ADDIS ABABA UNIVERSITY

COLLEGE OF HEALTH SCIENCES

SCHOOL OF NURSING & MIDWIFERY

ASSESSMENT OF KNOWLEDGE AND PRACTICE ON SAFE HANDLING OF CYTOTOXIC DRUGS AMONG NURSES WORKING IN ONCOLOGY UNIT AT GOVERNMENTAL HOSPITALS ADDIS ABABA, ETHIOPIA 2019.

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A THESIS SUBMITTED TO THE SCHOOL OF NURSING AND MIDWIFERY OFADDIS ABABAUNIVERSITY, COLLEGE OF HEALTH SCIENCES IN PARTIAL FULFILLMENTS OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE IN ONCOLOGY NURSING.

JUNE, 2019

ADDIS ABABA, ETHIOPIA

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Full title of the research project	Assessment of knowledge and practice on safe handling of cytotoxic drugs among nurses working in oncology unit at governmental hospitals Addis Ababa, Ethiopia 2019.
Duration of project	From April 1 to April 30 , 2019
Study area	Addis Ababa, Ethiopia
Total cost of the project	29,491 ETB birr
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APPROVAL BY THE BOARD OF EXAMINATION

This thesis by Selamawit Asefa is accepted in its present form by the board of examiners as satisfying thesis requirement for the degree of masters in oncology nursing.

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ACKNOWLEDGEMENT

First of all, I would like to thank almighty God then I would like to thank Addis Ababa University for creating this opportunity and sponsoring me. I would like to express my deepest gratitude to my advisors Mr. Fekadu Aga and co advisor Mr. Negalign Getahun for giving me constructive comments and continuous guidance, unreserved assistance and timely guidance during this thesis development. Also I would like to thank study participant.

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ABBREVIATIONS AND ACRONYMS

AND	Antineoplastic Drug
BSC	Biological Safety Cabinet
CD	Cytotoxic Drug
DNA	Deoxyribonucleic Acid
GLOBOCAN	Global Cancer Incidence Mortality and Prevalence
HCWs	Health Care Workers
HD	Hazardous Drug
PPE	Personal Protective Equipment
SPHMMC	Saint Paul Hospital Millennium Medical College
TASH	Tikur Anbesa Specialized Hospital

ABSTRACT

Introduction: Occupational exposure to cytotoxic drugs is a worldwide concern and the number of staff possibly exposed to hazardous effect of the cytotoxic drug was more than 5.5 million. Unsafe handling practices have been pointed out in several studies, particularly in countries where access and use of these medicines have recently risen.

Objective: To assess knowledge and practice on safe handling of cytotoxic drugs among nurses working in oncology unit at governmental hospitals Addis Ababa, Ethiopia 2019.

Method: An institutional based cross-sectional study was conducted on 77 nurses in two selected governmental hospitals Addis Ababa Ethiopia from April 1-30, 2019. Censuses approach was used to select nurses. Structured self-administered questionnaire was used to collect data. Descriptive statistics such as mean, standard deviation and percentage were calculated to describe frequency and displayed in tables. Multiple Linear regression was done to see the association between dependent variables and independent variables. Significant factors were identified based on include in 95% level at p-value less than 0.05.

Result: Mean score of knowledge of nurses about cytotoxic drug was7.82±2.22 and mean score practice of nurse 22.1±5.5 multiple regression analysis indicated that chemotherapy training was significantly associated with nurse's knowledge ($p = 0.01$) and practice of nurses handling cytotoxic drug ($p=.048$) respectively. Working ward and experience were significant associated with knowledge of nurses on handling cytotoxic drug.

Conclusion and Recommendation: Most of nurses didn't take training about chemotherapy handling. This study finding showed that chemotherapy training was significantly associated with knowledge and practice. In service training regarding chemotherapy handling should be given to nurse's and oncology course should be incorporated and reinforced in to nursing professions curriculums.

Key words: cytotoxic drug, knowledge, practice, Nurses

1. INTRODUCTION

1.1. Background

According to Global Cancer Incidence Mortality and Prevalence(GLOBOCAN) estimates, about 14.1 million new cancer cases and 8.2 million deaths occurred in 2012 worldwide(1).The global cancer burden is estimated to have increase to 18.1 million new cases and 9.6 million deaths in 2018(2). Cancer is a developing public health problem in Africa (3). According GLOBOCAN cancer incidence estimate in Ethiopia up to 150 000 cases per year(4).In Ethiopia, cancer is accountable for 5.8% of total national deaths(5)..

Cytotoxic drugs sometimes known as antineoplastic, anticancer or cancer chemotherapy drugs include a wide range of chemical compounds. Because of their ability to destroy tumor cell by interfering with cell division, they are extensively used to treat cancer(6). Cytotoxic drugs can be classified into several subgroups depending on the chemical structure and pharmacodynamics of the drug; alkylating agents, antimetabolites, antitumor antibiotics, topoisomerase inhibitors, mitotic inhibitors and Miscellaneous (7, 8).

Alkylating agents target DNA. Antitumor Antibiotics this group of chemotherapeutic agents has multiple mechanism of action. These drugs can intercalate into the DNA structure , resulting inter- and intrastrand cross-links(8).

Antimetabolites agents interfere with nucleic acid synthesis by replacing for normal metabolites or by blocking the activity of critical enzymes. Many of the drugs are structural analogues of folic acid, purines, or pyrimidine. (8). Platinum Compounds: Platinum-containing drugs are heavy-metal compounds that bind to DNA, causing inter- and intrastrand cross-links. Plant Alkaloids these drugs bind to the microtubule protein tubulin and thereby prevent normal mitotic spindle formation and function(8).

Cancer treatment with cytotoxic drugs started in early 20th century, since then the use of chemotherapy began to treat many types of cancer(9) .Chemotherapy is still the main treatment regimen, and approximately 50% of patients with cancer receive chemotherapy(10).

Cytotoxic drugs are carcinogenic, mutagenic and teratogenic. Inappropriate handling and use of these drugs leads to occupational health hazards among workers in cancer management settings(11). Nurses who handle cytotoxic drugs are susceptible to carcinogenic agents(10).The

occupational activities that pose a greatest risk of exposure are the preparation and administration of cytotoxic drugs(CDs), cleaning of CDs spills, and handling of patient excreta(12).The main routes of cytotoxic drug exposure contain the inhalation of aerosolized droplets, skin absorption, ingestion and needle stick injury, eye contact through splash of liquids(13, 14). The health risks associated with exposure to cytotoxic drugs are well documented (15).

Acute health effects such as hair loss, skin rash, eczema, skin flush, lightheadedness , nausea, vomiting and gastro intestine symptoms(16, 17). Among the possible reproductive side effects experienced by exposed nurses were infertility, abortion and abnormalities in fetus (18).

Safe handling of cytotoxic drugs is monumental aspect of cancer management, since these drugs have been identified as hazardous drugs (Hd). Safe handling program should be implemented wherever cytotoxic drugs are transported, received, stored, prepared, administered and disposed(19).Nurses are among the healthcare professionals who constantly handle these agents, therefore their knowledge and practice of nurses handling this cytotoxic drug is a great concern (20)Knowledge is critical to safe nursing practice in all settings, but it is especially very important when handling cytotoxic drugs because knowledge deficit about these toxic drugs may threatens personal safety or the safety of the patient (21).

1.2. Statement of the problem

Occupational exposure to cytotoxic drugs is a worldwide concern (22). The number of staff possibly exposed to hazardous effect of the cytotoxic drug was more than 5.5 million (6).Unsafe handling practices have been pointed out in several studies, particularly in countries where access and use of those medicines have recently increased (14).

Study done in India Nagpur show that 56% of nurses have poor practice while handling cytotoxic drug(23).Study conducted in tertiary hospital at Pakistan showed that only 3% participant able to get 80% scores in chemotherapy knowledge .The overall finding of the study indicated that the participants have poor knowledge. There is a gap between the nurses' knowledge and their actual behavior concerning the potential risks of cytotoxic agents and the use of protective measures(19).

Widespread use of cytotoxic drugs in the treatment of cancer has lead to higher health hazards among employee who handle and administer such drugs, so nurses should know how to protect themselves, their patients and their work environment against toxic effects of cytotoxic drug (6). In a large-scale study of 56,000 nurses in Canada, concluded that the nurses were at risk for breast and rectal cancers following work place exposure to cytotoxic drug(20).

Many cytotoxic drugs are known to be carcinogenic, teratogenic and mutagenic to humans (24). Acute health effects such as hair loss, skin rash, eczema, skin flush, lightheadedness, nausea, and dizziness have been reported by nurses who exposed to cytotoxic drug(16).

In Ethiopian, there is no published research concerning Knowledge and practice of nurses towards safe handling of cytotoxic drug. Therefore, the purpose of this study to assess knowledge and practice on safe handling of cytotoxic drug among nurses working in oncology unit at governmental hospitals of Addis Ababa.

2. LITERATURE REVIEW

In this literature review, research and theoretical evidences on nurses' knowledge and practice about safe handling of cytotoxic drug are explored. The review text is organized under various themes.

2.1. Literature on nurse's knowledge on cytotoxic drug handling

Study conducted in Pakistan revealed that only 3% of the participants scored 80% and 54.3% scored 60% in chemotherapy safe handling knowledge (25). A cross-sectional survey conducted among nurses who work in three tertiary care teaching hospitals in Tehran, Iran showed that the average knowledge score about cytotoxic drugs was 65.5%(22). Another an analytic cross sectional study conducted in Nepal on chemotherapy knowledge and handling practice of nurses revealed that the mean knowledge score was 61.32(24). None of the nurses took training about cytotoxic drug study done in Egypt, Iran and Nepal (12, 22, 24).

A study conducted Taipei, Taiwan on 203 nurses Evaluating Nurses' Knowledge of Chemotherapy revealed that overall correct answer rate of 60.9% (26). Another study conducted in Bethesda, Maryland, US on factors influencing nurses' use of hazardous drug safe handling precaution revealed that nurses had high chemotherapy exposure knowledge achieving mean score 10.16 (±1.46)on score range of 1-12 (27). Another cross sectional study conducted at sultanah bahiyah hospital in Malaysia on improving safety related knowledge, attitude and practice of nurse handling cytotoxic drug revealed that knowledge mean score improved from 45.5±10.52 to 73.4±8.88 out of 100 after training(18).

A cross sectional study, conducted on 27 nurses in Oncology Units a Erbil City Iraq on Safe handling knowledge and practices of chemotherapy among oncology nurses revealed that 59.3.% of nurses had fair knowledge and 40.7%, had good knowledge (7) and 18.52% of nurses have training course on safe handling cytotoxic drug. Similar study conducted in 6 university hospitals in Iran on 80 nurses safe handling of anti-neoplastic drugs revealed that 52.5% had a knowledge score above the mean were fairly satisfactory and 73.8% had been trained for working in oncology,43.8% had on-going training (28).

A descriptive study conducted on 40 nurses at Punjab India , on knowledge about safety measures regarding of chemotherapeutic agents among staff nurses in a tertiary care teaching hospital revealed that 40% had inadequate knowledge and 60% of had adequate knowledge, 27.8% nurses had received in service training about chemotherapeutic(29). Another study done at oncology department of Menoufia university hospital and Tanta oncology treatment Center showed that 77.8% had fair total knowledge score but, 61.1% of study group II had poor total knowledge score(6). The majority of, participants didn't receive previous training about chemotherapy safety precautions it is similar with study done in South Egypt 82.85% and Erbil City Iraq 81.43% (6, 7, 10).

A cross sectional study conducted on nurse's in Urmia , Iran on Knowledge, Attitude, and Performance of oncology nurses handling antineoplastic drugs, it revealed that mean score of knowledge of nurse 9.43±1.5 out of 12(16). A study conducted on 35 nurses in south Egypt on effect of designed nursing protocol on nurse's knowledge and practice showed that the majority of nurses 85.7% had unsatisfactory level of knowledge. (10). The study done in similar country on role of occupational health and safety program in improving knowledge and practice among nurses exposed to chemotherapy revealed that knowledge was score 4.0% knowledge is not satisfactory courses related to CDs handling (12).

2.2. Literature on nurse's practice on safe handling of cytotoxic drug

A descriptive study conducted in India, on practice regarding safety measures used nurses while handling chemotherapy drugs revealed that the majority of nurses 56% had poor practice in handling cytotoxic drug and 44% of nurses were having good practice while, handling chemotherapy drugs (23). Another study conducted on 27 nurses in oncology units Erbil City revealed that 63% of oncology nurses handling antineoplastic drugs showed that mean score of practice of nurse was 13.41±4.7 out of 23(16). Similar study conducted in the same country on protection behaviors for cytotoxic drug revealed that mean practice score was 21.1 ± 3.76 In six university hospital Iran on nurse's safe handling of anti-neoplastic drugs showed that mean score of practice 50.35±10.21 0ut of 60 were fairly satisfactory(28).

Another study conducted in Malaysia on nurses revealed that practice mean score improved from 7.6±5.51 to 15.3±2.55 out of 20 after training(18). A cross-sectional study was conducted at four hospitals of Urmia University, Iran on Knowledge, Attitude and Performance of nurse handling cytotoxic anticancer drug revealed that practice mean score 13.41(16). Another study conducted in Menoufia University hospital and Tanta oncology treatment center showed that 71.1% and 94.4% respectively had poor total practice score (6). A cross-sectional study conducted in Kenya on health workers knowledge and practice on safe handling of cytotoxic drugs revealed that on practice with 33.94% scoring fair 16.51% scoring poor and 49.54% good on practice(11).

A cross sectional study conducted in Nepal on chemotherapy knowledge and handling practice of nurses working revealed that more than 92% of participants reported usually wearing gloves (24) and use of face and respiratory protection was less than 5%, Chemotherapy was prepared in nursing station in 100% of work settings. Another study conducted in Iran revealed that only 60% of participants reported the use of all protective equipment simultaneously, 4% did not use any protective equipment(22). Another observational study conducted in Guangzhou, China on safe handling of antineoplastic drugs revealed that none use of gown and glove compliance rate of 76.3(30). A descriptive study at Punjab India , on knowledge about safety measures regarding of chemotherapeutic agents among staff nurses revealed that 32% nurses use safety cabinet device(29). Another study conducted in Kenya only 32.26% prepared the drugs in a biological safety cabinet(11).

A cross sectional, comparative study conducted on 73 nurses at a university hospital in Edirne, Turkey revealed that during the preparation and administration of antineoplastic drugs 96.9% of the nurses used gloves 78.1% used masks 56.3% used protective aprons, and only 3.1% used goggles, antineoplastic agents were prepared in a safety cabinet 46.9%(31). Another study conducted at Zagazig University hospitals revealed that more than 72.0% of the nurses reported that they prepare the CDs in treatment room (12). A cross sectional study conducted in Nigeria showed that 84% always used gloves for administration, 55% occasionally use face mask and goggle, and 20% never used goggles and face mask. Protective apron was also used 53%(20).

A survey conducted showed that employers do not consistently have appropriate protective equipment available for staff use when handling chemotherapy(32).

2.3.Factors related to nurse's knowledge and practice on safe handling of cytotoxic drugs

A Study done on nurses at Saint Tukdoji Maharaj Cancer Hospital, Nagpur showed that age in years, gender, chemotherapy training and working experience of nurses is associated with practice (23). Another cross sectional study conducted in Iran revealed, Spearman test indicated that there was a significant correlation between age, work experience, and working oncology ward with knowledge and practice (28). Study done in Kenya showed that fishers exact test indicated that there was no statistically significant association between demographic variables (age, sex, marital status and educational level) knowledge and practice(11). Study done in South Egypt showed that there was significant difference between nurse's knowledge scores and their years of experience (10) while, there was no significant difference between age and sex with practice.

Study done Zagazig University hospitals showed that nearly all socio-demographic data didn't significantly affect change of knowledge and performance, except nurses job rank as the knowledge of senior nurses improved more than the knowledge of junior nurses(12). Another study conducted in Tehran, Iran showed that none of the variables (such as demographic variables and job related variables) influenced on nurses' knowledge(33). A descriptive study conducted India reported statically significant at p value <0.05 regarding knowledge of chemotherapeutic agents with educational status and work experience(29).

Nurse working with cytotoxic drug were at risk. So, their knowledge and practice regarding cytotoxic drug is basic thing. The above literatures revealed that there is a gap of nurse's knowledge and practice while handling cytotoxic drug.

2.4. Conceptual framework

This conceptual frame work is developed from reviewing of different literature (10, 23, 28, 29) As indicated by different studies socio demographic such as age, sex, marital status, educational level and work experience and training has significant relation with knowledge and practice of nurses**.**

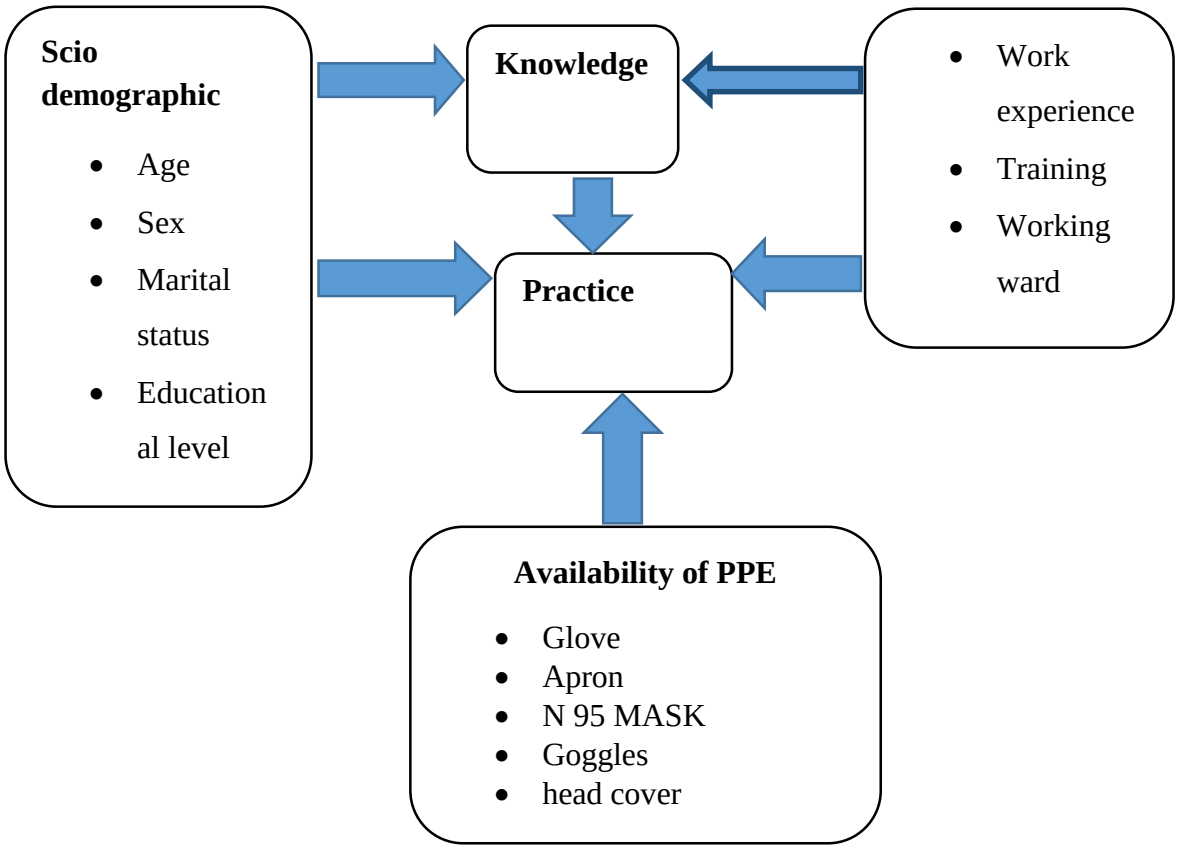

Figure 1: conceptual framework of knowledge and practice on safe handling of cytotoxic drugs among nurses working in oncology unit at governmental hospitals Addis Ababa, Ethiopia 2019.

2.5.Significance of the study

The result of this study will contribute important baseline data for policy makers, health care mangers and health care professional's especially nurses to develop guidelines that facilitate safe handling of cytotoxic drugs.

The results will also serve as a starting point for further study. This will establish baseline information about nurse's current knowledge and practice regarding on safe handling of cytotoxic drug.

3. OBJECTIVES

3.1.General objective

To assess knowledge and practice on safe handling of cytotoxic drugs among nurses working in oncology unit at governmental hospitals Addis Ababa, Ethiopia 2019.

3.2.Specific objective

- ✓ To assess knowledge of nurses about cytotoxic drug
- ✓ To assess practice of nurses on safe handling of cytotoxic drug
- ✓ To identify factors associated with nurses' knowledge on cytotoxic drug
- ✓ To identify factors associated with nurses' practice of safe handling cytotoxic drugs.

4. METHODOLOGY

4.1.Study area

This study was conducted in selected governmental hospitals in Addis Ababa. Addis Ababa is the capital city of Ethiopia and it has a population size of 3,048,631 of whom 1,595,968 were females and the rest1, 452,663 were males. The city is divided in to 10 sub-cities and located at the heart of the country, at an altitude ranging from 2,100 meters at Akaki in the south to 3,000 meters at Entoto Hill in the North (34).

With regard to health institutions the city totally holds 13 government hospitals (5 federal, 6 under Addis Ababa health bureau, 1 owned by police force and 1 armed force hospital) distributed throughout 10 sub cities. The government hospitals in the city are Tikur Anbesa Specialized Hospital (TASH), St Paul Hospital Millennium Medical College (SPHMMC), Amanuel Hospital, ALERT Hospital, St Peter Hospital, Police Hospital, Armed Force Hospital, Zewditu Memorial Hospital, Menilik II Memorial Hospital, Ras-Desta Memorial Hospital, Yekatite-12 Hospital, Tirunesh Beijing Hospital and Gandi Memorial Hospital(36). For this study Saint Paul and Tikur Anbesa Specialized Hospitals which have cytotoxic drug adminstration by the nurses was selected.

4.2.Study design

Institutional based cross-sectional study design was conducted.

4.3. Study period

The study was conducted from April 1 2019 to April 30, 2019**.**

4.4. Population

4.4.1. Source population

All nurse working in selected governmental hospital in Addis Ababa

4.4.2. Study population

All nurses working with cytotoxic drug in the selected governmental hospitals in Addis Ababa and meeting the inclusion criteria.

4.5. Inclusion and exclusion criteria

4.5.1. Inclusion criteria: nurses who were working in oncology units of governmental hospitals and willing to participate in the study were included.

4.5.2. Exclusion Criteria: Nurses those not work with cytotoxic drug were excluded.

Nurses on annual leave and maternity leave were excluded.

4.6. Sample size determination

From the total 85 nurses working in oncology unit of selected governmental hospital 77 nurses who were available during the data collection time and fulfill inclusion criteria were included in the sample using a census approach.

4.7. Sampling technique and Sampling procedure

Census approach was used. All nurses who work with cytotoxic drug and willing to participate in research were included.

4.8. Variables

4.8.1. Dependent Variables

Knowledge

Practice

4.8.2. Independent Variables

Age

Training

Gloves, gown/apron, eye protection, masks (availability of PPE).

Educational level

Sex

Marital status

Work experience

4.8.3. Operational definition

Knowledge: Nurses' knowledge of safe handling of cytotoxic drugs was measured using a 15-items multiple choice questions. The total knowledge score range from 0 – 15.

Practice: Nurses' practice of handling cytotoxic drugs was measured using a 20-items Likert type scale. Each item has 3 response options with values of 0 = never at all, 1 = sometimes, and 2 = always. The total score of the scale ranges from 0 to 40.

4.9. Methods of data collection

4.9.1. Data collection tool

A self-administered questionnaire was used to assess nurse's knowledge and practice on safe handling of cytotoxic drug handling .It is written in English the content of the tool is derived from literature(11, 35). The tool is free access. The tool contains Scio-demographic (age, sex, work experience, educational level, marital status). the knowledge part has15 multiple choice question and the practice has 20 Likert scale question.

4.9.2. Data collection procedure

For data collection two nurses (for TASH and saint Paul hospital were recruited. The data collectors were bachelor degree (BSc). The data collectors were responsible for the distribution and collection of the self-administered structured questionnaire to all nurses meeting the selection criteria and willing to participate in the study after briefly presenting the study purpose and consenting the nurses in the study area.

4.9.3. Data quality control

Data quality was made by pretest in 5 % of the sample nurses in Hallelujah Hospital. One full day training was given for data collectors and supervisor regarding the study, the questionnaire and data collection procedure by the main investigator. The collected data was checked every day by principal investigator for its completeness. Problems faced during data collection were resolved as soon as possible. Data was kept in the form of file in secure place where no one can access it except the investigator and confidentiality was insured by not recording names or any personal identity. Data was checked again for its completeness before data entry.

4.9.4. Data analysis

First, the data was checked for completeness then cleaned and coded before entered to EPI data. Next data from completed questionnaire was entered in to EPI data version 4.2.0.0. and exported in to SPSS version 23.0 for analysis. Descriptive statistics was done to describe frequency and percentages and it is displayed in tables, graphs and charts. Measure of central tendency (mean)

was calculated. Multiple linear regression was done to see the relationship between dependent variables and independent variable. T –test and ANOVA were used to see the association between the variables. For analysis knowledge question scored out of 15 and each correct question score of 1. Incorrectly answered questions and those not answered were assigned a score of 0. The practice question was Likert scale (always, sometimes and never scored accordingly 2,1&0) for the analysis and scored out of 40. All Multi categorical independent variables were dummy coded before entering into the multiple regression models.

4.10. Ethical Considerations

Ethical clearance was obtained from institutional review board of Addis Ababa University College of Health Sciences School of Nursing and Midwifery and Support letter from School of Nursing and Midwifery was written to Tikur Anbesa Specialized referral hospital,

Ethical clearance was also obtained from institutional review board of saint Paul millennium medical college. Participants were informed about the objective of the study. Informed written consent was obtained from all study participants.

4.11. Dissemination and Utilization of Result

The findings of the study are communicated to Addis Ababa University, Department Nursing and Midwifery and to hospitals nurses participated on the research. Presentations at professional, local, national and international meetings and publication in peer reviewed national or international journals will be attempted.

5. RESULT

5.1. Socio demographic characteristics

The total of 77 respondents were included in this study. From the total respondents 54 (70.1%) 0f them were female and 23 (29.9%) of them were male. The mean age of the participants was 29. 40 ±5.16 years old. Thirty-nine (50.6%) were married and 38 (49.4%) were single. Among the total respondents, 68 (88.3%), 7 (9.1%) and 2(2.6%) were BSc, MSc and diploma respectively. Regarding nurses working departments, nurses were working at medical ward 20(26%), 19(24.7) were from oncology ward ,16 (20.8%) oncology opd and 22(28.6%) were from hematology department. The mean years of work experience was 5.3 ± 4.2. Most of, the nurses 53(68.8%) didn't get training but 24 (31.2%) had training on chemotherapy handling.

Most of, the nurses find glove 56(72.7%) always, 21 (27.3%) sometimes, N-95 mask 32(41%) find always. Only 15(19.5%) get goggles always. Most of the respondent get apron 34(44.2%) sometimes. Nurses 44(58.1%) of them never get head cover. Mean score of nurse's knowledge was 7.82± 2.22. Mean score of nurses on practice on safe handling cytotoxic drug was 22.1±5.5 (Table 1).

Table 1: Scio-demographic characteristics and knowledge and practice on safe handling of cytotoxic drugs among nurses working on oncology unit at governmental hospitals Addis Ababa, Ethiopia 2019.

	Overall N(%)	Knowledge		Practice	
		Mean ±SD	Test of association		Test of association
Variable				Mean ±SD	
Age 29.4±5.2		7.8±2.2	r=.-177 p= .124	22.1±5.5	r= -.104 p=367
Sex					
Male	23(29.9)	7.8±2.2	t=-.107 p=.915	22.9±4.9	t=.819 p=.416
Female	54(70.1)	7.8±2.3		21.8±5.8	
Marital status					
Married	39(50.6)	7.6±2.1	t=.646 p=.520	22.9±5.3	t=1.300 p=.198
Single	38(49.4)	7.9±2.3		21.3±5.7	
Educational					
MSc	7(9.1)	9.3±1.9	1anova=f (2,2.91)	25.7±5.3	1anova=f (2 ,1.69
BSc	68(88.3)	7.6±2.2	P=.061	21±5.5	P=.191
Diploma	2(2.6)	10±2.8		23±1.4	
Workexperience		5.30±4.2	r=- .229 p=.045		r=0.41 p=.741
Workingward					
Medical	20(26)	7±2.3	1anova f=(4 ,	20.4±5.3	
Oncologyward	19(24.7)	7.6±2.1	2.743) p=.035	23.8±3.9	1anova f= (4 ,2.241)
Oncology opd	16(20.8)	9±1.8		24±5	p= 0.73
Hematology	22(28.6)	8±2.2		20±6.6	
Training					
Yes	24(31.2)	8.7±1.8	t= 2.415 p=.018	23.9±4.1	t=1.947 p=.055
No	53(68.8)	7.4±2.3		21.3±5.9	
Glove					
Always	56(72.7)			21.5±5.7	t=1.511 p=.135
Sometimes	21(27/3)			23.6±4.8	
Never					
N95 mask					
Always	32(41)			21.8± 6.1	1 Anova=F(2 ,3.965)
Sometimes	30(39)			23.8± 4.3	p= 0.23
Never	15(19.5)			19.1± 4.3	
Goggles					
Always	15(19.5)			22.8 ±3.2	1 Anova=F (2, 7.175
Sometimes	37(48.1)			23.9 ±5.4	P=.001
Never	25(32.5)			18.9 ±5.6	
Apron					1 Anova = F (2 ,2651)
Always	27(35)			21.9± 6.7	P=.077
Sometimes	34(44.2)			23.4± 4.2	
Never	16(20.8)			19.6 ± 5.0	
Head cover Always					
Sometimes	10(13)			25.2± 4.6	1 Anova=F (2 ,3.433)
Never	23(29.9)			23.2± 4.9	P=.038
	44(57.1)			20.1± 5.7	
Shoe cover					
Sometimes	4(5.2)			25± 5.7	1 Anova =F (1,1.575)
Never	73(94.5)			21 ±5.5	P=.213

t=independet-sample t-test r=person's correlation coffecient 1Anova= one way analysis of variance

5.2. Personal protective equipment used on handling cytotoxic drug.

Most of, the nurse used glove when preparing cytotoxic drug 72.7% but 21(27.3%) wear glove sometimes. Thirty-six of them used N-95 mask always, 28 (36.4%) used N-95 mask sometimes. Only 13(16.9%) used goggles always. Most of the respondent used apron 37(48.1%) sometimes. Seventy-two of them never used shoe cover (Table 2).

Table 2 : Use personal protective equipment on safe handling cytotoxic drug among nurse working in oncology units at governmental hospitals Addis Ababa, Ethiopia, 2019.

Variables	Frequency(%)
Glove	
Always	56 (72.7)
Sometimes	21(27.3)
Never	
N95mask	
Always	36 (46)
Sometimes	28 (36.4)
Never	13(16.9)
Goggles	
Always	13(16.9)
Sometimes	38 (49.4)
Never	26 (33.8)
Apron	
Always	28(36.4)
Sometimes	37(48.1)
Never	12(15.6)
Head cover	
Always	16 (20.8)
Sometimes	25(32.5)
Never	36(46.8)
Shoe cover	
Always	4(6.5)
Sometimes	72 (93.5)
Never	
BSC	
Always	42(54.5)
Sometimes	21(27.3)
Never	14(18,2)

5.3. Factors associated with nurse's knowledge and practice.

Correlation analysis showed that there was weak realation ship beteween work experience and knowledge of nurses on handling cytotoxic drug r = .229 p=.045 correlation siginficant at the level 0.05(table 1). An independent–sample t- test revealed that nurses who get training on chemotherapy handling compared to nuses doesn't took training t=2.415 p=.018(MD=

1.28,95CI ,.22, 2.3)nurses took training has different mean with that didn't take training(table 1).One way between group Anova was coducted to explore availablity of personal protective equipment N 95 mask has siginficance on practice F(3,3.751 p= .015). post hoc comparison using sidak test indicated that nurses who find N95 mask sometimes has better practice than never (MD =4.7 ,95% CI: .68 ,8.7) (table 1).One way between group Anova was coducted to explore availablity of personal protective equipment goggles has siginficance on practice F(2,7.175 p= .001). post hoc comparison using sidak test indicated that nurses who find goggles sometimes has better practice than never (MD =4.9 ,95% CI: 1.7 ,8.2)(table 1).

One way between group Anova was coducted to explore availablity of personal protective equipment headcover has siginficance on practice has signficance F(2, 3.433 p= .038). post hoc comparison using sidak test indicated that there no sginficance(Table 1).

Table 3: Result of multiple linear regression analysis predicting knowledge of nurses' cytotoxic drugs handling working in oncology units at governmental hospital Addis Ababa Ethiopia 2019.

Model	Beta (standardized)	P value	R^2	CI Lower higher	Co linearity Statistics	
					Tolerance	VIF
Training	0.292	.010	.085	0.338 2.938	1.000	1.000

ΔR^{2} = R2 change; VIF = Variance inflation factor

In addition multiple linear regression was used to assess the effect of number of factors to predict knowledge.R-square value indicated that 8.5% of the variance in the dependent variable is explaines by the model.After the variance explained by all other variables in the model were controlled, those respondent who took a training were the strongest unique contribution to explained the knowledge by recording standardized beta value of 0.292 as shown in table 3.Training was making a siginficant unique contribution to predict the knowledge.

Table 4: Result of multiple linear regression analysis predicting practice of nurses' cytotoxic drugs handling working in oncology unit at governmental hospital Addis Ababa Ethiopia 2019.

Model	Beta (standardized)	P value	R^2	CI Lower higher	Co linearity Statistics	
					Tolerance	VIF
Training	0.226	.048	.051	0.028 5.312	1.000	1.000

R2 change; VIF = Variance inflation factor

In addition multiple linear regression was used to assess the effects of the number of factors to predict practice.R –square value indicated that 5.1% of the variance in the dependent variable is explained by the model were controlled, the respondent those who took training were the strongest unique contribution to explain the practice by recording a standardized beta value of 0.226 as shown in table 4.Training was making a significant unique contribution to predict the practice.

6. DISCUSSION

The current study aim to examine the knowledge and practice of nurses regarding safe handling of cytotoxic drug in oncology units of governmental hospitals of Addis Ababa (Tikur Anbessa specialized hospitals and St Paul's hospital). Seventy-seven nurses were participated in the study.Mean score of nurse's knowledge was 7.82±2.22 , this low when compare the mean with study done at mary land US(10.16±1.46) , urmia iran and in malysia (9.43± 1.5,73.4± 8.88) respectively(16, 18, 36). This may be due to inadequate in-serivce training for nurses concerning cytotoxic drug handling or different tools used to assess knowledge and practice of nurses .

This study revealed also mean score of nurses on practice on safe handling cytotoxic drug was 22.1±5.5 relatively similar with study done urimia iran(13.41±4.7)(16).But low when compare to study done shirza iran (21.1±3.1outof 31), malysia(15±2.55out of 20) and in universtiy hospitals of iran50.35±10.21out of 60 (18, 28, 37). This may be due to training course nurses took and availablity of personal protective equpment.

This study revealed that most of the nurses 68.8% nurses didn't take training about chemotherapy it is similar with study conducted South Egypt and erbil city(10, 30).

This study revealed that only 31.2% of nurses had training it is different from a study done in Iran 73.8% had been trained(30).This may be due to different hospital setup and hospital rule and regulation on safe handling cytotoxic drug.

This study showed that 72,7 % nurses use glove always and it smilar with study done in, Turkey and Nepal more than 92% nurses usually use(24, 31).This similarity may be due to the availability of glove was high .In this study 16.9% used goggles it is different with that of turkey only 3.1% used goggles(31). This implied that nurses were not using all types of personal protective equpiment properly .In this study 46% of the nurses used mask it was different with study done in Nepal use of face and respiratory protection was less than 5%(24). It implies that there is better use of mask in here. Over all use of personal protective equipment minimize the risk that nurses exposed during handling cytotoxic. This study showed that 54.5% of nurse prepare drug in biological safety cabinet which is relatively similar study done at Edirne turkey (31). But different from study done in Kenya only 32.26% of them prepare in biological safety cabinet(11).which was completely different study done Nepal and Zagazig university hospital

cytotoxic drug were prepared in improper place(12, 24).Preparing drug in biological safety cabinet is most important in creating safe working environment. This study revealed that working experience and working ward has significant on knowledge of nurses on safe handling of cytotoxic drug and it is similar with study done in Iran(28). This study revealed that nurses who work in medical ward has lowest mean score when compared to other wards, it may be due to working in oncology ward has a better chance to get training related to cytotoxic drug handling. This study revealed that none of demographic variables were significantly associated with practice of nurses when handling cytotoxic drug similar with Study done Zagazig University hospitals(12). But it is different from study done Nagpur(23).It may be due to different tool used for the research. This study revealed that knowledge and practice of nurses on safe handling of cytotoxic drug has significant relationship(p=.033)but it is different with study done in Kenya(11). Multiple regression analysis revealed that having training on chemotherapy has significant on knowledge and practice of nurse's cytotoxic drug handling. which implies that training on chemotherapy important for nurses before handling cytotoxic drug.

7. STRENGTH AND LIMITATIONS

STRENGTH

- Standard and valid questionnaire used in other studies was adopted and adapted for this study.
- Pretest was done before actual administration of the prepared tool at actual subjects**.**

LIMITATION

- Cross sectional study makes determining causality impossible.

8. CONCLUSION AND RECOMMENDATION

CONCLUSION

Most of nurses didn't take training about chemotherapy handling. Multiple regression analysis showed chemotherapy training was significant for nurses' knowledge and practice of nurses while handling cytotoxic drug. Working ward and experience were significant associated with knowledge of nurses on handling cytotoxic drug.

RECOMMENDATION

- In service training regarding chemotherapy handling should be given to nurses.
- Oncology course should be incorporated and reinforced in to nursing professions curriculums.
- Guidelines and protocols must be designed for cytotoxic drug handling.

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ANNEX

Annex 1**: Participant information sheet**

Self-administered Questionnaire for Data Collection

Research Topic: - ASSESSEMENT OF KNOWLEDGE AND PRACTICE ON SAFE HANDLING OF CYTOTOXIC DRUGS AMONG NURSES WORKING IN ONCOLGY UNIT AT GOVERNMENTAL HOSPITALS.

Objective: -To assess knowledge and practice of nurses on safe handling cytotoxic drug at governmental hospital.

The questionnaire is composed of 4 sections; socio-demographic data, knowledge, practice and availability of PPE. You will be required to completely fill all sections of the questionnaire. All information provided will be handled with strict confidentiality.

Benefit: The goal of this research is to determine nurse's knowledge and practice on safe handling of cytotoxic drug The study will generate information that will lead to prompt safe handling of cytotoxic drug that will help nurses in practice of chemotherapy administration as well as patient's wellbeing.

Confidentiality: All information collected in this study will be treated as anonymous. Personal information will not be available to other participants or linked in any way.

Voluntariness: Participation in this research study is voluntary and you may withdraw at any time.

Alternatives to participant: If you choose not to participate, this will not affect you in any way.

Annex 2 Consent Form

I hereby voluntarily agree to participate in the study as explained to me by ….my signature is a confirmation that I have understood the nature of the study and whatever information that I give will remain confidential and my identity will not be revealed in this study.

I also confirm that no monetary or material gains have been promised or given to me for participating in the study.

Signed: ……..…… Date……

I have explained the nature and purpose of this study to the above study participant and have sought his/her understanding for informed consent.

Signature of principal investigator: ……..……Date…….

Annex 3: Questioner

Instruction: You are requested to answer following questions. The obtained information will be used to study purpose only and it will be kept confidential with anonymity.

Part- I: Demographic Information

1. Age in years _____
2. Sex male ☐ female ☐
3. Educational Level

1. Masters Nursing ☐
2. Bachelor Nursing ☐
3. Diploma nursing ☐
4. Other ☐

4. Marital status

1. Married ☐
2. Widowed ☐
3. Single ☐
4. divorced

5. Work Experience in Years _____
7. Working ward_____
8. Have you had any special course/training on cancer chemotherapy?

Yes ☐ No ☐

Part II: Question related to knowledge

1. Have you heard about the cytotoxic drugs?

Yes ☐ No ☐

If yes, which type of cytotoxic drugs? You can answer above one

a. Alkylating Agent
b. Antitumor Antibiotic
c. Anti-Metabolite d. Calcium Channel Blocker

2. Please tick in the right statement

a. Cytotoxic drug selectively destroy cancer cells without damaging the surrounding normal cells

b. Cytotoxic drugs after growth and reproduction of cancerous cells as well as some rapidly dividing cells

c. Cytotoxic drugs alter growth of tumor cells with distinguish between normal and cancerous cells

3) Is cytotoxic drugs are hazardous to health?

Yes ☐ No ☐

If yes, what type of

a. Carcinogenic c. mutagenic
b. Teratogenic d. None of the above

4) Can we minimize the hazardous effects of CDs by taking safety precaution?

Yes ☐ No ☐

If yes at what time you should take safety precaution

a. during preparation c. during disposal
b. During administration d. All times

5. During chemo preparation the nurse must wear

a. Latex or polyvinyl gloves

b. Gown, gloves, masks, goggles, head cover and shoe cover

c. Gown gloves masks but not goggles

d. Gown gloves and cap

6. Cytotoxic drugs must be prepared in

a. Nursing station

b. Patients bed side

c. Biological safety cabinet

d. Well ventilated separate room

7) What kind of syringe must be used during cytotoxic drug administration?

a. Glass syringe with large size

b. Luer luck fittings with large enough than solution

c. Disposable syringes without luer luck fittings

d. Glass syringe without luer luck fittings

8. Air of the syringe with full of CDs should be expelled

a. In an open area

b. In patients bed side at the time of administration

c. Safety cabinet

d. No need to expel

9. Cytotoxic drugs should be stored in

a. Patient's bedside

b. In nursing station

c. In preparation room

d. In cool dark separate place

10 If CDs (less than 5ml) spills on the skin what should you do

a. Wipe it out with any cloth immediately and wait for drying

b. Wipe if to out with tissue paper then dispose it precautionary

c. Use soap and cold water immediately

d. Use sprit to wipe the skin

11. If CDs contaminate your eyes what will you do as the 1st action?

a. Call for help

b. Report to the occupational health unit

c. Immediate rinse with tap water

d Immediate irrigation with sodium chloride 0.9% Eyewash

12. If an IV Bottle with CDs is broken accidentally. What will you do?

a. Report ward/ unit manager and pharmacy

b. The area should be cleaned immediately

c. The area should be dried up immediately and washed out three times with detergent and water

d. All ward staffs should wear personal protective cloths and leave spills showing the ward in charge.

13) Urine stool and vomit of CDs receiving patients should be handled Precautionary for

a. 24 hours of chemo administration

b. 12 hour of chemo administration

c. 48 hour of chemo administration

d. Can be handled without any precaution

14) Needle and syringes should be disposed

a. In puncture proof container after capped or crushed

b. In puncture proof container without capped or crushed

c. In plastic bags tabled with hazardous wastes

d. Bucket under the patient's bed

15) The best method of disposing hazardous waste is

a. Burning

b. Incineration

c. Dumping

d. Composting

If incineration under which temperature/

a.300c b. 600c c. 900c d. 1200c

Part-III Questions related to practice

Place tick the following statement whatever you are practicing in reality

Finding depends upon your honest in ticking

2 = Always (A) 1 = Sometimes (S) 0 = Never (N)

CDs= Cytotoxic Drugs

S.N	Statement	A	S	N
1	You wear protective clothing's during exposing with cytotoxic drugs (E.g. eye goggles ,apron ,glove and mask)			
2	You take similar precautions for all CDs while handling them			
3	You prepare CDs in vertical safety cabinet			
4	You prepare CDs in nursing station			
5	You Prepare CDs in patient's bedside			
6	You drink coffee in CDs preparation area			
7	You expel air from syringe containing CDs in an open area before giving to the patient			
8	You wear protective cloths at the time of changing IV fluid containing CDs			
9	You use needles as venting devices in iv bottle.			
10	You use luer lock			
11	You transfer prepared CDs from one place to another with bare-hand			
12	You wipe out the small spills on the skin with tissue paper immediately			
13	You use damp cloth for managing spillage of powered from of CDs			
14	You teach the patient as well as visitors about the safe handling of body wastage of the patient receiving CDs			
15	You dispose the contaminated needle in puncture proof container			
16	You store the hazardous drug waste together with other wastes			
17	You guide the ward attendants for taking safety precaution while collecting the hazardous waste			
18	You store the hazardous drug wastes in a covered container			
19	Hazardous waste receiving personal take precautions while transferring wastes from ward till incineration			
20	The hazardous wastes are disposed through incineration			

PART IV: How Often You Use Personal Protective Equipment (PPE)

TYPE OF PPE	ALWAYS	SOME TIMES	NEVER
GLOVE			
N 95 MASK			
GOGGOLES			
APRON			
HEAD COVER			
SHOE COVER			

Part V: How Often You Find This Personal Protective Equipment(PPE)

TYPE OF PPE	ALWAYS	SOME TIMES	NEVER
GLOVE			
N 95 MASK			
GOGGOLES			
APRON			
HEAD COVER			
SHOE COVER			

STATEMENT OF DECLARATION

By my signature below, I declare and affirm that this thesis is my own work. I have followed all ethical principles of scholarship in the preparation, data collection, data analysis and completion of this thesis. All scholarly matter that is included in the thesis has been given recognition through citation. I affirm that I have cited and referenced all sources used in this document. Every effort has been made to avoid plagiarism in the preparation of this thesis.

This thesis is submitted in partial fulfillment of the requirement for a graduate degree from the Addis Ababa University at College of Health Sciences, School of Nursing and Midwifery. The thesis is deposited in the Addis Ababa University Digital Library and is made available to local, national and international scientific community. I solemnly declare that this thesis has not been submitted to any other institution anywhere for the award of any academic degree, diploma or certificate.

Selamawit Asefa _____ _____

signature Date

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Name Rank signature Date

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Name Rank signature Date