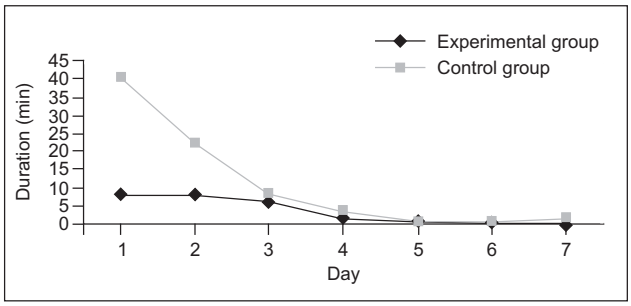

Fig 3. Duration of vomiting in the experimental and control groups over time

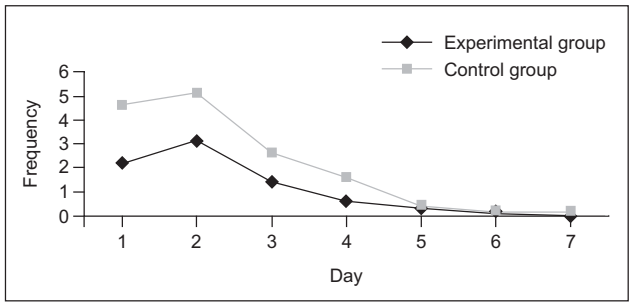

Fig 4. Frequency of vomiting in the experimental and control groups over time

experiencing NV when eating dairy products, NV during pregnancy, a later stage of the disease and younger age, a higher expectation of developing NV post-chemotherapy, and having higher levels of fatigue. The predictors of delayed nausea included higher depression scores and an expectation of developing NV post-chemotherapy, NV induced by coffee/tea, a history of labyrinthitis, and susceptibility to motion sickness (P=0.002).

Intensity of nausea and vomiting

The intensity of nausea was explained by the combined effects of higher state anxiety, fatigue and expectations of developing NV, a history of labyrinthitis, chronic alcohol use, susceptibility to motion sickness, and NV induced by eating certain vegetables (P<0.001). The intensity of vomiting was predicted by the combined effects of higher state anxiety, a higher expectation of developing NV, and NV induced by eating certain vegetables (P=0.002).

Discussion

The results of this study indicate that PMRT with guided imagery is superior to standard antiemetic treatment alone at reducing the frequency and duration of NV, the most distressing side-effects of cancer chemotherapy. In contrast to the control group, patients who received PMRT showed more stable levels of NV, suggesting patients receiving PMRT have better control of their NV. As the difference became smaller from the fourth day onwards, the data suggest that the effects of PMRT on NV were most pronounced in the initial stage of treatment when patients are most unfamiliar with the nature and side-effects of chemotherapy. This may be the time when patients are most in need of effective strategies to cope with distressing symptoms. The findings of the present study also confirmed previous studies showing that PMRT can be taught by oncology nurses, is easily learned, and can be applied by patients on their own.[3] The results provide further support for the use of PMRT with guided imagery as an effective adjunctive treatment for reducing the distressing side-effects of cancer chemotherapy. However, the results of the present study did not show a significant reduction in the intensity of NV after chemotherapy. This may be due to a floor effect reflecting a low level of intensity of NV in both groups.

The study also provided evidence that several factors

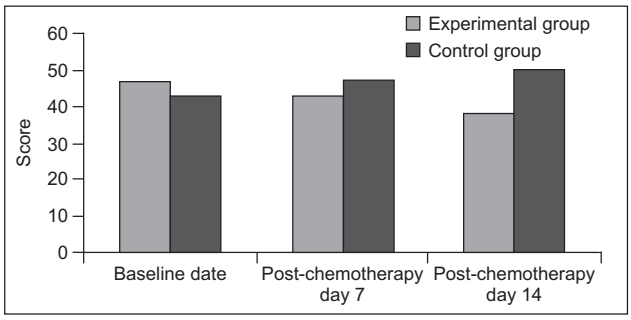

Fig 5. Overall mood disturbance

associated with a tendency to NV could be predictors of post-chemotherapy NV. The variables that emerged most frequently included a history of labyrinthitis (indicative of vestibular dysfunction), an expectation of developing NV post-chemotherapy administration, the stage of disease, and NV induced by drinking coffee/tea. Also, psychological variables (state anxiety, depression, and fatigue) and susceptibility to motion sickness were predictors of delayed NV whereas NV during past pregnancies and younger age were predictors of acute NV. A history of labyrinthitis was a prognostic factor mainly for nausea. Thus, in the induction of post-chemotherapy NV, non-pharmacological factors play role alongside the pharmacological properties of the chemotherapeutic agents. Furthermore, the frequency, duration, and intensity of NV, although sharing some common pre-treatment predictors, are largely explained by the combined effects of different variables. In terms of non-pharmacological factors, they may constitute different clinical phenomena.

Acknowledgements

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