Effect of Ginger Tea on Chemotherapy-Induced Nausea and Vomiting among Patients Attending the Oncology Teaching Hospital, Baghdad 2020

Remal Adel Kadhim[1], Besmah Mohammed Ali[2], Maysaa Adel Kadhim[3], Samer Jassim Mohammed[4]

[1] Family Medicine Specialist, Clinical Nutrition Fellowship/ Arab Board, Ministry of Health/Environment, Iraq, [2]Consultant Community Medicine, Head of Scientific Council of Nutrition Fellowship/Arab Board, Ghazy Al- Hariri Hospital For Surgical Specialties/Medical City Directorate, Baghdad, [3]Family Medicine Specialist, Baghdad Al-Rusafa Health Directorate, [4]Community Medicine Specialist, Al- Baladiat Health Sector/Baghdad Al-Rusafa Health Directorate

Abstract

Background: Ginger has been widely used to relieve nausea and vomiting in several settings, one of them, patients receiving chemotherapy. This study was done to assess the effect of ginger in controlling the chemotherapy induced nausea and vomiting (CINV) among patients. **Methods:** An interventional (pre-post) study design was conducted in oncology teaching hospital in Baghdad for three months. Sixty participants were randomly assigned into intervention group (30 participants received ginger tea (1.5 g/d) with routine antiemetic regimen for the first 5 days of the chemotherapy cycle) and control group (30 participants received only routine antiemetic regimen). MASCC Antiemesis Tool (MAT) was used for assessment of CINV in cancer patients before and after the use of ginger tea.

Results: No significant difference was observed between the intervention and control groups in the acute and delayed phases of CINV after intervention with ginger tea($p > 0.05$), but difference between the study groups was found statistically significant ($p < 0.05$)regarding the severity of nausea postchemotherapy. **Conclusions:** The addition of ginger tea to routine antiemetic regimen in patients receiving chemotherapy effectively reduced the severity of nausea. However, there is no additional role for ginger in reducing the acute and delayed phases of CINV.

***Key words*:** *Chemotherapy -nausea -vomiting -ginger-cancer.*

Introduction

Nausea and vomiting are the most frequent health concern with cancer patients receiving chemotherapy[1,2]. The primary mechanism of chemotherapy induced nausea and vomiting (CINV) is related to the production of free radicals within the gastrointestinal tract postchemotherapy. This leads to release of neurotransmitters from enterochromaffin cells, which stimulates emesis[3].

Corresponding author:
Remal Adel Kadhim
E-mail: dr_remal_81@yahoo.com

Three types of CINV: acute (during first 24 hours postchemotherapy); delayed (after 24 hours postchemotherapy and may last for up to 6 or 7 days) and anticipatory (affects people who have experienced severe nausea and vomiting in their previous use of chemotherapeutic agents). The prevalence of untreated CINV is about 70-80%[4], some chemotherapeutic agents including (cyclophosphamide and cisplatin) can increase the incidence of CINV up to 90%[5].The prevention of CINV is a priority in the oncology setting, despite that development of anti-emetic medications and the reduction of the prevalence of CINV, vomiting and nausea are still reported by up to 25% and 61%, respectively[6,7].

Ginger (Zingiber officinale Roscoe) is a perennial herb belonging to the family Zingiberaceae , primarily grown in Asia and tropical regions and it is one of the most widely consumed herbs globally[5]. Ginger contains: zingerone, shogaols, gingerols and volatile oil. Gingerol is mainly help in facilitate the movement of digested food contents and toxins through the gastrointestinal system and reducing incidence of nausea and vomiting[2,8].

Ginger is used in different forms such as fresh, dried, pickled, preserved, candied and powdered. Presentations can include capsules, tablets, tea, and liquid extracts[5,9], it is considered a safe herb for human consumption[5]. Clinical trials were encouraged to scientifically assess the effectiveness of ginger as a complementary and alternative medicine[5,10].

Aims of the Study

1- To study the effect of ginger tea on the two phases of vomiting and nausea between intervention and control groups

2- To assess the severity of acute and delayed nausea between both study groups after intervention with ginger tea.

Materials and Methods

This is an interventional (pre-post) study design was conducted in Oncology Teaching Hospital in Baghdad from the first of April to end of June 2020. The sample was chosen from those patients with cancer who attended the chemotherapy day unit.

Sixty participants were qualified to enter the trial, they were randomly assigned into two groups: 30 in intervention group used ginger tea (1.5 g/d) plus routine antiemetic regimen for the first 5 days of the chemotherapy cycle and 30 in control group used routine antiemetic regimen alone. Randomization was done by random sampling technique depending on the days of the week; groups were created on alternative days.

The exclusion criteria were applied equally to both study groups, include(age less than 18 years, history of hematological *malignancies*, ginger in the diet or history of allergy to ginger, history of chronic disease on medications, concurrent illnesses that induced nausea independent of chemotherapy, history of bleeding disorders and clinically significant thrombocytopenia and finally patients who were lost to follow up). The consent was taken from participants prior to direct interview.

The main items covered in the questionnaire form were age, sex, duration of cancer (calculated since the date of first diagnosis), type of cancer (including in the screening), stage of the cancer classified according to TNM staging system (tumour, node, metastases), management of cancer, cycle's number of chemotherapy course.

For assessment of CINV in cancer patients, we were used MASCC Antiemesis Tool (MAT) which is developed by the Multinational Association of Supportive Care in Cancer (MASCC), it was designed to be a short self-administered tool for measuring both acute and delayed nausea and vomiting[11].

In order to measure the phases of CINV before and after intervention with ginger tea, participants were asked to fill MAT for 5 days postchemotherapy. Patients were advised to eat easily digestible foods and avoid emetogenic ones.

Results

Data were analyzed by descriptive and inferential statistics using SPSS version 25, P value ≤ 0.05 was considered significant.

The finding of this study showed that 46.7% of participants in intervention group and 33.3% in control group were in the age group(51-60) years . Most of the participants were females. The rest of baseline demographic and clinical characteristics were summarized in[Table 1].

Table1: Baseline demographic and clinical characteristics

Characteristics	Intervention group N= 30 (%)	Control group N= 30 (%)
Age (years)		
21-30	2 (6.7)	4 (13.3)
31-40	0	5 (16.7)
41-50	8 (26.7)	7 (23.3)
51-60	14 (46.7)	10 (33.3)
> 60	6 (20.0)	4 (13.3)
Gender		
Male	7 (23.3)	9 (30.0)
Female	23 (76.7)	21 (70.0)
Duration of cancer history(years)		
<1	20 (66.7)	16 (53.3)
1	3 (10.0)	3 (10.0)
2	3 (10.0)	4 (13.3)
3	1 (3.3)	2 (6.7)
4	2 (6.7)	2 (6.7)
≥ 5	1 (3.3)	3 (10.0)
Type of cancer		
Breast	15 (50.0)	14 (46.7)
Colorectal	6 (20.0)	4 (13.3)
Gynecological	1 (3.3)	4 (13.3)
Lung	1 (3.3)	3 (10.0)
Others	7 (23.3)	5 (16.7)
Stage of cancer*		
Early	5 (16.7)	9 (30.0)
Intermediate	14 (46.7)	10 (33.3)
Advanced	11(36.7)	11 (36.7)
Management of cancer		
Chemotherapy	4 (13.3)	8 (26.7)
Mixed therapy**	26 (86.7)	22 (73.3)
Chemotherapy cycle		
First	0	0
Second	6 (20.0)	7 (23.3)
Third	7 (23.3)	6 (20.0)
Fourth	6 (20.0)	3 (10.0)
Fifth	1 (3.3)	4 (13.3)
Sixth	3 (10.0)	1 (3.3)
Seventh	5 (16.7)	3 (10.0)
Eighth	2 (6.7)	6 (20.0)

* Early stage (localized primary tumour), intermediate stage (regional lymph nodes involvement), advanced

stage (presence of metastases)

**Mixed therapy (chemotherapy, surgery, radiotherapy)

The data in[Table 2] shows that 50% of intervention group and 43.3% of control group had acute vomiting pretest while posttest it was 40% and 43.3%.

In the other hand, 43.3% of intervention group and 36.7% of control group had delayed vomiting pretest but after posttest, it was 26.7% and 30%. Despite that there was no significant statistical association tested by McNemar test between the pre-posttest level of chemotherapy-induced acute and delayed vomiting among both groups[Table 2].

Ninety percent of intervention group and 76.7% of control group had acute nausea pretest and this was decreased posttest by 33.3% and 3.4%. The high percentage of intervention group (76.6%) and (73.3%) of control group reported delayed nausea pretest while posttest, it decreased only in intervention group. The differences before and after ginger tea use in acute and delayed nausea in intervention group was provided by McNemar test and it was statistically significant while in control group it was not[Table 2].

Overall, after intervention, no significant difference was detected by ANOVA test between the study groups in acute and delayed phases of vomiting(p=0.798,p=0.779) and in acute and delayed phases of nausea(p=0.182,p=0.112).

Table2: Differences in nausea and vomiting before and after Ginger tea use among the intervention and control groups

Phases of vomiting and nausea before and after Ginger tea use			Intervention group	Control group	P- Value	
			N (%)	N (%)	Intervention	Control
Acute vomiting	pretest	yes	15 (50.0)	13 (43.3)	0.250	1.000
		no	15 (50.0)	17 (56.7)		
	posttest	yes	12 (40.0)	13 (43.3)		
		no	18 (60.0)	17 (56.7)		
Acute nausea	pretest	yes	27 (90.0)	23 (76.7)	0.002	1.000
		no	3 (10.0)	7 (23.3)		
	posttest	yes	17 (56.7)	22 (73.3)		
		no	13 (43.3)	8 (26.7)		
Delayed vomiting	pretest	yes	13 (43.3)	11(36.7)	0.063	0.625
		no	17 (56.7)	19 (63.3)		
	posttest	yes	8 (26.7)	9 (30.0)		
		no	22 (73.3)	21 (70.0)		
Delayed nausea	pretest	yes	23 (76.7)	22 (73.3)	0.016	1.000
		no	7 (23.3)	8 (26.7)		
	posttest	yes	16 (53.3)	22 (73.3)		
		no	14 (46.7)	8 (26.7)		

Concerning the severity of acute nausea, it was found that in pretest the high percentage of intervention group had moderate degree and in control group the percentage was equally distributed between mild and moderate nausea. After intervention, reporting of no nausea was increased by 33% and no one reported severe degree while in control group there was increase in number of the participants reported severe nausea. The difference in the severity of acute nausea before and after ginger tea use in intervention group was statistically significant(p=0.0001)[Table 3].

Regarding the severity of delayed nausea in intervention group, 36.7% had mild degree and it's the same in control group. After asking the participants in intervention group about the relief that was provided by ginger tea ,they reported no nausea and mild nausea in equal percentages while nearly no change in control group. The difference pre-posttest in intervention group was statistically significant[Table 3].

Focusing on the differences between both study groups regarding the severity of nausea posttest, it was found statistically significant by using ANOVA test[Table 4].

Table3: Differences in the severity of nausea before and after Ginger tea administration among intervention and Control groups

Severity of nausea before and after ginger tea use			Intervention group N (%)	Wilcoxon Signed Ranks Test (Z)	Asymp. Sig. (2-tailed)	Control group N (%)	Wilcoxon Signed Ranks Test (Z)	Asymp. Sig. (2-tailed)
Acute nausea	Pre test	no	3 (10.0)	- 4.772	0.0001	7 (23.3)	0.0001	1.000
		mild	10 (33.3)			11 (36.7)		
		moderate	13 (43.3)			11 (36.7)		
		severe	4 (13.3)			1 (3.3)		
	Post test	no	13 (43.3)			8 (26.7)		
		mild	15 (50.0)			10 (33.3)		
		moderate	2 (6.7)			10 (33.3)		
		severe	0			2 (6.7)		
Delayed nausea	Pre test	no	7 (23.3)	- 4.359	0.0001	8 (26.7)	- 0.378	0.705
		mild	11 (36.7)			11(36.7)		
		moderate	10 (33.3)			11(36.7)		
		severe	2 (6.7)			0		
	Post test	no	14 (46.7)			8 (26.7)		
		mild	14 (46.7)			12 (40.0)		
		moderate	2 (6.7)			10 (33.3)		
		severe	0			0		

Table 4: The effect of Ginger tea on the severity of nausea posttest between the intervention and control groups

Phases (Posttest)	Severity	F	Sig.
Acute nausea	No	7.811	0.007
	Mild		
	Moderate		
	Severe		
Delayed nausea	No	6.518	0.013
	Mild		
	Moderate		
	Severe		

Discussion

Nausea and vomiting remains as one of the most important problems postchemotherapy[12]. In this study , the percentage of acute and delayed vomiting in intervention group decreased after ginger tea use, despite that there was no significant differences between the study groups in both phases of chemotherapy induced vomiting. Five studies showed this result too by finding that ginger intake had no significant effect in controlling acute and delayed vomiting (Li et al.2018; Thamlikitkul et al.2017; Ansari et al.2016; Lua et al.2015; Panahi et al.2012)[1,13,14,15,4], but all the previous studies including this study disagreed with what had been concluded by(Arslan et al.2015; Yekta et al.2012) that ginger had significant effect on chemotherapy induced vomiting[16,17].This might be due to that in our study the intervention with ginger was after chemotherapy. Ryan et al. speculated that using ginger before chemotherapy may prepare the intestine for emetic response by binding to 5-HT3 receptors which may give better results[18,19].

The present study showed that the differences between pre-posttest level of chemotherapy induced acute and delayed nausea in intervention group was statistically significant. Surprisingly, no significant difference was detected between the two study groups, this was close to a study of Li et al.2018, they noted that no significant difference of acute and delayed nausea between the two study groups[1]but disagreed with Sanaati et al.2016 who stated that ginger significantly affect the frequency of nausea[19/20]. These differences in results might be due to different types of ginger could give different effects on nausea[21].

The data of Panahi et al. study in 2012, showed no significant difference between the intervention and control groups in each of the four subclasses of severity of acute and delayed nausea[4]. Another three studies did not support the effect of ginger in reducing the severity of nausea (Ansari et al.2016; Thamlikitkul et al.2017; Li et al.2018)[14,13,1,19],on the contrary to these studies, our study showed that the differences in severity of acute and delayed nausea between both study groups were statistically significant**.**

Two studies also approved these results; the first was carried out in Turkey, 2015 by Arslan et al[16] and the second one in USA, 2012 by Ryan et al[18] in which they found that ginger administration will be safely able to reduce nausea severity postchemotherapy.

In 2020, a study carried by Neethu et al showed that the difference in severity of CINV after giving ginger tea was significant between study groups[22].

All the previous studies including our study demonstrated the effect of ginger on CINV among cancer patients. Some studies supported this effect , while others did not. As mentioned earlier in the discussion, the findings of the present study may not be directly comparable to some of the previous studies because of differences in the type of the study design, presence or absence of control group, chemotherapeutic regimens, ginger used (dose, type, concentration of active compounds, duration) and the assessment tools which was used to assess CINV.

Several ethical issues concerning cancer patients, beside uncontrolled chemotherapy regimens (high versus low emetogenic regimens) could be the reasons for the negative findings. This study overcame some limitations of other studies as 1)using validated assessment tool (MAT) to assess CINV because of the subjective nature of nausea 2)including different types of cancers which had specific therapeutic protocol and show different degrees of nausea, this was approved by Lee et al 2013[23] 3)involvement of control group to determine the intervention's true effect 4)CINV before the intervention was evaluated and 5) the dose of ginger was specified.

In conclusion, this study showed the use of ginger as a complementary therapy to routine antiemetic therapy had no significant effect in controlling the CINV but it had additional benefit in reducing the severity of chemotherapy induced nausea in cancer patients. Ginger is a safe herbal medication but its effects on CINV need further investigation.

Ethical Clearance: The Research Ethical Committee at scientific research by ethical approval of Council of Arab Board of health Specializations, the Oncology Teaching Hospital/medical city directorate/ Baghdad and the Ministry of Health/Environment in Iraq

Source of Funding: Self- funding

Conflict of Interest: None to declare

References

1- Li X, Qin Y, Liu W, Zhou XY, Li YN, Wang LY. Efficacy of ginger in ameliorating acute and delayed chemotherapy-induced nausea and vomiting among patients with lung cancer receiving cisplatin-based regimens: a randomized controlled trial. Integrative cancer therapies.2018 Sep;17(3):747-54.

2- Das S, Banra MP, Joseph NM. Effect of ginger tea on chemotherapy-induced nausea and vomiting among cancer patients in selected hospitals, Bhubaneswar, Odisha. International Journal of Research in Pharmaceutical Sciences.2020 Feb 8;11(1):1165-71.

3- Danwilai K, Konmun J, Sripanidkulchai BO, Subongkot S. Antioxidant activity of ginger extract as a daily supplement in cancer patients receiving adjuvant chemotherapy: a pilot study. Cancer management and research.2017;9:11.

4- Panahi Y, Saadat A, Sahebkar A, Hashemian F, Taghikhani M, Abolhasani E. Effect of ginger on acute and delayed chemotherapy-induced nausea and vomiting: a pilot, randomized, open-label clinical trial. Integrative cancer therapies.2012 Sep;11(3):204-11.

5- Lete I, Alluć J. The effectiveness of ginger in the prevention of nausea and vomiting during pregnancy and chemotherapy. Integrative medicine insights.2016 Jan;11:IMI-S36273.

6- Marx W, McCarthy AL, Ried K, McKavanagh D, Vitetta L, Sali A, Lohning A, Isenring E. The effect of a standardized ginger extract on chemotherapy-induced nausea-related quality of life in patients undergoing moderately or highly emetogenic chemotherapy: a double blind, randomized, placebo controlled trial. Nutrients.2017 Aug;9(8):867.

7- Hsieh RK, Chan A, Kim HK, Yu S, Kim JG, Lee MA, Dalén J, Jung H, Liu YP, Burke TA, Keefe DM. Baseline patient characteristics, incidence of CINV, and physician perception of CINV incidence following moderately and highly emetogenic chemotherapy in Asia Pacific countries. Supportive Care in Cancer.2015 Jan 1;23(1):263-72.

8- Moghaddasi MS, Kashani HH. Ginger (Zingiber officinale): a review. Journal of Medicinal Plants Research.2012 Jul 31;6(26):4255-8.

9- Baliga MS, Haniadka R, Pereira MM, D'Souza JJ, Pallaty PL, Bhat HP, Popuri S. Update on the chemopreventive effects of ginger and its

phytochemicals. Critical reviews in food science and nutrition.2011 Jul 1;51(6):499-523.

10- Palatty PL, Haniadka R, Valder B, Arora R, Baliga MS. Ginger in the prevention of nausea and vomiting: a review. Critical reviews in food science and nutrition.2013 Jan 1;53(7):659-69.

11- Alafafsheh A, Ahmad M. Tool development to assess nausea and vomiting among patients receiving chemotherapy. Int J Cancer Oncol.2016;3(1):1-5.

12- Lavdaniti M, Tsitsis N. Investigation of nausea and vomiting in cancer patients undergoing chemotherapy. Health Psychology Research.2014 Nov 6;2(3).

13- Thamlikitkul L, Srimuninnimit V, Akewanlop C, Ithimakin S, Techawathanawanna S, Korphaisarn K, Chantharasamee J, Danchaivijitr P, Soparattanapaisarn N. Efficacy of ginger for prophylaxis of chemotherapy-induced nausea and vomiting in breast cancer patients receiving adriamycin–cyclophosphamide regimen: a randomized, double-blind, placebo-controlled, crossover study. Supportive Care in Cancer.2017 Feb 1;25(2):459-64.

14- Ansari M, Porouhan P, Mohammadianpanah M, Omidvari S, Mosalaei A, Ahmadloo N, Nasrollahi H, Hamedi SH. Ef cacy of Ginger in Control of Chemotherapy Induced Nausea and Vomiting in Breast Cancer Patients Receiving Doxorubicin-Based Chemotherapy. Asian Pacific Journal of Cancer Prevention.2016 Aug 1;17(8):3877-80.

15- Lua PL, Salihah N, Mazlan N. Effects of inhaled ginger aromatherapy on chemotherapy-induced nausea and vomiting and health-related quality of life in women with breast cancer. Complementary therapies in medicine.2015 Jun 1;23(3):396-404.

16- Arslan M, Ozdemir L. Oral intake of ginger for chemotherapy-induced nausea and vomiting among women with breast cancer. Clinical journal of oncology nursing.2015 Oct 1;19(5).

17- Yekta ZP, Ebrahimi SM, Hosseini M, Nasrabadi AN, Sedighi S, Surmaghi MH, Madani H. Ginger as a miracle against chemotherapy-induced vomiting. Iranian Journal of Nursing and Midwifery Research.2012 Jul;17(5):325.

18- Ryan JL, Heckler CE, Roscoe JA, Dakhil SR, Kirshner J, Flynn PJ, Hickok JT, Morrow GR. Ginger (Zingiber officinale) reduces acute chemotherapy-induced nausea: a URCC CCOP study of 576 patients. Supportive care in cancer.2012 Jul 1;20(7):1479-89.

19- Saneei Totmaj A, Emamat H, Jarrahi F, Zarrati M. The effect of ginger (Zingiber officinale) on chemotherapy-induced nausea and vomiting in breast cancer patients: A systematic literature review of randomized controlled trials. Phytotherapy Research.2019 Aug;33(8):1957-65.

20- Sanaati F, Najafi S, Kashaninia Z, Sadeghi M. Effect of ginger and chamomile on nausea and vomiting caused by chemotherapy in Iranian women with breast cancer. Asian Pacific Journal of Cancer Prevention.2016 Aug 1;17(8):4125-9.

21- Marx WM, Teleni L, McCarthy AL, Vitetta L, McKavanagh D, Thomson D, Isenring E. Ginger (Zingiber officinale) and chemotherapy-induced nausea and vomiting: a systematic literature review. Nutrition reviews.2013 Apr 1;71(4):245-54.

22- Das S, Banra MP, Joseph NM. Effect of ginger tea on chemotherapy-induced nausea and vomiting among cancer patients in selected hospitals, Bhubaneswar, Odisha. International Journal of Research in Pharmaceutical Sciences.2020 Feb 8;11(1):1165-71

23- Jiyeon Lee RN, Heeyoung Oh RN. Ginger as an antiemetic modality for chemotherapy-induced nausea and vomiting: a systematic review and meta-analysis. In Oncology nursing forum 2013 Mar 1 (Vol. 40, No. 2, p. 163). Oncology Nursing Society.