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## RESEARCH ARTICLE

# KNOWLEDGE AND ATTITUDE REGARDING SAFE HANDLING OF CHEMO- THERAPEUTIC DRUGS AMONG NURSES: A CROSS SECTIONAL SURVEY

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**ABSTRACT**

**Introduction:** Cancer is describes as the disease that results due to cellular changes and these changes cause the uncontrolled growth and division of cells. A cell receives instructions to die so that the body can replace it with a newer cell that functions better. Cancerous cells lack the components that instruct them to stop dividing and to die. Chemotherapeutic drugs (CDs) are the most widespread worldwide modality used in cancer treatment, and other autoimmune diseases. However, their non-selective mechanism of action affects both cancerous and non-cancerous cells, that resulting in well documented side effects. Nurses are at risk of suffering side effects. Little negligence or mistake may lead to adverse unpleasant effects for patients, staff and environment. This study was undertaken to assess the knowledge and attitude regarding safe handling of chemotherapeutic drugs among nursing personnel in tertiary care hospital, India. **Aim:** The aim is to assess the knowledge and attitude regarding safe handling of chemotherapeutic drugs among nursing personnel. **Material & Methods**: Non-experimental descriptive cross sectional survey approach was used. Through convenient sampling, 60 subjects were selected. The knowledge questionnaire to assess knowledge and Likert's scale to assess attitude was used. Descriptive statistics, pearson corelation and ANOVA /t- tests were used to analysis data. **Results:** The result revealed that the majority of nursing personnel (55%) had poor knowledge and (46.7%) had mild positive attitude regarding safe handling of chemotherapeutic drugs. The statistically significant association was found between knowledge regarding safe handling of chemotherapeutic drugs and gender, education of nursing personnel. The statistically highly significant association was found between attitude regarding safe handling of chemotherapeutic drugs and oncology work experience of nursing personnel. **Conclusion**: The results of the present study reveal that there is poor knowledge and mild positive attitude regarding safe handling of chemotherapeutic drugs among nursing personnel of tertiary care hospital, India.



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## INTRODUCTION

Cancer is describes as the disease that results due to cellular changes and these changes cause the uncontrolled growth and division of cells. There is rapid cell growth in some types of cancer cells, while in others there is slow growth and division. Certain forms of cancer result in visible growths called tumors, while others, such as leukemia, do not. Most of the body's cells have specific functions and fixed life spans. Cell death is the result of natural process of old cell dying called apoptosis. In apoptosis a cell receives instructions to die so that the body can replace it with a newer cell and this newer cell functions better. In cancerous cells there is lack of the signals that instruct them to stop dividing and to die. As a result, they grow up in the body, using oxygen and nutrients that would usually nourish other cells. Cancerous cells can form tumors, impair the immune system and cause other changes that prevent the body from functioning regularly (What to know about cancer). Cancer is the second death causing problem throughout the world (Abhishek Purkayastha, 2018). Whereby more than 10 million people are diagnosed with cancer and 6 million deaths take place annually (WHO, 2003 and Dhiaa Alrahman, 2018). According to World Health Organization there would be estimated 27 million cases of cancer by 2030, 17 million deaths from cancer, and 75 million individuals living with cancer each year. The greatest effect of this increase will occur in middle-income and developing countries. In addition, this increase is due to the result of the global transformations that have occurred in recent decades, which changed the situation of populations due to increased urbanization, sedentary

lifestyle changes, and consumption patterns (Borges, 2015). Cancer treatment plans vary greatly from patient to patient and depend on the diagnosis, staging of the cancer, clinician recommendations and patient requests. Treatment options may consist of chemotherapy, biotherapy, surgery, radiation or a combination of the above. The decision of treatment option are also guided by expectations of care. Therapy will be decided upon depending if the patient is seeking full cure with complete treatment, palliative care with treatment geared toward symptom relief or comfort care only (Polovich, Olsen, & LeFebvre, 2014). Chemotherapy refers to chemotherapeutic drugs used to treat tumors. There are multiple formulations of chemotherapeutic drugs and treatment depends on the type and site of the malignancy. The drugs are administered systemically and attack the body's cells during specific phases of replication. The drugs are not able to discriminate between healthy cells and cancer cells therefore, they tend to cause overall damage and have multiple treatment complications (DeMacedo, 2016). There is a successful history of Drugs in treating illnesses, and they are responsible for many of our medical advances (Karima, 2010). Chemotherapeutic drugs (CDs) are the most widespread worldwide modality used in cancer treatment, and other autoimmune diseases. They are also known as antineoplastics, cytotoxics, or anticancer drugs. These drugs are working by interrupting the cell cycle and killing rapidly dividing (cancer cells) (Mona, 2016). However, their non-selective mechanism of action affects both cancerous and non-cancerous cells, that resulting in well documented side effects (Naglaa Elsayed Mahdy, 2017). These drugs are responsible to improve quality of life, decrease length of illness, and cure cancer (Sharma, 2018). However, virtually all drugs have side effects associated with their use by patients, and nurses also have risk of side effects who handle them. Route of exposures to chemotherapeutic drugs may occur through inhalation, skin contact, ingestion, or injection. Inappropriate hygienic behaviors such as eating, drinking or smoking during preparation or in preparation area, administration, and disposal of chemotherapeutic drugs are wrong behaviors that increase the risk of exposure (Karima, 2010). There are chances of accidental exposure to chemotherapeutic agents at various stages during handling (i.e., transport, unpacking, storage, handling, administration, and disposal) (Goodin, 2011). Toxicity of chemotherapeutic drugs is known since 1940's, when they were first introduced for the treatment of cancer. During the 1970's evidence came to light indicating that health care workers may be at risk for harmful effects from chemotherapeutic drugs as a result of occupational exposure. Since that time reports from several countries have documented drug contamination of the work place, identified drugs in the urine of the workers and measured genetic responses in the workers (Sarita Devi, 2019).

Nearly 40 years after the association between healthcare workers and the adverse effects of antineoplastic drug exposure was established, the matter remains a concern today for a number of reasons. First, the incident rate of cancer is steadily increasing and, in turn, the use of antineoplastic drugs is growing. Second, existing safe drug handling practices may not effectively eliminate the risk potential as drug contamination of surfaces is prevalent in multiple departments within a hospital. Lastly, the number and variety of healthcare workers potentially exposed to antineoplastic drugs has increased because the use of these agents for treating nonmalignant diseases has expanded (Hon, 2014).

According to the National Institute for Occupational Safety and Health [NIOSH](2004), there is documented evidence of contamination of the work environment with hazardous drug HDs, which increases the potential for exposure by nurses, pharmacists and other healthcare workers when these agents are handled inappropriately (Polovich, 2010 and Martin, 2005). Knowledge is critical to safe nursing practice in all settings, but it is especially significant when a knowledge deficit on the part of the nursing practices and threatens personal safety or the safety of the patient also. In past research it is suggested that chemotherapy may have unintentionally compromised the oncology work setting for more than thirty years (Hazen, 2010 and Wafaa, 2015). Because oncology nurses serve at the point of care for chemotherapy administration in most settings, they serve as the safety net for themselves and their patients (Seema, 2015). Lack of knowledge and adherence to the guidelines are important reasons for unsafe handling of chemotherapeutic drugs. Therefore, the guidelines cannot guarantee safe behaviors, and knowledge is an important factor to change the performance (Sharma, 2018). Attitude is the underlying way we think, feel, act, and react to the world around us. Knowledge act as a fuel to generate positive attitude. It is time for nurses to take their own occupational safety as seriously as the safety of patients under their care. For the administration of chemotherapy the American Society of Clinical Oncology (ASCO) and the Oncology Nursing Society (ONS) have developed specific safety standards. These standards require that each institution utilize a comprehensive educational program and monitor nursing competency at specific intervals (Jacobson, 2012). Nurses who used to administer chemotherapy need to update their clinical and theoretical knowledge including drug calculations, appropriate dilutions, identification of antidotes of chemotherapeutic drugs, and management of side effects particularly in case of extravasations. Along with technical expertise for ensuring safe administration of treatment, nurses have to demonstrate a high level positive attitude to help cancer patients in their psychological issues due to chemotherapy (Wafaa, 2015 and Khan, 2012). It is observed that in majority of the oncology units, chemotherapy is being prepared, administered by oncology nurses along with the management of its side effects if patient have. So nurses are being responsible for complete the whole process of chemotherapy. Hence, there is a great need to assess the knowledge and attitude of oncology nurses This study was conducted to assess knowledge and attitude of nursing personnel regarding safe handling of chemotherapeutic drugs.

## MATERIAL AND METHODS

A quantitative research approach and non experimental descriptive cross sectional survey design was used for the study. The present study was conducted at department of radiation oncology of tertiary care hospital of India. Total sample size was 60 nursing personnel (nursing personnel are staff nurses and intern nursing students), who were working in the radiation oncology department and were exposed to chemotherapeutic drugs while providing care to patient. Total three tools were used for the study. Tool 1 was socio-demographic profile sheet consisted of 11 items to measure demographic data of the subjects was used. These variables were age, gender, marital status, type of family, total income of family (in rupees per month), place of residence, education, working / training experience in nursing, working experience in oncology ward, formal training and challenge in safe

**Table 1. Sample characteristics of the sample N=60**

| Socio demographic characteristics | | f (%) |
|---|---|---|
| Age (in years) | 20-25 | 41 (68.3%) |
| | 26-30 | 7 (11.6%) |
| | 31-35 | 7 (11.6%) |
| | 36+ | 5 (8.3%) |
| Gender | Female | 58 (96.7%) |
| | Male | 2 (3.3%) |
| Marital status | Single | 44 (73.3%) |
| | Married | 16 (26.7%) |
| | Others | 0 (0%) |
| Family type | Nuclear | 45 (75%) |
| | Joint | 15 (25%) |
| Residence place | Urban | 29 (48.3%) |
| | Rural | 31 (51.7%) |
| Family income | 10.000-30,000 | 21 (35%) |
| | 30,001-50,000 | 18 (30%) |
| | 50,001-70,000 | 15 (25%) |
| | >70,000 | 6(10%) |
| Education | Staff nurse | |
| | M.Sc. nursing | 0 (0%) |
| | BSc nursing | 4 (20%) |
| | Post basic BSc nursing | 4 (20%) |
| | GNM Diploma | 12 (60%) |
| | Student trainee | |
| | M.Sc. nursing | 0 (0%) |
| | BSc nursing | 14 (35%) |
| | Post basic BSc nursing | 26 (65%) |
| | GNM Diploma | 0 (0%) |

**Table 2. Professional characteristics of the sample N=60**

| Professional characteristics | | Frequency (n) & Percentage (%) |
|---|---|---|
| sGroups of nursing personnel | Staff nurse | 20 (33.3%) |
| | Student trainee | 40 (66.7%) |
| | Staff Nurse work experience | |
| Work/training experience in nursing | < 1 year | 4(20%) |
| | >1 to 3 years | 9 (45%) |
| | >3 to 5 years | 2(10%) |
| | > 5 years | 5 (25%) |
| | Student Trainee training experience | |
| | < 1 year | 0(0%) |
| | >1 to 3 years | 4 (10%) |
| | >3 to 5 years | 29 (72.5%) |
| | Staff Nurse oncology work experience | |
| Oncology experience | < 1 year | 4 (6.6%) |
| | >1 to 3 years | 9 (15%) |
| | >3 to 5 years | 2 (3.33%) |
| | > 5 years | 5 (8.33%) |
| | Student Trainee oncology training experience | |
| | < 1 week | 5 (8.33%) |
| | >1 to 3 weeks | 14 (23.3%) |
| | >3 to 5 weeks | 17 (28.3%) |
| | > 5 weeks | 4 (6.66%) |
| | No | 54 (90%) |
| Formal training in safe handling of chemotherapeutic drugs | If yes, Workshop | 4 (6.7%) |
| | In service education | 1 (1.7%) |
| | Mass media education | 0 (0%) |
| | Induction classes | 1 (1.7%) |
| Challenge in safe handling of chemotherapeutic drugs | Lack of management support | 20 (33.3%) |
| | High workload | 17 (28.3%) |
| | Non Availability of PPE | 17 (28.3%) |
| | Lack of provision of knowledge | 6(10%) |

handling of chemotherapeutic drugs. Tool 2 was self-structured Questionnaire consisted 40 items which were structured multiple choice questions having one correct answer among four options. Each item had a score of one (1) mark for correct answer and zero (0) for incorrect answer with overall score range from (0-40). Tool 3 was likert's scale consisted of 20 statements concerning the attitude of nursing personnel regarding safe handling of chemotherapeutic drugs. There were 10 positive statements and 10 negative statements. The statements were developed for the respondents to respond on five points Likert's scale from strongly agree (score=5), agree (score=4), uncertain (score=3), disagree (score=2) and strongly disagree (score=1). The negative statements were scored reversely. The overall score in the scale was ranging from (20-100). Reliability of knowledge questionnaire was checked by split half method and acceptable at Cronbach's Alpha value 0.832. The reliability of likert's scale to check the attitude was checked by test re-test method and acceptable at r value 0.97. The data was analyzed by using the descriptive and inferential statistics, karl pearson correlation and ANOVA/t-test.

**Ethical Considerations:** Ethical approval was taken from Institutional Ethical Committee. A written informed consent was taken from each participant. Confidentiality and anonymity of the subjects were maintained.

## RESULTS

Table 1 depicts socio-demographic characteristic of study participants and as majority of nursing personnel (96.7%) were female. About less than third fourth (73.3%) of them were single, and three fourth (75%) belonged to nuclear family. More than one third of nursing personnel (35%) were from rural area and from monthly family income group of 10,000-30,000/- Rs. Professional characteristics of the study participants are shown in the Table 2. Here it is found that more than half of study participants (66.7%) were student trainee, from that half (50%) of nursing personnel had Post Basic Nursing education and more than half (51.7%) had >3-5 year working/training experience in nursing. Majority of nursing personnel (90%) did not receive any formal training regarding safe handling of chemotherapeutic drugs. One third of nursing personnel (33.3%) reported lack of management support as a barrier to safe handling of chemotherapeutic drugs. Nursing personnel's knowledge regarding safe handling of chemotherapeutic drugs is illustrated in table 3, the mean score of knowledge of nursing personnel regarding safe handling of chemotherapeutic drugs was 19.08. Maximum obtained score by nursing personnel was 29 and minimum obtained score was 11. The majority of nursing personnel (55%) had poor knowledge regarding safe handling of chemotherapeutic drugs. Near to half of nursing personnel (45%) have average knowledge regarding safe handling of chemotherapeutic drugs. Table 4 illustrated that attitude regarding safe handling of chemotherapeutic drugs revealed the mean score of attitude of nursing personnel regarding safe

**Table 3. Mean and standard deviation of knowledge score, Frequency and percentage distribution of nursing personnel according to knowledge score N=60**

| Area | Possible score | Obtained score | Mean (score) ± SD |
|---|---|---|---|
| Knowledge score | 0-40 | 11-29 | 19.08± 4.473 |
| | Level of knowledge | | |
| Knowledge category | Poor knowledge (<50%) | Average knowledge (51-75%) | Excellent (>90%)/ Good knowledge (>75%) |
| Frequency (n) & Percentage (%) | 33 (55.0%) | 27 (45.0%) | 0 (0%) |

**Table 4. Mean and standard deviation of attitude score of nursing personnel. Frequency and percentage distribution of nursing personnel according to attitude score regarding safe handling of chemotherapeutic drugs N=60**

| Area | Possible score range | obtained score range | Mean (score) ± SD | |
|---|---|---|---|---|
| Attitude score | 20-100 | 50-85 | 72.33 ± 7.208 | |
| | Level of attitude | | | |
| Assessment of attitude regarding safe handling of chemotherapeutic drugs | Negative attitude (<50%) | Mild Positive attitude (51-75%) | Moderate Positive attitude (>75%) | Highly positive attitude (>90%) |
| Frequency (n) & Percentage (%) | 5 (8.3%) | 28 (46.7%) | 27 (45%) | 0 (%) |

**Table 5. Correlation of knowledge and attitude with each other N=60**

| | | Attitude |
|---|---|---|
| Knowledge | Pearson Correlation (r) | 0.153 |
| | P value | 0.244 |

**Correlation is significant at the 0.01 level

**Table 6. Association of knowledge score with selected socio demographic variables N=60**

| Socio Demographic characteristics | | Mean± SD | Df | F/t /r value | P value |
|---|---|---|---|---|---|
| Age | | 19.08±4.473 | | r =0.136 | .301$^{NS}$ |
| Gender | Female | 19.31±4.366 | 58 | 2.183 | .033* |
| | Male | 12.50± 2.121 | | | |
| Marital status | Single | 18.41± 3.506 | 1 | 3.935 | .052$^{NS}$ |
| | Married | 20.94± 6.202 | | | |
| | Others | 0 | | | |
| Family type | Nuclear | 18.62± 4.297 | 1 | 1.943 | .169$^{NS}$ |
| | Joint | 20.47± 4.853 | | | |
| | Extended | 0 | | | |
| Residence place | Urban | 19.79± 5.421 | 58 | 1.193 | .238$^{NS}$ |
| | Rural | 18.42± 3.314 | | | |
| Family income | 10,000-30,000 | 17.86 ± 3.291 | 3 | 2.414 | .076$^{NS}$ |
| | 30,001-50,000 | 18.33± 3.308 | | | |
| | 50,001-70,000 | 20.33± 6.149 | | | |
| | >70,000 | 22.50± 4.764 | | | |
| Education | Staff Nurse | | 2 | 0.289 | .753$^{NS}$ |
| | MSc nursing | 0 | | | |
| | BSc nursing | 22.25±7.63 | | | |
| | Post basic BSc nursing | 20.50±2.51 | | | |
| | GNM Diploma | 19.50±6.62 | | | |
| | Student Trainee | | 1 | 6.385 | .016* |
| | MSc nursing | 0 | | | |
| | BSc nursing | 20.21±3.66 | | | |
| | Post basic BSc nursing | 17.58±2.84 | | | |
| | GNM Diploma | 0 | | | |

Majority of nursing personnel (46.7%) had mild positive attitude regarding safe handling of chemotherapeutic drugs. Near to half of nursing personnel (45%) have moderate positive attitude and less than one tenth (8.3%) have negative attitude regarding safe handling of chemotherapeutic drugs. Table 5 depicted correlation of knowledge and attitude with each other revealed no correlation between knowledge and attitude regarding safe handling of chemotherapeutic drugs (r = 0.372, p <0.05).

T able 6 and 7 illustrated that association of knowledge with selected socio-demographic variables revealed statistically significant association of knowledge regarding safe handling of chemotherapeutic drugs with gender, education, formal training in safe handling of chemotherapeutic drugs and challenge in safe handling of chemotherapeutic drugs. Table 8 and 9 depicted association of attitude with selected socio-demographic variables revealed statistically highly significant association of attitude with work experience and oncology

**Table 7. Association of knowledge score with professional characteristic: N=60**

| Socio Demographic characteristics | | Mean± SD | df | F/t value | P value |
|---|---|---|---|---|---|
| Group of nursing personnel | Staff nurse | 20.25± 6.069 | 58 | 12.977 | .155$^{NS}$ |
| | Student trainee | 18.50± 3.359 | | | |
| Work / training experience in nursing | SN work experience | | 3 | 0.315 | .814$^{NS}$ |
| | < 1 year | 19 ± 5.345 | | | |
| | >1 to 3 years | 19.78 ± 6.078 | | | |
| | >3 to 5 years | 19 ± 11.314 | | | |
| | > 5 years | 22.60± 6.148 | 3 | .475 | .702$^{NS}$ |
| | ST training experience | | | | |
| | < 1 year | 0 | | | |
| | >1 to 3 years | 18.50±3.10 | | | |
| | >3 to 5 years | 18.62± 3.24 | | | |
| | > 5 years | 19.67± 3.21 | | | |
| Oncology experience | Staff nurse | | 3 | 0.315 | .814$^{NS}$ |
| | < 1 year | 19 ± 5.345 | | | |
| | >1 to 3 years | 19.78 ± 6.078 | | | |
| | >3 to 5 years | 19 ± 11.314 | | | |
| | > 5 years | 22.60± 6.148 | | | |
| | Student trainee | | 3 | 1.621 | .202$^{NS}$ |
| | < 1 week | 16.80± 4.764 | | | |
| | >1 to 3 weeks | 18.14 ± 3.371 | | | |
| | >3 to 5 weeks | 18.59 ± 3.001 | | | |
| | > 5 weeks | 21.50 ± 1.291 | | | |
| Formal training in safe handling of chemo-therapeutic drugs | No | 19.09± 4.154 | 3 | 3.034 | .037* |
| | If yes, Workshop | 15.50± 5.802 | | | |
| | In service education | 29.00± 0 | | | |
| | Mass media education | 0 | | | |
| | Induction classes | 23.00± 0 | | | |
| Challenge in safe handling of chemotherapeutic drugs | Lack of management support | 19.10± 19.10 | 3 | 3.172 | .031* |
| | High workload | 21.12± 21.12 | | | |
| | Non availability of PPE | 16.71± 16.71 | | | |
| | Lack of provision of knowledge | 20.00± 4.472 | | | |

*=Significant at p <0.05

**Table 8. Association of Attitude score with selected socio demographic variables N=60**

| Socio Demographic characteristics | | Mean± SD | Df | F/t/r value | P value |
|---|---|---|---|---|---|
| Age | | 19.08 ± 4.473 | | r = -0.06 | 0.643$^{NS}$ |
| Gender | Female | 69.71±9.489 | 58 | 1.728 | .089$^{NS}$ |
| | Male | 58.00±2.828 | | | |
| Marital status | Single | 69.32± 9.776 | 1 | 3.828 | .055$^{NS}$ |
| | Married | 69.31± 9.293 | | | |
| | Others | 0 | | | |
| Family type | Nuclear | 68.84±10.309 | 1 | .434 | .513$^{NS}$ |
| | Joint | 70.73± 7.015 | | | |
| | Extended | 0 | | | |
| Residence place | Urban | 68.38±10.069 | 58 | .731 | .468 $^{NS}$ |
| | Rural | 70.19±9.159 | | | |
| Family income | 10,000-30,000 | 68.57± 9.485 | 3 | .286 | .835$^{NS}$ |
| | 30,001-50,000 | 70.89± 9.349 | | | |
| | 50,001-70,000 | 68.13±11.451 | | | |
| | >70,000 | 70.17± 6.369 | | | |
| | Staff Nurse | | 2 | .276 | .726$^{NS}$ |
| | MSc. Nursing | 0 | | | |
| Education | BSc. Nursing | 65.00±12.72 | | | |
| | Post basic nursing | 71.25±17.85 | | | |
| | GNM | 67.75± 9.45 | 2 | 3.66 | 0.063$^{NS}$ |
| | Student Trainee | | | | |
| | MSc nursing | 0 | | | |
| | BSc nursing | 73.43±10.54 | | | |
| | Post basic BSc nursing | 68.19± 6.76 | | | |
| | GNM Diploma | 0 | | | |

*=Significant at p <0.05

**Table 9. Association of Attitude score with selected Professional characteristics N=60**

| Professional characteristics | | Mean± SD | df | F/t value | P value |
|---|---|---|---|---|---|
| Group of nursing personnel | Staff nurse | 67.90±11.4 | 58 | .808 | 0.422$^{NS}$ |
| | Student trainee | 70.03±8.53 | | | |
| | SN work experience | 59.67±11.27 | 3 | 8.132 | .002$^{*}$ |
| Work / training experience in nursing | < 1 year | | | | |
| | >1 to 3 years | 73.00±6.727 | | | |
| | >3 to 5 years | 61.50± 7.77 | | | |
| | > 5 years | 74.00±5.56 | | | |
| | ST training experience | | 3 | .440 | .725$^{NS}$ |
| | < 1 year | 0 | | | |
| | >1 to 3 years | 68.00±5.41 | | | |
| | >3 to 5 years | 70.72±9.34 | | | |
| | > 5 years | 71.33±5.50 | | | |
| | Staff nurse | | 3 | 8.132 | .002* |
| Oncology work experience | < 1 year | 52 ± 12.19 | | | |
| | >1 to 3 years | 73 ± 6.72 | | | |
| | >3 to 5 years | 61.50 ±7.77 | | | |
| | > 5 years | 74 ± 5.56 | | | |
| | Student trainee | 57.60±10.92 | 3 | 5.660 | .003* |
| | < 1 week | | | | |
| | >1 to 3 weeks | 70.71±4.32 | | | |
| | >3 to 5 weeks | 72.47±8.24 | | | |
| | > 5 weeks | 72.75±8.24 | | | |
| Formal training in safe handling of chemotherapeutic drugs | No | 68.89±9.70 | 3 | .598 | .619$^{NS}$ |
| | If yes, Workshop | 74.00±9.12 | | | |
| | In service education | 77.00± 0 | | | |
| | Mass media education | 0 | | | |
| | Induction classes | 66.00± 0 | | | |
| Challenge in safe handling of chemotherapeutic drugs | Lack of management support | 69.65±5.36 | 3 | .613 | .609$^{NS}$ |
| | High workload | 67.53±12.3 | | | |
| | Non availability of PPE | 71.53±9.48 | | | |
| | Lack of provision of knowledge | 67.00±12.79 | | | |

*=Significant at p <0.05

work experience of nursing personnel. It indicates overall work experience as staff nurse and oncology work experience of nursing personnel affects the attitude of nursing personnel regarding safe handling of chemotherapeutic drugs.

## DISCUSSION

In this research study knowledge and attitude of nursing personnel regarding safe handling of chemotherapeutic drugs was examined. The overall finding of the study indicated that the participants have poor knowledge; however their attitude is mild positive. This finding is important for nursing care to cancer patients because if nursing personnel in oncology department did not have advance knowledge will be considered as unsafe for providing chemotherapy administration to cancer patients and there are high chances for medication errors as highlighted in various studies in past (Abbasi, 2016; Rinke, 2007 and Koceja, 2003). In the present study more than 90% i.e. (96.7%) were female nursing personnel. This finding was comparable to another study by Chan Huan Keat *et al*. (2013) where 93.6% participants were female. In the present study majority of nursing personnel (90%) did not receive any formal training regarding safe handling of chemotherapeutic drugs. Similar findings were revealed by Abbasi, *et al*. (2019) and it revealed that almost all of the nurses (91.7%) stated that before working in an oncology unit, they did not receive any education about methods of protection. In the present study majority of nursing personnel i.e. 55% had poor knowledge. Another study in favor of this finding by Meral Türk *et al.* (2018) concluded that the level of knowledge of the nurses concerning antineoplastics was not satisfactory. In controversial studies by Rupinder Kaur (2017) revealed that 60% of the staff nurses had adequate knowledge and 40% had inadequate knowledge regarding handling of chemotherapeutic agents.

In the present study nursing personnel majority of nursing personnel (46.7%) had mild positive attitude regarding safe handling of chemotherapeutic drugs. Similar findings were founded in the study N. Khan *et al.* (2012) and the results of the study illustrated that the participants' attitude regarding chemotherapy administration and management was mid way. Similar study was done by Orujlu, *et al*. (2016) and it revealed that the attitude of nurses towards chemotherapy exposure achieved the range 30-51(39.14± 6.5). Majority of participants i.e. 63.3% had medium and 36.4% of nurses had high level of attitude. In the present study there is no correlation between knowledge and attitude. Opposite findings were founded in the previous study Zayed HA *et al.* (2019) and study showed that there was only a strong positive correlation between knowledge and attitude regarding safe handling of Chemotherapeutic Drugs. In the present study there were no significant association of knowledge score with age, work/training experience in nursing and oncology work experience. Controversial findings were found in similar study Alehashem M (2018) and results illustrated that there was a significant correlation between age, work experience in nursing, and in oncology ward with knowledge. In the present study there was significant association of knowledge score with education status of nursing personnel. Contrary findings were founded in previous study by Kaur R. (2017), results showed significant association of knowledge score with education status. In the present study there was significant association of attitude with work experience in nursing. Supporting findings were founded in the study Zayed HA *et al*. (2019) and revealed that work experience was associated with positive attitude. Contrary findings were found in another similar study Orujlu, *et al.* (2016), showed that only the attitude of nurses differed significantly among chemotherapy work experience categories.

**Conclusion and Recommendation:** After the detailed analysis this study leads to following conclusions, chemotherapeutic drugs have been widely used clinically. In addition, nursing personal exposed to chemotherapeutic drugs do not generally attach enough importance to self protection. To raise the self protection consciousness and ability of nursing personal exposed to chemotherapeutic drugs, hospitals should build a perfect monitoring system, set standard training programs, and introduce protective facilities, so that the hazards could be limited to the least.

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