



# A STUDY TO ASSESS THE MEDICATION DOSAGE CALCULATION SKILLS AMONG STAFF NURSES IN SGT HOSPITAL, HARYANA

<sup>1</sup>Diksha Biswal, <sup>2</sup> Akanksha Rai, <sup>3</sup>Deepanshu, <sup>4</sup>Aarti, <sup>5</sup>Mannu

PG Tutor, Post Basic B. Sc. Nursing final year student<sup>2-5</sup>

MSc. MSN (CVTN), Department of Medical Surgical Nursing

Faculty of Nursing, SGT University, Budhera, Gurugram, Haryana, India

**Abstract:** Health administrators, work throughout the world to provide proper care to individuals when they are unhealthy and prevent disease. Availability and safe medication administration practices are the basic care provided to all the patients. Medications are chemicals that are intended to cure, prevent disease and relieve symptoms, diagnosis of certain illnesses as well as early treatment. They are prescribed and administered to patients with the intention of achieving results that improve a patient's quality of life while minimizing suffering.

Nurses have inadequate medication dosage calculation skills and this is a topic of concern. In the clinical setting, nurses are having rights of medication administration to the patients. Although providing medication is a multidisciplinary process, nurses take on almost all the responsibility for administering and controlling the medication used. In this study we found out that out of the total 160 samples, 56.5% of the staff nurses had moderate knowledge [ $<50\%$ ], 31.25% had adequate knowledge [51-75%] and 11.25% had inadequate knowledge [ $<50\%$ ] regarding the medication dosage calculation. The study also indicates that there is no correlation between the medication dosage calculation skills with selected demographic variables of staff nurses.

**Keywords-** Medication, Dose calculations, Calculation skills.

## I. INTRODUCTION

The World Health Organization (WHO) defines medication as 'any substance which is used or intended to modify or explore the physiological systems or pathological states for the benefit of the recipients.'<sup>[1]</sup>

Nurses play an important role in caring for sick people and one of the most important aspects is caring for admitted patients. Safety of the patient's health and providing prescribed medication as per the physician order are the important responsibilities of an individual nurse. Any defeat in making safe drug calculations leads to trouble towards patient safety. Medication administration is one of the most essential and common tasks performed by staff nurses, providing patient care and safe medication administration is an important and very challenging responsibility of a nurse. Proper administration of the medications helps in the promotion of the health and prevention of disease of the patients. However, sometimes miscalculations of medicines will lead to serious harm to the patients.<sup>[2]</sup>

Unsafe medication practices are considered as the leading reason of injury and unavoidable harm in the health care system throughout the world. Miscalculations of medication happen in all settings may or may not cause an adverse drug event, but with complex drug dose regimens given in specialty areas such as ICU, emergency department etc. have a high risk of adverse drug events. Appropriate medication administration at the correct calculated dose is an essential component of delivering patients' care. The basic knowledge and attitude of nurses towards the medication calculation and its administration must be identified and confirmed before going into systematic approaches to avoid any complications. It is a complex process that needs mathematical proficiency to enhance the medication calculation skills.<sup>[3]</sup>

The contributing factors in the barrier of medication dosage calculation skill include impoverished team communication, complexity of care processes, dosing units, health worker fatigue, overcrowding, staff shortage, improper training, lack of communication in instructions, lack of knowledge, psychological lapses and skills related to insufficient pharmacological awareness, an inability to calculate the medication dosage correctly, workload as well as organizational structure and policies. Nurses play a key role in examining and improving the health care system in order to avoid these barriers and ensure patient safety. [4]

Miscalculation in drug dosage will not only affect the physical health of the patient but also the psychological aspect of the patient and his family. In addition to adverse economic consequences, these errors may increase the length of stay in the hospital and associated expenses, which cause potential harm to patients with disabilities. Besides this, it deteriorate circumstances of staff nurses such as decreased self-assurance, expanded pressure, clashes at work, lack of interpersonal relations with patients and their family. [5]

To resolve the problem of medication miscalculations, multidisciplinary approaches are mandatory. It is very necessary to reassess and continue with the upgrading of the guidelines to reduce the chances of errors. Providing extra classes, organizing seminars, conferences, quiz competitions, etc. to enhance their knowledge, skills, capability towards their work. Quality-assured, safe and effective medicine vaccines and medical devices are fundamental and also the necessary tool in a functioning health system. [6]

The nurses must follow the three checks; follow the rights of medication administration and the guidelines, while ensuring the safe use of medications provides a model for risk-free nursing activity. Documentation of administered medication is very important for nursing practice. Proper documentation helps a nurse to save her time, prevent omissions, avoid confusion essential for good clinical communication, an essential document, etc. Systematic approaches to medication reconciliation can also enhance the medication calculation skill. Nurses' have to be more competent and pay special attention in the preparation and administration phases of medication. [7]

### 3.1 Population and Sample

In the present study, the population comprises of staff nurses from general wards, intensive care units, operation theatre and other areas (maternal ward, pediatric ward, surgery, orthopaedic, pulmonary, ENT ward) of SGT Hospital, Gurugram.

The sample size consisted of various demographic variables of staff nurses working in SGT Hospital, Gurugram.

#### ▪ Formulae used

$$S = [Z^2 \times p \times (1-p)/m^2]$$

$$Z = 1.96 \text{ (Z is the critical power)}$$

$$P = 0.5$$

$$M = 0.05$$

$$S = (1.96)^2 \times 0.5 \times (1-p)/m^2$$

$$= 3.8416 \times 0.25/0.0025$$

$$S = 384.16$$

#### ▪ Calculations

Let's assume approximately a sample size,  $p = 250$

Therefore

$$\text{Adjust Sample} = \frac{S}{1 + \frac{S-1}{\text{population}}}$$

$$= \frac{384.16}{1 + \frac{(384.16-1)}{250}}$$

$$= \frac{384.16}{1 + \frac{383.16}{250}}$$

$$= \frac{384.16}{1+1.53} = \frac{384.16}{2.53} = 151.8 \text{ approx.}$$

Expectation of 10% drop out, so  $152 + 8 = 160$

Therefore, the sample size is 160 and the sample size for the pilot study is 10.

### 3.2 Data and Sources of Data

For this study data were collected from the available and reliable sources, data and information from books, journals which were published and non-published research studies and attempt was made to review literature through internet (sites: MEDLAR, PUBMED and MEOLINE) research and printed or published (books, journals, articles) research.

The reviewed literature for the present study is organized and presented under as follows headings: -

- Literature related to knowledge of medication dosage calculation.
- Literature related to medication dosage calculation error.

## I. RESEARCH METHODOLOGY

The descriptive approach was adopted to accomplish the objectives of the study. Non probability purposive sampling technique was used to select 160 staff nurses who were working in SGT Hospital Gurugram, Haryana. The data was collected using self-structured demographic data and a self-structured knowledge questioner.

### 3.4 Statistical tools and econometric models

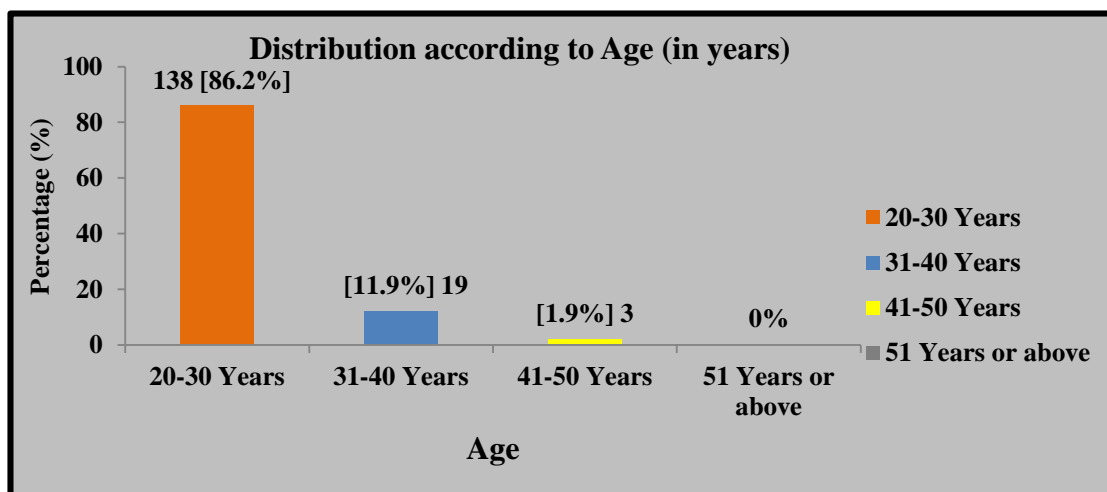
Data analysis was planned to include descriptive and inferential statistics. The following plan for analysis was developed with the opinion of the experts based on the objectives of the study:-

1. Distribution of demographic variables among staff nurses using frequency and percentage.
2. Describing the medication dosage calculation skills among staff nurses related to different aspects as conversions, tablet calculations, IV (intravenous) drug calculations, inotropic drug calculations, drug calculations in pediatric patient and drug calculations in maternal patients by using mean, mean percentage and standard deviations.
3. Describing the knowledge level regarding medication dosage calculation skills among staff nurses in terms of adequate knowledge, moderate knowledge and inadequate knowledge.
4. Correlation between knowledge level with selected socio demographic variables of the staff nurses.

### IV. RESULTS AND DISCUSSION

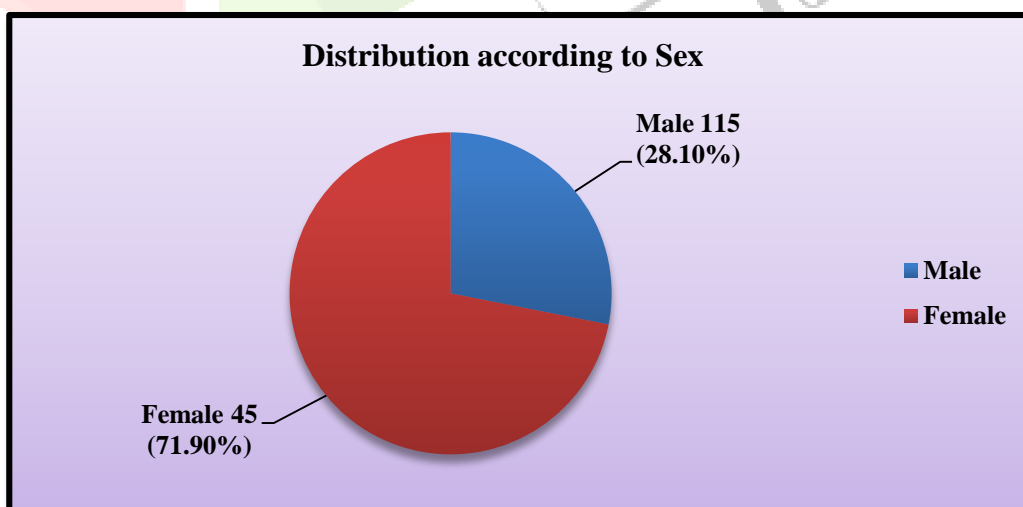
#### SECTION 1: Description of socio-demographic variables of the staff nurses.

It deals with demographic data which consists of 6 items to collect the sample characteristics, which includes age (in years), sex, marital status, highest educational level, working area and total years of working experience. A non-probability



**Figure 1: Column graph showing frequency and percentage distribution of staff nurse according to age (N=160)**

Figure 1: Indicates that out of total samples maximum 138 (86.20%) were of age group 20-30 years, 19 (11.90%) were of age group 31-40 years, 3 (1.90%) were of age group 41-50 years and none were in 51 years or above.



**Figure 2: Pie chart showing frequency and percentage distribution of staff nurse according to sex (N=160)**

Figure 2: Indicates that out of total samples the maximum 115 (71.90%) were females and remaining 45 (28.1%) were males.

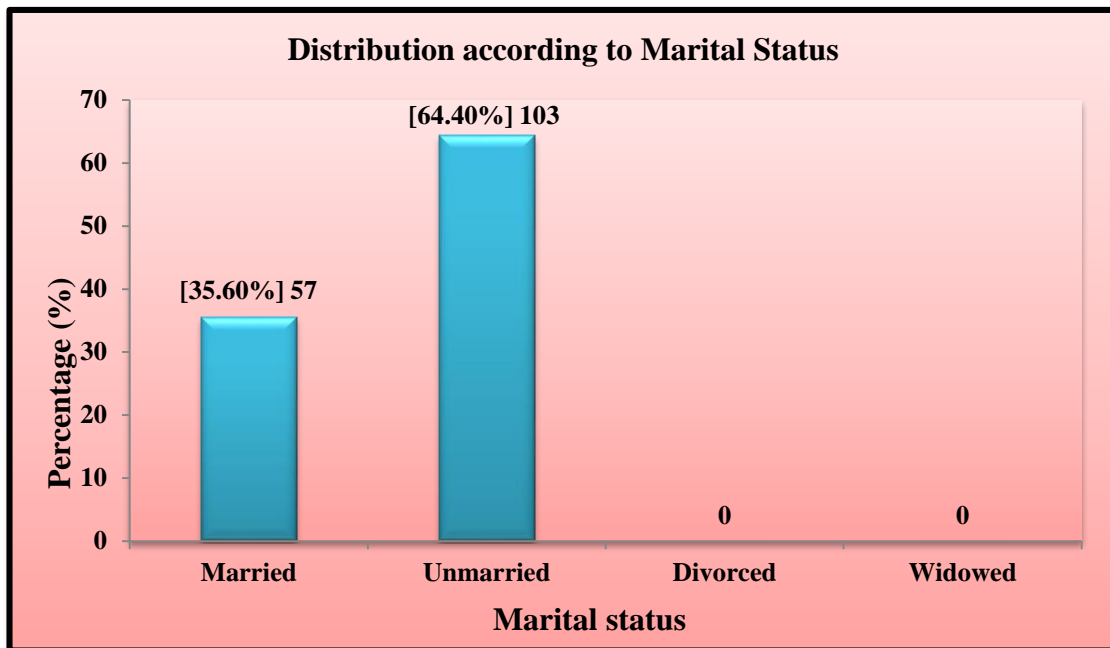


Figure 3: Column graph showing frequency and percentage distribution of staff nurses regarding to marital status (N=160)

Figure 3: Indicates out of the total samples the maximum 103 (64.40%) were unmarried, 57 (35.60%) were married and none were divorced or widowed.

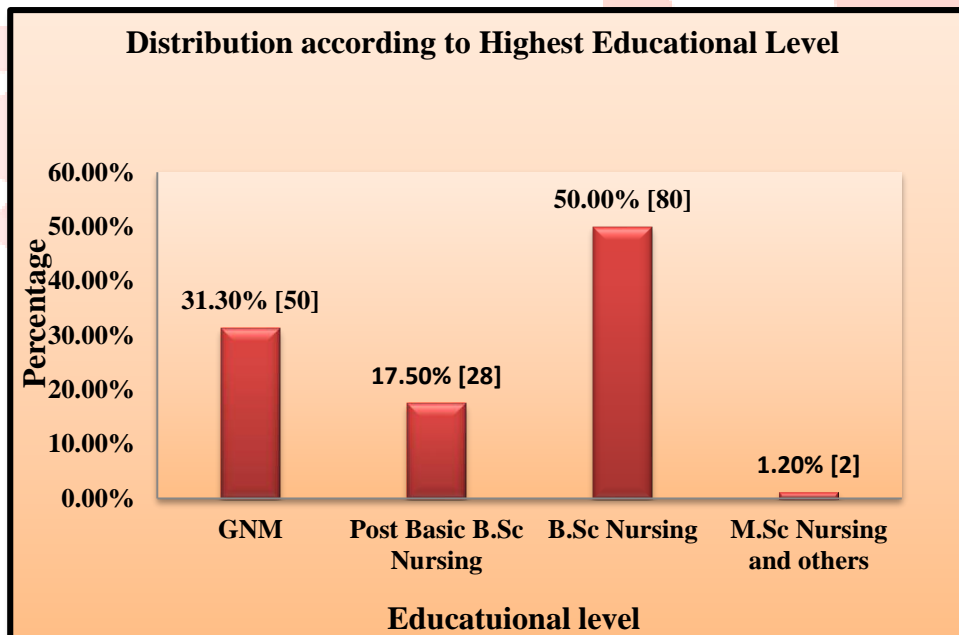


Figure 4: Column graph showing frequency and percentage distribution of staff nurses according to highest educational level (n=160)

Figure 4: Indicates that out of the total samples, maximum 80 (50.00%) staff nurses had a qualification of B.Sc. Nursing, 50 (31.30%) had qualification of GNM, 28 (17.50%) had qualification of Post Basic B.Sc. Nursing and 2 (1.20%) had qualification of M.Sc. Nursing.

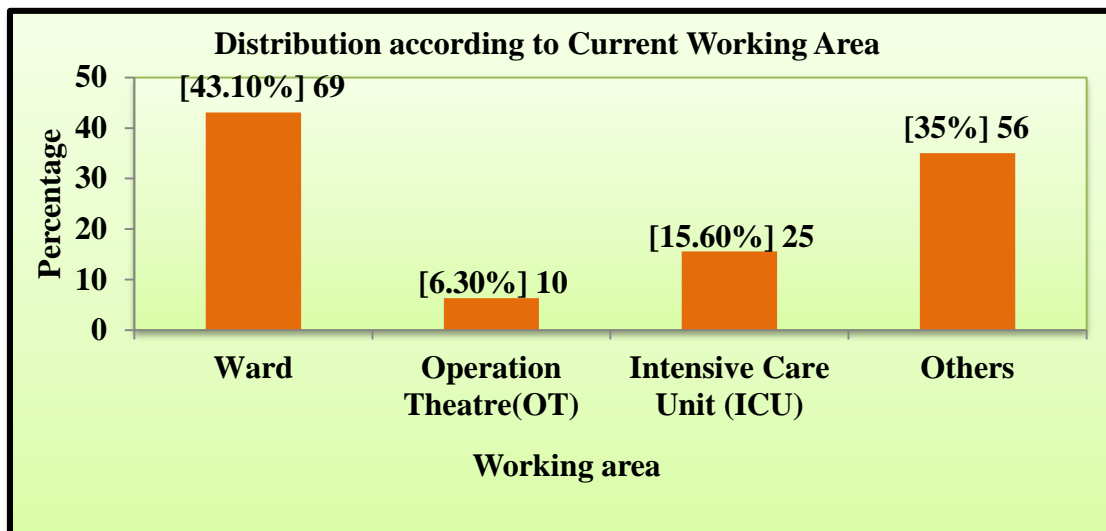


Figure 5: Column graph showing frequency and percentage distribution of staff nurses according to current working area (N=160)

Figure 5: Indicates that out of the total samples, maximum 69 (43.10%) staff nurses were working in the ward, 56 (35%) were working in other areas, 25 (15.60%) were working in intensive care unit and 10 (6.30%) were working in operation theatre.

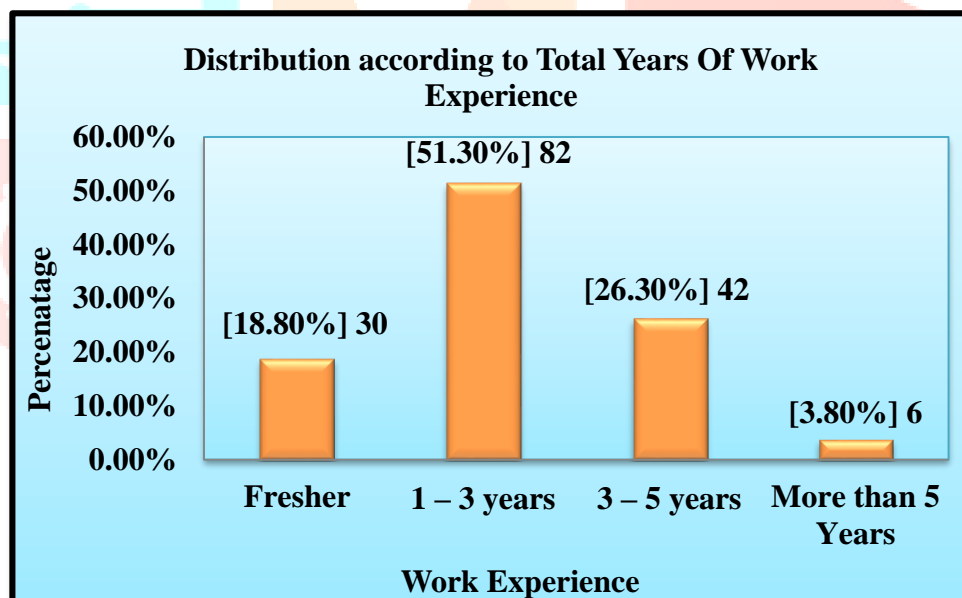
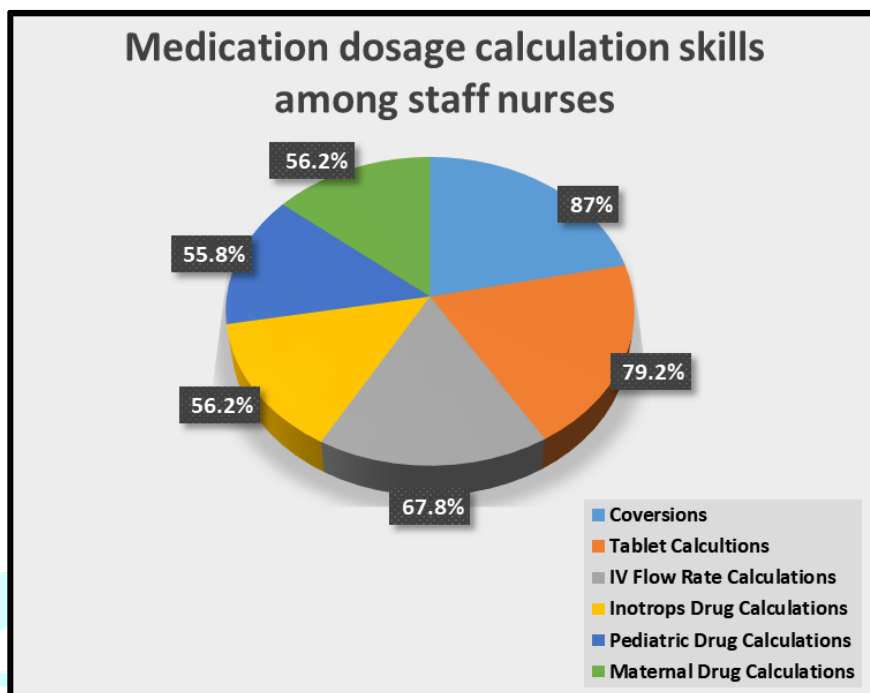


Figure 7: Column graph showing frequency and percentage distribution of staff nurses regarding total years of work experience (N=160)

Figure 7: Indicates that out of the total samples, maximum 82 (51.30%) staff nurses had 1-3 years of work experience, 42 (26.30%) had 3-5 years of work experience, 30 (18.80%) were freshers and 6 (3.80%) had more than 5 years of work experience.

**SECTION 2: Analysis is based on knowledge of medication dosage calculation skills among staff nurses.**

This section deals with the analysis and interpretation of the data in terms of knowledge related to medication dosage calculation skills in the aspects of conversion, tablet calculations, IV (Intravenous) flow rate calculations and inotropes drug calculations, drug calculations in pediatric patients and drug calculations in maternal patients among staff nurses.



**Figure 8: Pie chart shows the level of knowledge distribution in terms of the mean percentage of the staff nurses regarding medication dosage calculation skills.**

Figure 8: Indicates that out of the total sample, the staff nurses had the highest [87%] mean percentage of knowledge in the conversion section, [79.2%] mean percentage in the tablet calculation, [67.8%] mean percentage in the intravenous flow rate calculations, [56.2%] mean percentage in the inotropic calculations and drug calculations in maternal patients and staff nurses had the minimum [55.8%] mean percentage of knowledge in the drug calculations in pediatric patient section.

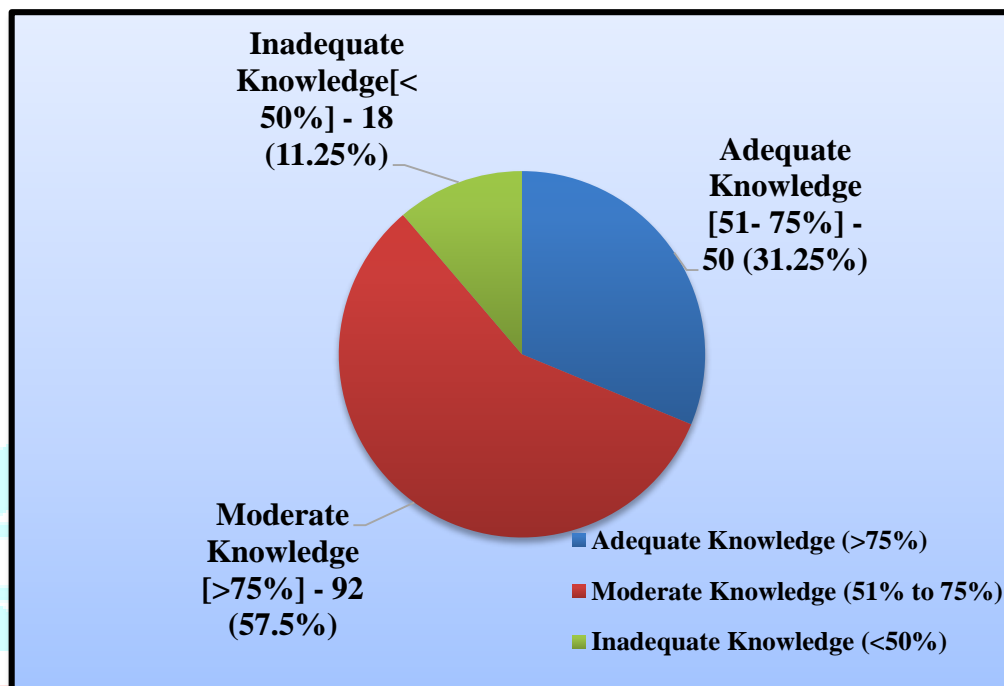
**Table 1: Finding related to medication dosage calculation skills among staff nurses.**

(N=160)

S.NO.	ASPECT	NO OF ITEM	MEAN	MEAN [%]	SD
1.	Conversions	5	4.35	87%	1.05
2.	Tablet Calculations	5	3.96	79.2%	1.07
3.	IV (Intravenous) Flow Rate Calculations	5	3.39	67.8%	1.26
4.	Inotropes Drug Calculations	5	2.81	56.2%	1.41
5.	Drug Calculation in Paediatric Patients	5	2.79	55.8%	1.40
6.	Drug Calculation in Maternal Patients	5	2.81	56.2%	1.38
<b>TOTAL</b>		<b>30</b>	<b>20.14</b>	<b>67.13%</b>	<b>3.91</b>

Data presented in table 1 shows the mean and standard deviation of the staff nurses regarding the medication dosage calculation skills in the aspects, such as, conversions [4.35, 1.05], Tablet calculations [3.96, 1.07], IV flow rate calculations [3.39, 1.26], Inotropes drug calculations [2.81, 1.41], drug calculations in Pediatric patients [2.79, 55.8%, 1.40], drug calculations in Maternal patients [2.81, 1.38] respectively. In a total of 30 questions, each section contained 5 questions and every question carried 1 mark. The minimum marks is 15 and the maximum marks is 30.

The frequency and percentage distribution of knowledge level in terms of adequate, moderate and inadequate knowledge.



**Figure 8: Pie chart shows the frequency and percentage distribution of the knowledge level regarding medication dosage calculation skills among staff nurses (n=160)**

Figure 8: Indicates that out of the total 160 samples, the maximum 92 [57.5%] staff nurses had moderate knowledge [>51%], 50 [31.25%] staff nurses had adequate knowledge [>75%] and 18[11.25%] of staff nurses had inadequate knowledge [<50%].



**SECTION 3: To find association between knowledge level with selected socio demographic variables of the staff nurses.**

**Table 2: association between knowledge level with selected socio demographic variables of the staff nurses.**

[N=160]

Category	Sample	Adequate	Moderate	Inadequate	$\chi^2$ value	df	P Value
		F	F	F			
<b>Age [ in years]</b>							
20 – 30 years	138	41	80	17	2.036	4	0.729
31 - 40 years	19	8	10	1			
41 - 50 years	3	1	2	0			
51 or above	0	0	0	0			
<b>Sex</b>							
Male	45	18	22	5	2.342	2	0.310
Female	115	32	70	13			
<b>Marital status</b>							
Married	57	28	25	4	13.326	2	0.001*
Unmarried	103	22	67	14			
Divorced	0	0	0	0			
Widowed	0	0	0	0			
<b>Highest education status</b>							
GNM	50	16	29	5	0.716	6	0.994
Post Basic B.Sc Nursing	28	9	16	3			
B.Sc Nursing	80	24	46	10			
M.Sc Nursing and others	2	1	1	0			
<b>Current working area</b>							
Ward	69	24	37	8	5.668	6	0.461
Intensive care unit (ICU)	25	7	13	5			
Operation Theatre (OT)	10	2	6	2			
Others	56	17	36	3			
<b>Total years of work experience</b>							
Fresher	30	7	18	5	5.042	6	0.538
1 – 3 years	82	30	44	8			
3 – 5 years	42	10	27	5			
More than 5 Years	6	3	3	0			

#### \* **Significant at 0.05 Level**

Data represented in table 3 shows there is no significant association between the level of knowledge of the staff nurses and the demographic variables of the staff nurses in terms of age, sex, education, working area and work experience. Hence, we fail to accept the research hypothesis, eventually accept the null hypothesis.

## DISCUSSION

Medication dosage calculation is an important aspect for the staff nurses while providing care to the patients in the hospital settings. A small negligence will lead to life-threatening conditions. This study aims to assess the medication dosage calculation skills among staff nurses in SGT hospital, Haryana.

A total of 160 samples, 92 (56.5%) of the staff nurses had moderate knowledge (<50%) regarding knowledge of medication dosage calculation, 50 (31.25%) had adequate knowledge (51-75%) and 18 (11.25%) had inadequate knowledge (<50%) regarding the medication dosage calculation.

The result of the study indicates that there is no correlation between the medication dosage calculation skills with selected demographic variables of staff nurses.

The following objectives and hypothesis have been in relation to the study's findings:

## Medication dosage calculation skills among staff nurses.

An assessment of the medication dosage calculation skills was done using systematic knowledge questions. As a result, most of the staff nurses had moderate knowledge, only a few had adequate and very small had inadequate knowledge regarding medication dosage calculations. A similar study was conducted in Pune, regarding assessment of knowledge related to drug calculation among staff nurses. The staff nurses' knowledge was assessed using a structured questionnaire, which showed moderate knowledge among the maximum number of staff nurses and the rest of the staff nurses having adequate and inadequate knowledge regarding medication dosage calculations. [24]

## Association of medication dosage calculation skills with selected demographic variables.

The findings in the study indicated that there is no correlation between the levels of knowledge with selected demographic variables. It was supported by a study conducted on the staff nurse of a hospital which indicated that there is no correlation between the level of knowledge and the selected demographic variables. [28]

## II. ACKNOWLEDGMENT

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