



ORIGINAL ARTICLE

Effectiveness of Health Education on Safety Measures for Family Caregivers of Cancer Patients Receiving Cytotoxic Drugs: An Intervention Study

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ABSTRACT

Background: Cytotoxic drugs are widely used for the treatment of cancer. The safety of family members who get in contact with the body fluids of patients who receive cytotoxic drugs has to be ensured. The objective of this study was to assess the effectiveness of a health education intervention in changing the level of knowledge and practice of caregivers regarding safety measures against cytotoxic drugs received by the patient.

Methods: A pretest-posttest intervention study was conducted among 94 family caregivers in the chemotherapy inpatient unit at Zagazig University hospitals over a period of four months (June to September 2021).

Results: There was a highly significant improvement in the level of knowledge from 5.3% to 93.6% and practice from 11.7% to 89.4% (P-value <0.001 and 0.001, respectively). Level of education was predicted to be the only independent variable that improved the level of posttest knowledge (P-value <0.001) while there were no significant independent variables that acted as a predictor in the improvement of the posttest practice.

Conclusions: Health Education intervention succeeded to improve the knowledge and practice of family caregivers regarding safety measures against cytotoxic drugs. There is a need to improve the safety culture of health care workers toward caregivers through continuous intervention programs.

Keywords: safety measures; family caregivers; cytotoxic drugs.



INTRODUCTION

Cytotoxic drugs have been markedly used for the treatment of various types of cancers over the past decade [1]. Exposure to these cytotoxic drugs can occur during preparation, administration, or cleaning spills and waste disposal [2] through contact with contaminated surfaces, contaminated clothing, or contact with patient's body fluids [3,4].

Since the metabolites of these drugs are excreted through different body fluids, so care should be taken when handling excreta as urine, stools, and sweat in the first 48 hours after treatment as the drugs are excreted from the body at this time [5].

Not only healthcare workers are at risk of exposure to cytotoxic drugs but also caregivers are at a higher

risk for indirect drug exposure as patients receiving these drugs spend most of their time at home [6]. The effect of these cytotoxic drugs on environmental health is of great importance [7] as its consequences on the exposed person is not limited to be a short term one as headache, nausea, rash, and throat irritation [8], but there are dangerous long-term consequences as mutation and DNA and chromosomal damage [9]. A study conducted to assess the possible sources of exposure to cytotoxic drugs revealed that workers who were dealing with the patients' laundry, cleaning toilets, and washing patients were exposed to antineoplastic drugs which suggest that caregivers of patients receiving cytotoxic drugs are at potential risk of exposure to cytotoxic drugs [10]. A study conducted in the United States revealed that the

caregiver stays in contact with cancer patients for at least 8.3 hours daily [11] which reflects inevitable exposure to body fluids of the cancer patient.

Several studies are conducted to assess the effect of cytotoxic drugs on the personnel who get in contact with these drugs in workplaces but, patients' caregivers are largely neglected by the health care systems [12].

Providing information and education for caregivers has a central role in supporting patients' families who are engaged in home-based care. To the best of our knowledge, few studies addressed this topic study. The aim of this study was to assess the effectiveness of the health education intervention in changing the level of knowledge and practice of caregivers of cancer patients regarding safety measures against cytotoxic drugs.

METHODS

Ethical consideration

This study was approved by the Institutional Review Board at Zagazig University Hospitals (IRB No: 6376). Participation was voluntary and written informed consent was taken from the participants. Their data was kept confidential, the participants were informed about the purpose of the study and the data will be used only for research purposes. Participants were assured that they can withdraw from the study at any time.

Study design and setting

A pretest-posttest intervention study was conducted at the chemotherapy inpatient unit of the Oncology Department at Zagazig University Hospitals over four months (June to September 2021)

Sample size and sample technique

The sample was calculated to be 94 based on a two-sided confidence significance level of 95%, 80% power of the test, the prevalence of knowledge regarding safety measures against cytotoxic drugs in pretest (40%), and the prevalence of the in posttest (70%) calculated from the pilot study. Participants were recruited by simple randomization.

Study population

Inclusion criteria were the caregivers throughout the chemotherapy journey of the patient. A total of 94 adult family caregivers of cancer patients receiving intravenous cytotoxic drugs were included in the current study with an age range of (18-60 years).

Pilot study

Before starting the study, a pilot study was conducted on 15 caregivers to test the applicability of the questionnaire and to calculate the sample size

considering that their data were not included in the final data of the study.

Tools of the study

A structured questionnaire designed by the researchers guided by guidelines issued by the American Cancer Society [13,14]. The questionnaire was delivered in the Arabic language, reviewed, and approved by a panel of experts.

The questionnaire comprised of five sections as follow: First section; covered sociodemographic characteristics including age, gender, education, working status. Second section; comprised questions asking about information regarding the patient as tumor location, and the number of past chemotherapy sessions. Third section; it composed of one question assessing the incidence of acute health hazards of exposure to cytotoxic drugs among family caregivers. Fourth section; comprised questions regarding knowledge of the family caregiver about safety measures when dealing with the patient within the first 48 hours after the chemotherapy session. Knowledge was assessed through 11 questions and answers were presented in eight questions as yes/no and the other three questions were multiple choices. Knowledge questions were related to excretion of cytotoxic drugs, toilet precautions, washing patients' cloths, private utensils, sexual life, vulnerable groups who are not allowed to deal with patients in the first 48 hours after receiving medication and if dealing with patients receiving cytotoxic drugs needs special precautions in the first 48 hours. Fifth section; included questions regarding practice of the family caregiver about safety measures when dealing with the patient within the first 48 hours after the chemotherapy session. Practice questions were related to applying toilet precautions, Proper cleaning of patient cloths, Proper disposal of body fluids, if the patient has private utensils, personal hygiene of both caregiver and the patient, and if caregivers use gloves in regular contact with patients' stuff. Practice was assessed through 7 questions. Answers were presented as yes/no in 6 questions and one question was multiple choices.

The correct answers were scored as 2 and wrong answers were scored as 0 with a total score of 22 for knowledge and 14 for the practice. Participants were considered to have a good level of knowledge if the total score is more than 11 and they were considered to have a good practice if the total score is more than 7. Both cutoff points represent 50% of the total score.

Validity and reliability

The questionnaire was revised by 6 experts and scale content validity/ universal agreement was measured and the result was one. Reliability was measured by Kuder–Richardson and revealed 0.66 for knowledge and 0.79 for practice which indicate good reliability.

Phases of the study

Implementation of the current study was conducted in three phases: pre-test, intervention, and post-test phases. Pre-test phase: a self-administrated questionnaire was filled by the caregiver. Some caregivers needed assistance in filling the questionnaire due to poor level of reading. Filling the questionnaire took 10 minutes on average to be filled. Intervention phase: it was conducted in the same session of questionnaire filling through conduction of health education to the family caregivers about safety measures when dealing with the patient after the chemotherapy session. The educational message focused on; the essential safety measures when dealing with the patient after the chemotherapy session especially within the first 48 hours and was introduced through small lectures (one to one, or small group discussions). The one-to-one sessions lasted for 15 minutes while small group discussions took 45 minutes. To facilitate the dissemination of information, the distribution of simple brochures and printed instructions about the safety measures to the caregivers was conducted. Post-test phase: it was conducted two months from the health education intervention. The previously participating caregivers filled the section in the same pre-test questionnaire assessing the knowledge and practice of the caregivers about the safety measures when dealing with the patient after receiving the chemotherapy.

Statistical analysis:

Data were analyzed using SPSS version 25 IBM Corp (NY, United States). Data was presented in frequency tables as numbers and percentages. Quantitative data were presented as mean and standard deviation. Comparison between pre-test and post-test values of caregivers’ knowledge and practice about safety measures was performed using McNemar test of significance and Pearson correlation tested the relationship between posttest knowledge and practice. p- value was significant at ≤ 0.05 and less than 0.001 is considered to be high

statistically significant. Multinomial logistic regression was used to predict the relation between posttest knowledge and practice with the sociodemographic variables of caregivers.

RESULTS

Females represented 81.9% of the studied sample with mean age 40.34+11.3 and range (19-65). The education of the studied sample varied between elementary education, high school, and bachelor’s degree by 37.2%, 28.7%, and 34% respectively. 77.7% of the studied participants were not working. 46.8% of the companion patients of caregivers had breast cancer and 35.1% of the patients received 5-10 chemotherapy sessions (**Table 1**).

There was a significant improvement in the level of those having good knowledge from 5.3% to 93.6% at a P-value of 0.00. The most improvement achieved in questions related to specific precautions are needed from patient side and caregiver side and washing of patients’ cloths separately where the percentage of true answers improved from (12.8% to 100%) and (7% to 100%) at P-values 0.00 and 0.00 respectively (**Table 2**).

Also, there was an improvement in the level of good practice from 11.7% to 89.4% at a P-value of <0.001 . The marked improved practices were in the personal hygiene of the patient and the caregiver which increased from (3.3% to 90.4%) and (21.3% to 94.7%) respectively (**Table 3**).

As shown in (**Figure 1**) there was a significant moderate positive correlation between knowledge and practice of posttest ($r = 0.3$, P-value 0.002). (**Figure 2**) shows percentage of change 16.7% in knowledge and 6.6% in practice.

In studying the predicted factors of posttest good knowledge and practice, it was found that the level of education was the only factor that affected the posttest knowledge at a P-value of 0.035, while there were no significant factors affected the improvement in practice in the posttest (**Table 4**).

As illustrated in (**Figure 3**) there were no health hazards among 80.8% of the participants during exposure, while skin rash, abdominal colic, dizziness, nausea, and chest tightness were represented by 1.1%, 6.4%, 4.2%, 4.3%, and 3.2% respectively.

Table 1: Characteristics of the studied population

	Mean \pm SD (Range)
Age	40.34+11.3

	Mean ± SD (Range)
	(19-65)
	No. (n=94) (%)
Gender	
Male	17(18.1)
Female	77(81.9)
Education	
Elementary education	35(37.2)
High school or diploma	27(28.7)
Bachelor and higher	32(34)
Working state	
Not working	73(77.7)
Working	21(22.3)
Type of cancer	
Brain	3(3.2)
Breast	44(46.8)
Genitourinary	10(10.6)
GIT	22(23.4)
Lymphoma	2(2.1)
Respiratory	13(13.8)
Number of chemotherapy sessions received by patients	
Less than 5	29(30.9)
5-10	33(35.1)
More than 10	32(34)

Table 2: Comparison between pre and post knowledge among studied participants

	Knowledge (Correct answers) n =94		P-value*
	Pretest No (%)	Posttest No (%)	
Excretion of cytotoxic drugs			
Is it excreted outside the body?	30(31.9)	94(100)	0.00
Body fluids through which drugs are excreted	30(31.9)	78(83)	0.00
Dealing with patients receiving cytotoxic drugs			0.00
Needs specific precaution from patient side and caregiver side	12(12.8)	94(100)	0.00
Duration of precautions	2(2.1)	68(72.3)	
Toilet precautions	22(23.4)	71(75.5)	0.00
Proper washing of patient cloths			
Separate patients' cloths	7(7.4)	94(100)	0.00
How to wash patients' cloths	46(48.9)	94(100)	0.00
Private utensils	14(14.9)	85(90.4)	0.00
Vulnerable groups			
Pregnant women	24(25.5)	64(68.1)	0.00
Children	0(0)	56(59.6)	0.00
Safety of sexual life	26(27.7)	86(91.5)	0.00
Total good knowledge	5(5.3)	88(93.6)	0.00

*McNemar is the test of significance.

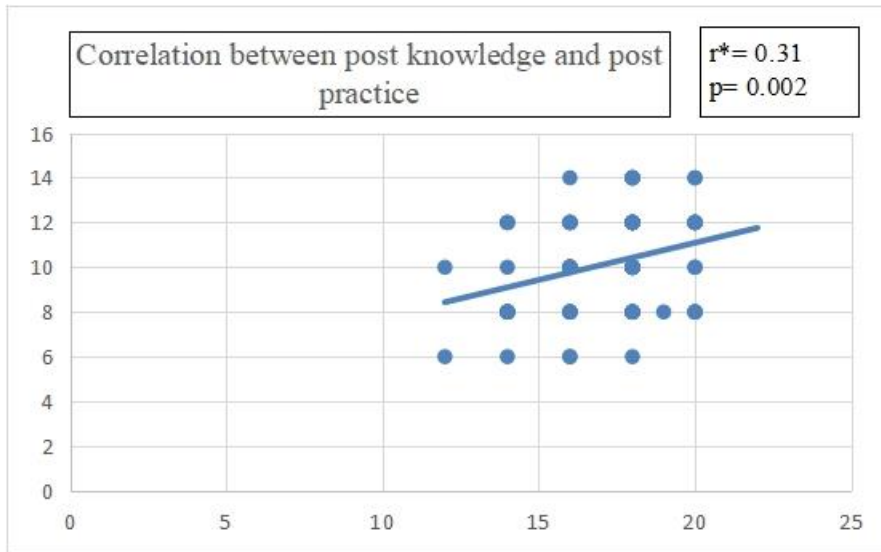
Table 3: Comparison between pre and post-practice among studied participants

	Correct Practice (n =94)		P-value*
	Pretest (%)	No Posttest No (%)	
Apply toilet precautions	33(35.1)	94(100)	0.00
Proper cleaning of patient cloths	7(7.4)	57(60.6)	0.00
Proper disposal of body fluids	76(80.9)	80(85.1)	0.57
Patients use Private utensils	9(9.6)	50(53.2)	0.00
Personal hygiene			
Patient	36(3.3)	85(90.4)	0.00
Caregiver	20(21.3)	89(94.7)	0.00
Caregivers use gloves in regular contact with patients' stuff	2(2.1)	39(41.5)	0.00
Total good Practice	11(11.7)	84(89.4)	0.00

*McNemar is the test of significance.

Table 4: Multinomial logistic regression analysis of post knowledge and post-practice

	Likelihood Ratio Tests for post-test Knowledge				Likelihood Ratio Tests for post-test Practice				
	Model Fitting Criteria		Likelihood Ratio Tests		Model Fitting Criteria		Likelihood Ratio Tests		
	-2 Log Likelihood of Reduced Model	Chi-Square	df	Sig.		-2 Log Likelihood of Reduced Model	Chi-Square	Df	Sig.
Intercept	55.981a	.000	0	.	Intercept	93.832a	.000	0	.
Age	56.869	.888	1	0.35	Age	93.955	.122	1	0.73
No. of sessions	56.004	.023	1	0.88	No. of sessions	94.647	.815	1	0.37
Sex	56.222	.240	1	0.62	Sex	94.239	.407	1	0.52
Occupation	56.538	.557	1	0.46	Occupation	93.922	.090	1	0.76
Education	62.711	6.730	2	0.04	Education	94.738	.905	2	0.64
Posttest practice	56.092	.111	1	0.74	Posttest knowledge	93.933	.101	1	0.75



*Pearson correlation coefficient

Figure 1: Correlation between post knowledge and post practice.

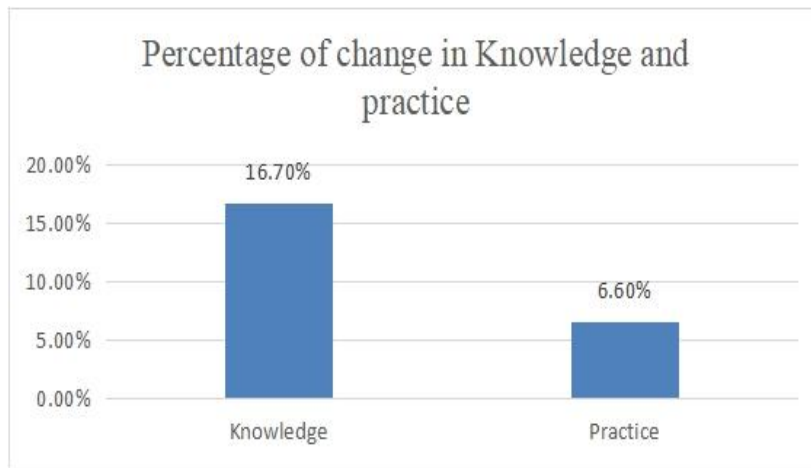


Figure 2: Percentage of change in knowledge and practice.

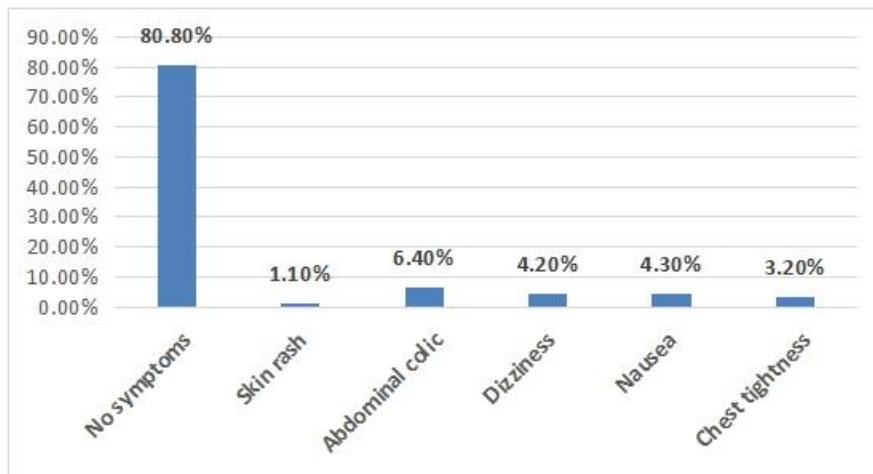


Figure 3: Health hazards among family caregivers during contact with patients who received cytotoxic drugs.

DISCUSSION

This intervention study was conducted in the chemotherapy inpatient unit of the Oncology Department at Zagazig University Hospitals among 94 caregivers of patients receiving cytotoxic drugs. The current study revealed poor baseline knowledge regarding safety measures against caring with patients receiving cytotoxic drugs which reflects lack of caregivers centered health education. This finding was supported with another study conducted in the same place which reported lack of training programs related to proper dealing with cytotoxic drugs [15]. There was marked significant improvement in the level of knowledge after the application of intervention which reflects the eagerness of the caregivers to know how to protect themselves. The findings of the current research are consistent with the results of a systematic review which stated that the knowledge and self-efficacy of family caregivers of patients receiving chemotherapy have been improved after application of intervention studies [16]. Also, there was poor baseline practice, and it was expected due to poor knowledge and after application of the educational intervention a marked improvement was achieved in their practice of safety measures which reflects their interest and awareness of the risk of being exposed to cytotoxic drugs and the benefits of applying the safety measures. There was significant positive correlation between posttest knowledge and practice which is consistent with the findings of another study suggested that increase in knowledge is a must in order to improve practice [17]. The present study revealed that the level of education was the only independent variable that improved the posttest knowledge of the participants which could be attributed to the fact that “the higher educated people, the better self-awareness” and this was supported by another study which stated that the higher the education the more attention to preventive care [18]. The family caregivers in the current study reported the occurrence of acute health hazards by 20.2% which suggest exposure to cytotoxic drugs. This explanation is consistent with another study that proved that home sitting got contaminated with body fluids of patients receiving cytotoxic drugs exposes family caregivers to health risks [19]. Despite reporting acute health hazards in in fifth of the sample, it is still unknown if they are at risk of genetic mutations on long-term exposure to cytotoxic

drugs or not. This finding may be explained by that 66% of patients in this study received less than 10 previous chemotherapy sessions.

Limitations

Studying the social class as an independent indicator affecting the improvement in knowledge and practice of safety measures when dealing with the patients receiving cytotoxic drugs should be addressed.

CONCLUSION

There was a significant improvement in the level of good knowledge and practice after the application of the health education intervention. Further research is needed to study the frequency of health hazards among caregivers adhering to safety measures. Health care workers need training programs to improve the safety culture not only for the patient but also for the caregivers who have to adhere to safety measures to reduce the risk of exposure.

Conflict of interest: None.

Financial Disclosures: None.

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