

A Study to Assess the Knowledge and Skill Regarding Safe Handling of Chemotherapeutic Drugs among Third Year B.Sc Nursing Students in Selected College of Nursing Bangalore

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ABSTRACT

Background:

Chemotherapy involves the use of drugs to destroy cancer cells, but these agents are highly toxic, with carcinogenic, mutagenic, and teratogenic properties. Safe handling during preparation, administration, and disposal is essential, especially for nurses who are at risk of occupational exposure. This study focuses on assessing the knowledge and skills of nursing students to promote safe practices and support the development of a health education leaflet.

Methods:

A non-experimental descriptive research design was adopted. The study was conducted at Banaswadi College of Nursing, Bangalore, with a sample of 40 third-year B.Sc. Nursing students selected through simple random sampling. Data were collected using a structured questionnaire to assess knowledge and a structured checklist to assess skills.

Results:

The findings showed that 57.5% of students had inadequate knowledge, 37.5% had moderate knowledge, and only 5% had adequate knowledge regarding safe handling of chemotherapeutic drugs. In terms of skills, the majority demonstrated poor competency, with a smaller proportion showing moderate to good skill levels. A statistically significant association was found between knowledge scores and selected demographic variables such as age, religion, and previous academic performance ($p < 0.05$).

Conclusion:

The study highlights insufficient knowledge and skills among nursing students regarding the safe handling of chemotherapeutic drugs. There is a clear need for targeted educational interventions, such as health education leaflets and training programs, to enhance competency and ensure safety in clinical practice.

Keywords: Knowledge and skill, Third-year B.Sc. Nursing students, Chemotherapeutic drugs, Safe handling, Health education leaflet.

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INTRODUCTION

Cancer is often spoken about as if it were a single disease, but in reality it refers to a large group of more than 200 different conditions. All cancers share a common feature—uncontrolled growth of abnormal cells—but they differ widely in their causes, symptoms, and treatment approaches. Although cancer is commonly associated with older adults, particularly those above 55 years of age, it can affect individuals at any stage of life. Today, cancer remains a major global health concern, contributing significantly to overall disease burden and mortality worldwide (1).

Treatment for cancer has evolved considerably, with several options available depending on the type, stage, and location of the disease, as well as the patient's general health. These include surgery, radiation therapy, chemotherapy, immunotherapy, and targeted therapies such as monoclonal antibodies (2). Among these, chemotherapy plays a central role in managing many cancers, including solid tumors and hematological malignancies like leukemia, lymphoma, and myeloma (1).

Chemotherapy works by using drugs that circulate through the bloodstream to destroy rapidly dividing cancer cells throughout the body. Because of this systemic action, it can also affect normal cells that divide quickly, such as those in the bone marrow, gastrointestinal tract, reproductive system, and hair follicles. As a result, patients often experience side effects like nausea, vomiting, hair loss, and mouth ulcers (3). Despite these challenges, chemotherapy remains a cornerstone of cancer treatment.

Nurses play a critical role in the safe administration of chemotherapy. Ensuring the correct drug, dose, and patient is essential, yet medication errors can still occur. Studies suggest that the overall error rate ranges between 2–10%, with a significant number of healthcare professionals reporting incidents in their workplace. However, only a small proportion of these errors are formally reported beyond the institution (4). This highlights the need for continued vigilance and improved safety practices.

Handling chemotherapeutic drugs requires strict precautions, as these agents are often carcinogenic, mutagenic, and teratogenic. Direct exposure can harm the skin, eyes, and mucous membranes. Therefore, healthcare professionals must follow established safety protocols, including the use of personal protective equipment, proper labeling and transport of drugs, accurate documentation, safe disposal of waste, and appropriate management of accidental spills (5). These measures are essential to protect not only patients but also healthcare workers.

Education and training are key to ensuring safe practices in chemotherapy handling. Continuous learning helps nurses stay updated on drug actions, side effects, administration guidelines, and advances in cancer care. Well-informed nurses are better equipped to minimize risks, manage complications effectively, and provide safe, high-quality care to patients undergoing cancer treatment (2).

NEED FOR STUDY

Cancer involves uncontrolled growth of abnormal cells, and chemotherapy is a systemic drug therapy used to inhibit or destroy these cells. While effective, chemotherapy can also damage healthy cells, leading to side effects such as nausea, hair loss, and mucosal damage; however, normal cells often recover over time (6). Globally, cancer remains a major public health concern, with millions of new cases and deaths reported, and common types including lung, breast, colorectal, and stomach cancers (7). In India, patterns vary, with stomach and lung cancers more common among men, and breast and cervical cancers among women (8).

Occupational exposure to chemotherapeutic agents poses significant health risks to healthcare workers, especially nurses who are directly involved in drug preparation and administration. Studies have reported acute toxic effects such as nausea, dizziness, and liver damage, as well as long-term risks including reproductive issues and genetic damage (9,14). Medication errors in chemotherapy are also a serious concern, often linked to inadequate knowledge and training, potentially leading to severe or fatal consequences (10). Implementing standardized protocols, such as chemotherapy order forms, has been shown to reduce such errors and improve safety (11).

Nurses play a critical role in oncology care, particularly in chemotherapy administration, which requires precision and strict adherence to safety guidelines. Without proper precautions, exposure can occur during drug preparation, administration, or waste handling, increasing health risks (5). Complications such as extravasation during intravenous administration can further impact patient outcomes and healthcare resources if not properly managed (12). Evidence also suggests that exposure to antineoplastic drugs may increase risks of miscarriage and stillbirth among healthcare workers (13).

Despite awareness, studies indicate gaps between knowledge and actual practice among nurses, with low usage of protective measures and limited access to in-service education (15). Continuous training and education are therefore essential to ensure safe handling practices. Supporting this, research highlights the importance of structured teaching and supervised clinical practice, especially for students and newly trained nurses entering oncology settings (16). Hence, there is a clear need to strengthen educational interventions, such as planned teaching programs, to enhance the knowledge and skills of nursing students in safely handling chemotherapeutic drugs.

STATEMENT OF THE PROBLEM

“A study to assess the knowledge and skill regarding safe handling of chemotherapeutic drugs among Third year B.Sc nursing students in selected college of nursing Bangalore”.

OBJECTIVES OF THE STUDY

1. To assess knowledge of Third year B.Sc nursing students regarding Safe handling of chemotherapeutic drugs.
2. To assess the skills of Third year B.Sc nursing students regarding Safe handling of chemotherapeutic drugs.
3. To find the association between Knowledge and skills among Third year B.Sc nursing students regarding Safe handling of chemotherapeutic drugs based on different selected variables.

HYPOTHESIS

H1- There will be significant association between knowledge scores of Third year B.Sc nursing students with their selected demographic variables.

H2- There will be significant association between skills scores of Third year B.Sc nursing students with their selected demographic variables.

ASSUMPTIONS: It is assumed that,

1. Third year B.Sc nursing students have some knowledge regarding the handling of chemotherapeutic drugs.
1. Third year B.Sc nursing students have some skills regarding the handling of chemotherapeutic drugs.

DELIMITATIONS

1. The study is limited to only Third year B.Sc nursing students.
2. It is further limited to Third year B.Sc nursing students who are studying in selected nursing colleges of Bangalore

METHODOLOGY

The study used a descriptive research design to assess the knowledge and skills of third-year B.Sc. Nursing students regarding the safe handling of chemotherapeutic drugs at Banaswadi College of Nursing, Bangalore. A sample of 40 students was selected through simple random sampling. Data were collected using a structured tool developed based on the study objectives. The instrument consisted of three parts: Part I included demographic data with 6 items (age, gender, religion, previous academic performance, family income, and source of information); Part II comprised 25 multiple-choice questions assessing knowledge, with one correct answer scored as ‘1’ and incorrect as ‘0’, giving a maximum score of 25; Part III included a 10-item checklist to assess skills, with ‘yes’ scored as ‘1’ and ‘no’ as ‘0’, yielding a maximum score of 10.

The tool was validated by experts using a rating scale for relevance, and necessary modifications were made based on their suggestions. Reliability of the instrument was established using the Spearman-Brown prophecy formula. The reliability of the interview schedule to assess Knowledge and skill of Third year B.Sc nursing students was found to be 0.84 and 0.96 respectively. Hence the tool was found to be reliable. Pilot study was conducted on 10 subjects in Diana College of Nursing in Bangalore. The data collection was done for 4 weeks in Banaswadi College of Nursing in Bangalore. A formal written permission was obtained from the Principal, Banaswadi College of Nursing in Bangalore and data collected within a given period. The data collected from the participants were grouped and analyzed with the help of statistical measures. Data was transformed into the master sheet for analysis. The data analysis was planned to include descriptive and inferential statistics.

INCLUSION CRITERIA: The study included the Third year B.Sc nursing students who are Studying in selected nursing colleges of Bangalore, Willing to participate in the study and who available during the period of data collection.

EXCLUSION CRITERIA: The study excluded third year B.Sc nursing students who are not available at the time of data collection and Third year B.Sc nursing students who are sick.

DATA ANALYSIS:

The data is presented under the following sections.

SECTION – I: DEMOGRAPHIC CHARACTERISTICS OF THIRD YEAR B.SC NURSING STUDENTS

Table 1: Distribution of Third year B.Sc nursing students according to age

N = 40

SI No	Demographic Characteristic	Frequency	Percentage
1.Age	a. 20 years	19	47.5
	b. 21 years	11	27.5
	c. 22 years and above	10	25.0
2.Gender	a. Male	9	22.5
	b. Female	31	77.5
3. Religion	a. Hindu	21	52.5
	b. Muslim	4	10.0
	c. Christian	15	37.5
4. Performance in previous exam	a. Failed	6	15.0
	b. Pass	12	30.0
	c. First class	19	47.5
	d. Distinction	3	7.5
5.Family income	a. Less than Rs. 10000	19	47.5
	b. Rs. 10001-20000	13	32.5
	c. Rs. 20001 and above	8	20.0
6. Source of information	a. Academics	21	52.5
	b. Journals and Magazines	7	17.5
	c. Workshop and Conferences	6	15.0
	d. Friends and seniors	6	15.0
	Total	40	100

SECTION II: KNOWLEDGE AND SKILL LEVEL OF THIRD YEAR B.SC NURSING STUDENTS REGARDING THE SAFE HANDLING OF CHEMOTHERAPEUTIC DRUGS



Fig 2: Knowledge level of Third year B.Sc nursing students regarding safe handling of chemotherapeutic drugs



Figure 3: Skills level of Third year B.Sc nursing students regarding safe handling of chemotherapeutic drugs

Table – 2: Analysis of Knowledge and skill scores of Third year B.Sc nursing students regarding safe handling of chemotherapeutic drugs

N = 40

Knowledge and skill aspects	Number of Items	Maximum Score	Mean	Mean %	Median	SD
a. Overview and Mode of Chemotherapy	8	8	3.23	40.37	3	1.656
b. Safety Measures During Handling of Chemotherapy	17	17	7.68	45.17	8	3.576
Overall Knowledge	25	25	10.9	43.6	11.5	4.903
Skills	10	10	6.18	61.8	6.0	2.818

SECTION III: ASSOCIATION OF THE KNOWLEDGE AND SKILL SCORES OF THIRD YEAR B.SC NURSING STUDENTS WITH SELECTED DEMOGRAPHIC VARIABLES

Table 3: Association of Knowledge and skill score of Third year B.Sc nursing students with the demographic variables.

N= 40

Variables	Below Median	Median and above	Chi square	Df	P value (0.05)	Inference
1. Age in years						
a. 20 years	9	10	6.925	2	0.043	S
b. 21 years	3	8				
c. 22 years and above	8	2				
2. Gender						
a. Male	4	5	0.143	1	0.705	NS
b. Female	16	15				
3. Religion						
a. Hindu	14	7	6.095	2	0.047	S
b. Muslim	3	1				
c. Christian	3	12				
4. Performance in previous exam						

a.	Failed	6	0	8.386	3	0.040	S
b.	Pass	8	4				
c.	First class	6	13				
d.	Distinction	0	3				
5. Family income							
a.	Less than Rs. 10000	8	11	1.166	2	0.558	NS
b.	Rs. 10001-20000	8	5				
c.	Rs. 20001 and above	4	4				
6. Source of information							
a.	Academics	9	12	3.238	3	0.356	NS
b.	Journals and Magazines	3	4				
c.	Workshop and Conferences	3	3				
d.	Friends and seniors	5	1				

Table – 4: Association of skills score of Third year B.Sc nursing students with the demographic variables.

N= 40

Variables		Below Median	Median and above	Chi square	Df	P value (0.05)	Inference
1. Age in years							
a.	20 years	11	8	2.165	2	0.339	NS
b.	21 years	6	5				
c.	22 years and above	3	7				
2. Gender							
a.	Male	4	5	0.143	1	0.705	NS
b.	Female	16	15				
3. Religion							
a.	Hindu	13	8	2.857	2	0.240	NS
b.	Muslim	2	2				
c.	Christian	5	10				
4. Performance in previous exam							
a.	Failed	4	2	8.474	3	0.040	S
b.	Pass	10	2				
c.	First class	6	13				
d.	Distinction	0	3				
5. Family income							
a.	Less than Rs. 10000	12	7	2.508	2	0.285	NS
b.	Rs. 10001-20000	5	8				
c.	Rs. 20001 and above	3	5				
6. Source of information							
a.	Academics	6	15	8.048	3	0.041	S
b.	Journals and Magazines	2	5				
c.	Workshop and Conferences	6	0				
d.	Friends and seniors	6	0				

DISCUSSION

The findings of the study are discussed under following headings.

Section I: Demographic characteristics of Third year B.Sc nursing students.

- In the study 47.5% of subjects were in the aged 20 years, 27.5% of subjects were in the age group of 21 years.
- Majority 77.5% of the subjects were Females and remaining 28% were Males.
- Majority 52.5% subjects belong to Hindu religion, 10% were Muslims and 37.5% were Christians.
- Majority 47.5% of subject's had first class, 30% of them had pass class, 7.5% of them had distinction and remaining 15% were failed in the previous examination.
- Among Third year B.Sc nursing students 47.5% of them had family income less than Rs. 10000, 32.5% had income between Rs. 10001-20000 and remaining 20% of the subjects had family income of Rs. 20001 and above.
- Majority 52.5% of subjects had information from Academics, 17.5% had had information from journals and magazines.

Section II: Knowledge and skill level of Third year B.Sc nursing students regarding the safe handling of chemotherapeutic drugs.

The findings of the study revealed that majority 57.5% of the Third year B.Sc nursing students had inadequate Knowledge and 37.5% had moderate Knowledge and 5% had adequate Knowledge.

The overall mean Knowledge score obtained by the Third year B.Sc nursing students was 10.9 (43.6%) with standard deviation of 4.903. The mean skills scores of the Third year B.Sc nursing students was found to be 6.18 (61.7%) with the standard deviation of 2.818 which shows Third year B.Sc nursing students had moderately good skills of safe handling of chemotherapeutic drugs.

Section III: Association between Knowledge and skill scores and selected demographic variables.

It was evident that there was a statistically significant association between the Knowledge scores of the Third year B.Sc nursing students with demographic variables such as age, religion and performance in previous exam at the probability level of $p < 0.05$. Hence the research hypothesis stated that there will be significant association between the Knowledge scores of Third year B.Sc nursing students regarding the safe handling of chemotherapeutic drugs with selected demographic variable was accepted.

It also revealed that there was no statistically significant association between the skills scores of Third year B.Sc nursing students on safe handling of chemotherapeutic drugs and selected demographic variables. Thus the hypothesis stated there will be significant association between skills scores of the Third year B.Sc nursing students and selected demographic variables is accepted.

CONCLUSION

The focus of this study was to assess the Knowledge and skill of Third year B.Sc nursing students regarding safe handling of chemotherapeutic drugs at the Banaswadi College of Nursing, Bangalore, Karnataka. A non experimental descriptive design was used in the study. The data was collected from 40 samples through simple random sampling technique.

The data collected was subjected to analysis using descriptive statistics in terms of frequencies, percentage and inferential statistics like chi square test to find the association.

IMPLICATIONS OF THE STUDY: The findings of the study can be used in the following areas of nursing profession.

1. **Nursing Practice:** Nurses are the key persons of the health team, who play a major role in health promotion and maintenance. The nursing personnel need to provide information regarding the child care aspects such as safe handling of chemotherapeutic drugs and prevention of its complications accurately and precisely. The education through health education leaflet should be clear and understandable that can be referred by any family members. Providing health information is an integral part of nursing services.
2. **Nursing Education:** As a nurse educator, there are abundant opportunities for nursing professionals to educate the Third year B.Sc nursing students regarding safe handling of chemotherapeutic drugs. The study emphasizes significance of short term in-service education programmes for nurses related to safe handling of chemotherapeutic drugs. Nursing personnel studying in hospitals as well as in community areas should be given in-service education.
3. **Nursing Administration:** Nursing administrators should take interest in motivating the nursing personnel's especially nurses in all the hospital to improve their professional Knowledge and skill by attending the health

conferences, workshops, seminars and training program on safe handling of chemotherapeutic drugs. The nursing administrator should arrange regular in-service education program on safe handling of chemotherapeutic drugs.

4. **Nursing Research:** Research provides nurses credibility to influence decision making, policy and protocol formulation regarding safe handling of chemotherapeutic drugs among Third year B.Sc nursing students. Findings of the present study suggest that educators and administrator should encourage nurses to read, discuss and conduct research studies so as to enable the nurse to make data based decision and maintaining health records.

LIMITATIONS OF THE STUDY

- ✚ Only Knowledge and skill was considered in the present study.
- ✚ The study was conducted in one hospital, which restricts the generalization.

RECOMMENDATIONS: On the basis of the findings of the study following recommendations have been made:

- ✚ A similar study can be replicated on large sample to generalize the findings.
- ✚ A similar study can be conducted in different setting.
- ✚ A study can be conducted to assess the effectiveness of innovative teaching methods.

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