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Effect of ginger tea on chemotherapy-induced nausea and vomiting among cancer patients in selected hospitals, Bhubaneswar, Odisha

Sasmita Das¹, Mary Preeti Banra², Neethu Maria Joseph^{*1}¹Department of Medical-Surgical Nursing, SUM Nursing College, "Siksha 'O' Anusandhan (Deemed to be University), Bhubaneswar, Odisha, India²Master of Science in Nursing (Medical-Surgical Nursing- Neuroscience Nursing), SUM Nursing College, Siksha 'O' Anusandhan (Deemed to be University), Bhubaneswar, Odisha, India

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ABSTRACT

A quasi-experimental research study (posttest only research design) was conducted to evaluate the effect of ginger tea on chemotherapy-induced nausea and vomiting among cancer patients in selected hospitals of Bhubaneswar and to find out the association of level of chemotherapy-induced nausea and vomiting with selected socio-demographic variables. For this study, a quantitative experimental approach and post-test only research design was adopted. 100 patients were selected by convenience sampling technique and categorized into experimental (n=50) and control group (n=50) for this study. Self-structured socio-demographic proforma and self-structured record analysis proforma was used to collect socio-demographic data and modified nausea and vomiting scale was used to measure the level of chemotherapy-induced nausea and vomiting among cancer patients. The data was analyzed by using SPSS version 20.0 (Statistical Package for the Social Science). The post-test level of chemotherapy-induced nausea and vomiting among experimental and control groups was compared by unpaired 't' test and the result showed ($p < 0.0001$) significant difference between both groups. The chi-square analysis shows a statistically significance association between chemotherapy-induced nausea and vomiting and the emetogenic potential of the drug in both groups and in control group age was also significance associated. The ANOVA test revealed the statistically significance of the posttest level of chemotherapy-induced nausea and vomiting within groups of the emetogenic potential of a drug. The present study concluded that the food component, like ginger tea, is an effective home remedy for the reduction of chemotherapy-induced nausea and vomiting among cancer patients.



*Corresponding Author

Name: Neethu Maria Joseph

Phone: 9958166931

Email: researchsub01@gmail.com

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INTRODUCTION

Cancer is caused by alteration of cell DNA, resulting mutation of genetic, cellular DNA and begins to abnormal cell growth (Hinkle and Cheever, 2010). Cancer is a disease of cells, characterized by alteration in normal mechanisms of cell growth and proliferation; it may be malignant or benign neoplasm (Suzanne and Bare, 2004). Now-a-days, cancer is one of the prominent reasons for mortality in economic established countries and the secondary main reason for mortality in the develop-

ing countries (Chintamani, 2011). The report of ICMR (Indian Council of Medical Research) 2016 estimated 7.36 lakh new cases of cancer found in 2016 and 17.3 new cases and approximately 8.8 lakh deaths due to cancer by 2020. Among females, breast cancer is topped in a list and among males mouth cancer (Dey, 2016). Cancers are treated with multiple approaches like surgical treatment, radiotherapy, chemotherapy, hormonal treatment or targeted therapies. Chemotherapy is considered as effective treatment and therapeutic option for certain cancers (Hinkle and Cheever, 2010). Nausea and vomiting remains as the most common adverse effect by chemotherapy inspite of the administration of antiemetic. Various alternative, adjuvant and complementary therapies are widely used to prevent the side effects of chemotherapy. Ginger supplements are effectively reducing the occurrence of chemotherapy-related nausea and vomiting by hindering 5-HT₃ receptors and scavenging of free-radical in the gut. (Li, 2018) found that side effect of chemotherapy like nausea and vomiting is a most frequent health issue with cancer patients receiving chemotherapy and several classes of drugs developed to treat this side effect in a large number of cancer patients. This side effect in cancer patients can adversely impact on their amount of dietary consumption and increase the consequences of malnutrition during chemotherapy (Carelle et al., 2002). The combination of antiemetic medicines has significantly reduced the incidence of vomiting, but nausea has been not successfully controlled. The nausea is affecting approximately 60% of patient. (Bloechl-Daum et al., 2006).

Herbal therapy is the most commonly used complementary treatment. Ginger is used as traditional medicine and cooking spices since many years in India. It contains four constituents: zingerone, shogaols, gingerols and volatile oil. Gingerol is mainly help in increasing the motility of the gastrointestinal tract and facilitate the movement of digested food contents and toxins through the gastrointestinal system and diminishing incidence of nausea and vomiting. Ginger also promotes salivation in the mouth and also the excretion of various gastric juices or enzymes, which helps in the neutralization of the gastric acids. The ginger ease functions of stomach muscles and sedate the tissues of the stomach and helps to decreases the excess activity of the stomach, resulting reduction of nausea and pain. It has analgesic, sedative, antipyretic and antibacterial properties (Moghaddasi and Kashani, 2012).

Objectives

1. To assess the level of chemotherapy-induced nausea and vomiting among cancer patients in control group and experimental group after giving intervention.
2. To compare the effect of ginger tea on the level of chemotherapy-induced nausea and vomiting among the experimental group and control group.
3. To find out the association of post test level of chemotherapy-induced nausea and vomiting with and within selected socio-demographic variables among the experimental and control group.

Review of literature

Literature related to chemotherapy-induced nausea and vomiting

Kottschade et al. (2016) analyzed previously reported studies to find out the incidence of emesis related to chemotherapeutic treatment and features of persistent effect and further use of NCCTG N08C3 with 413 patients who had received high emetogenic chemotherapy. They used 0-10 scale of Functional living index- emesis for assessment chemotherapy-induced nausea and vomiting and found that 35% had nausea greater than 2.5 scores, 19% had one episode emetic and 49% had got rescue medication. These findings reported that patients were more prone to develop acute and chronic chemotherapy-induced nausea and vomiting (Kottschade et al., 2016).

Fitzgerald and Murphy (2015) reviewed the articles on the effect of chemotherapy-induced nausea and vomiting on patients' quality of life (QoL) and synthesized & critiques evidence during 2014. They found that CINV is recognized in patients but still not managed properly and also found inconsistencies in management, which seriously affects cancer patients' QOL. The investigators recommended to more qualitative research on effects of CINV and non- pharmacological approaches for management (Fitzgerald and Murphy, 2015).

Literature related to the use of ginger

Zadeh and Kor (2014) investigated the physiological and pharmaceutical properties of ginger (*Zingiber officinale roscoe*) as an important medicinal plant. Ginger is traditionally used by Chinese and Indian medicine since 25 centuries. The researcher found fresh ginger contains 80.9% moisture, 2.3% protein, 0.9% fat, 1.2% minerals, 2.4% fiber and 12.3% carbohydrates. The ginger is increasing the muscular activity of gastrointestinal and stimulates

digestion, absorption, relieve constipation and flatulence. It also increases blood circulation throughout the body by a powerful stimulatory effect on the heart muscle and by diluting the blood. The aqueous extract of ginger stimulates the production of platelet thromboxane-B2 and prostaglandin-E2 (PGE2) (Fitzgerald and Murphy, 2015).

Mashhadi *et al.* (2013) conducted a study to investigate the antioxidative and anti-inflammatory effects of ginger in health and physical activity. Ginger (*Zingiber officinale* Rosc.) belongs to the family Zingiberaceae. The ginger contains a huge amount of phytochemicals, which helps in health promotion. The authors reviewed fifty-nine articles for study on the evidence of anticancer properties of ginger and found that its functional ingredient like gingerol, shagaol and paradols can prevent various cancers (Mashhadi *et al.*, 2013).

Literature related to the effect of ginger on chemotherapy-induced nausea and vomiting

Marx *et al.* (2017) conducted a double-blind, randomized, placebo-controlled trial to investigate the effect of standardized ginger extract on CIN- related quality of life of patients receiving moderately and highly emetogenic chemotherapeutic agents. They used Functional Living Index- Emesis (FLIE) questionnaire to measure the symptoms and found p value = 0.029 of CIN- related QoL, p value = 0.043 of chemotherapy-induced nausea vomiting related QoL, p value = 0.015 of global QoL and p -value = 0.006 of fatigue showed significantly better quality of life in interventional participants than placebo group during the first cycle of chemotherapy. During the third cycle of chemotherapy p , value = 0.040 of global QoL and p value = 0.013 of fatigue revealed improvement of QoL in a ginger group as compared to placebo. The result revealed adjuvant ginger supplement is effective in CIN- related quality of life and less in cancer-related fatigue and showed not significant changes in adverse effects as compared to placebo groups. (Marx *et al.*, 2017).

Seena (2016) conducted a quasi-experiment to investigate the effectiveness of ginger supplements on chemotherapy-induced nausea and vomiting in 40 cancer patients receiving cisplatin drugs in the chemotherapy unit. The convenient sampling technique was used for selection of subjects and semi-structured interview method and MAT (MASCC antiemetic tool- standardized tool) for data collection and found that mild 65%, moderate 35% nausea and vomiting in the experimental group and in control group moderate 35%, severe 65% of nausea and vomiting. The result revealed $t = 10.272$, 9.454, 14.139 respectively for 24 hours, day four,

and day tenth; $p < 0.001$ and suggested that ginger supplement was effective for occurrence and frequency of chemotherapy-induced nausea and vomiting (Seena, 2016).

MATERIALS AND METHODS

Design

A Quasi-experimental research design (post-test only research design) was used in this study to assess the effect of ginger tea on chemotherapy-induced nausea and vomiting among cancer patients receiving chemotherapy in the Oncology Department. The present study adopted the conceptual model based on the Health promotion model by Nora J Pender in 1982.

Sample

In this study, 100 samples were selected by convenience sampling technique who admitted in oncology ward and daycare center at IMS & SUM Hospital, Bhubaneswar, Odisha. An inclusion criterion includes clients who were willing to participate, age more than 19 years and who can read and write Odia and the English language. The participants were randomly assigned into two groups using the lottery method: 50 in the intervention group and 50 in the control group. The data collection was carried out for a period of five weeks. The study protocol was approved by the ethical committee of IMS & SUM Hospital, S'O'A University and Research Committee of SUM Nursing College, Bhubaneswar, Odisha. The informed consent was taken from all participants for the study.

Instruments

Data was collected by using self- structured socio-demographic proforma for demographic data, self-structured disease analysis proforma for disease background and modified nausea and vomiting scale for chemotherapy-induced nausea and vomiting.

Data collection

Data collection was done from 23rd January 2018 to 22nd June 2018 at the Oncology Department of IMS & SUM Hospital, Bhubaneswar, Odisha. The study was conducted with 100 samples that fulfill the inclusion criteria. The data for the study were collected from cancer patients who were receiving chemotherapy in the oncology ward and daycare centre to assess the post-test level of chemotherapy-induced nausea and vomiting after giving ginger tea intervention through modified nausea and vomiting scale.

Reliability and validity

In this study, reliability of the tool was evaluated with Cronbach's Alpha (an internal reliability coefficient) ($r=0.80$) after using a tool on 10 oncology patients and content validity was confirmed by 6 experts in the Nursing field (Medical-Surgical Nursing specialty) and Medical Oncologist.

Data analysis

Data were analyzed by descriptive and inferential statistics using SPSS version 22.0; the statistical significance level was considered 0.05. Frequency and percentage distribution of subjects according to a socio-demographic variable by self-structured interview proforma, disease background by self-structured record analysis proforma and post-test level of chemotherapy-induced nausea and vomiting by modified nausea and vomiting scale. The difference of post-test level of chemotherapy-induced nausea and vomiting between two groups were statistically evaluated with unpaired 't' test. Association of post-test levels of chemotherapy-induced nausea and vomiting with selected socio-demographic variables was found out through Chi-square. ANOVA test was used to explore the association of the post-test level of chemotherapy-induced nausea and vomiting within a selected socio-demographic variable.

RESULTS AND DISCUSSION

The finding of the present study showed that majority (65.2%) of participants in experimental group and (73.9%) control group were age group 26- 60 years, 'majorities (52.2%) of samples in the experiment group were female and majorities (65.2%) of samples in control group were male. The study revealed that the majority (60.9%) of participants had mild post-test levels of chemotherapy-induced nausea and vomiting in an experimental group.

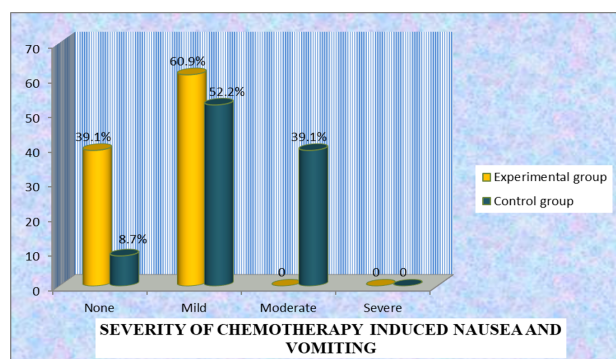


Figure 1: Cylindrical diagram showing the distribution of subjects according to a post-test level of severity of chemotherapy-induced nausea and vomiting

Distribution of study subjects according to the

severity of the post-test level of chemotherapy-induced nausea and vomiting by using frequency and percentage

The data in Figure 1 shows 8.7% had no symptoms, 52.2% had mild and 39.1% had moderate nausea and vomiting in the control group. 39.1% had no symptoms and 60.9% had mild nausea and vomiting in an experimental group.

Comparison of the effect of ginger tea on the level of chemotherapy-induced nausea and vomiting among experimental and control groups

The study shows that the difference between the post-test level of chemotherapy-induced nausea and vomiting among the two groups was statistically tested by using unpaired 't' test (unpaired 't' test value= 5.261, $p<0.0001$) that is statistically significant shown in Table 1. There was a significant difference between the effects of ginger tea on chemotherapy-induced nausea and vomiting among experimental and control groups. Therefore, the null hypothesis was rejected and the research hypothesis was accepted and inferred that regular intake of ginger tea during chemotherapy was reduced chemotherapy-induced nausea and vomiting and improve health status and treatment adherence of cancer patients.

Association of post-test levels of chemotherapy-induced nausea and vomiting with selected socio-demographic variables among the experimental group

The data in a Table 2 shows calculated chi-square (χ^2) value 7.842 ($p= 0.05$) was more than tabulated ' χ^2 ' at 0.05 significant level, which implies there was an association between post-test level of chemotherapy-induced nausea and vomiting with an emetogenic potential of chemotherapy drug. The findings inferred that high and moderate emetogenic potential drugs induced severe nausea and vomiting, low and minimal emetogenic potential drugs may or may not induce nausea and vomiting.

Association of post-test levels of chemotherapy-induced nausea and vomiting with selected socio-demographic variables among the control group

The data in Table 3 shows calculated chi-square (χ^2) values 9.752 ($p= 0.047$) and 15.014 ($p=0.005$) of age and emetogenic potential of drugs respectively were more than tabulated ' χ^2 ' at 0.05 significant level and which implies there were association between post-test level of chemotherapy-induced nausea and vomiting with age and emetogenic potential of drug. The above result inferred that age group 26- 60 years were mostly suffered

Table 1: Unpaired t-test analysis to compare the effect of ginger tea on levels of chemotherapy-induced nausea and vomiting among the experimental and control group.

Group	Mean± SD	Standard error	df	Unpaired t test	P value	Inference [N=100 (n ₁ +n ₂ =50+50)]
Experimental group	4.96±4.180	1.003	98	5.261	<0.0001**	Statistically significant
Control group	14.74±7.509	1.566				

**p<0.05 = Highly statistically significant

Table 2: Chi-square analysis of the post-test level of chemotherapy-induced nausea and vomiting with selected socio-demographic variables among the experimental group.

Demographic variables	Chi-square	df	p-value	Inference [n ₁ = 50]
Age	4.177	2	0.124	Not significant
Gender	0.354	1	0.552	Not significant
Educational status	1.833	3	0.608	Not significant
Types of diet	1.720	1	0.190	Not significant
Food preference	0.842	2	0.656	Not significant
Habits	5.596	3	0.133	Not significant
Stage of cancer	2.308	3	0.511	Not significant
The emetogenic potential of a chemotherapy drug	7.842	3	0.05*	Statistically significant
Sites of cancer	3.278	3	0.351	Not significant

*p≤0.05 = statistically significant

Table 3: Chi-square analysis to find out the association between the post-test t level of chemotherapy-induced nausea and vomiting with selected socio-demographic variables among the control group

Demographic variables	Chi-square	df	p-value	Inference [n ₂ = 50]
Age	9.752	4	0.047*	Statistically significant
Gender	1.448	2	0.485	Not significant
Educational status	7.028	6	0.318	Not significant
Types of diet	0.670	2	0.715	Not significant
Food preference	2.452	4	0.653	Not significant
Habits	7.624	6	0.267	Not significant
Stage of cancer	7.119	6	0.310	Not significant
Emetogenic potential of drug	15.014	4	0.005*	Statistically significant
Sites of cancer	4.440	6	0.617	Not significant

*p≤0.05 = statistically significant

and high and moderate emetogenic potential drugs induced severe nausea and vomiting and low and minimal emetogenic drugs may or may not induced nausea and vomiting.

Association of the post-test level of chemotherapy-induced nausea and vomiting within selected socio-demographic variables among the experimental and control groups

The ANOVA test shows tabulated F- value was less than calculated F- value (3.090) at 0.05 level

of significance. It revealed a significant association between the post-test level of chemotherapy-induced nausea and vomiting within the emetogenic potential of the drug in an experimental group.

The ANOVA test shows tabulated F- value was greater than the calculated F- value (5.852) at 0.05 level of significance. It revealed a significant association between the post-test level of chemotherapy-induced nausea and vomiting within the emetogenic potential of the drug in the control group.

This quasi-experimental study was done to evaluate the effect of ginger tea on chemotherapy-induced nausea and vomiting among cancer patients at IMS & SUM Hospital by using modified nausea and vomiting scale. The aim of this study is to assess the level of chemotherapy-induced nausea and vomiting after giving intervention, to compare the effect of ginger tea on level of chemotherapy-induced nausea and vomiting and to find out the association of post-test t level of chemotherapy-induced nausea and vomiting with and within selected socio-demographic variables among the experimental and control group.

The results of the present study supported by a study of Seena (2016) that revealed a majority of study samples (45%) were within 18-39 years in the control group and (65%) were in 50-59 years in the experimental group and were female. Seena (2016). The majority of samples, 80% were male; 66.7% were aged 46- 80 years found in a study of Alparslan *et al.* (2012). Studies on effect of ginger supplement on chemotherapy-induced nausea and vomiting among patients receiving chemotherapy found that t value=10.272, 9.454, 14.139 respectively for 24 hrs, day 4, and day 10 and p-value = < 0.001, which shows ginger tea intervention was quite effective in reduction of chemotherapy-induced nausea and vomiting (Seena, 2016). The result of the present study supported by a study conducted in 2012 on effects of ginger on chemotherapy-induced nausea and vomiting in cancer patients in the hematology clinic of a training hospital in which the control group received antiemetic drugs for ethical reasons and the intervention group received ginger tablets (800 mg). They found no differences in the characteristics of the intervention and control groups ($p > 0.05$) but significant difference between the groups receiving ginger and antiemetic ($p < 0.05$), that revealed ginger is effective for the treatment of nausea and vomiting (Alparslan *et al.*, 2012).

By contrast, no significant difference found in the effect of ginger on acute and delayed nausea and vomiting among gynecologic patients receiving chemotherapy (cisplatin), but restlessness was reduced in a ginger group (p value=0.109) as compared to metoclopramide Manusirivithaya *et al.* (2004).

The result of the present study are in line with a study conducted on chemotherapy-induced nausea and vomiting in daily clinical practice: a community hospital-based study and found that the emetogenic potential of chemotherapy was significantly associated with CINV and it influenced the prevalence and severity of CINV. Alafafsheh and Ahmad (2016) The

variables such as age, gender and alcohol use were also associated with CINV (Hilarius *et al.*, 2012). The study conducted by Seena (2016), found a significant association between smoking and alcohol with nausea and vomiting Seena (2016).

The limitation of the present study includes the small group of cancer patients, which limits the generalization of findings and follow up data was not collected.

CONCLUSIONS

The present study concluded that chemotherapy-induced nausea and vomiting is a major health risk inspite of the administration of antiemetic drugs among cancer patients who are receiving chemotherapy. Ginger has an antiemetic property, which helps in reducing the occurrence and severity of chemotherapy-induced nausea and vomiting. Ginger is easily acceptable by the patients due to availability and used as spices. Antiemetic medications and the emetogenic potential of the chemotherapeutic agent were extraneous variables affecting the occurrence of nausea and vomiting. The patients did not have complaints of any side effects from ginger tea.

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Conflict of interest

The authors declared that there is no conflict of interest.

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