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Comparative study to evaluate the knowledge of staff nurses regarding anthropometric measurement in relation to nutritional status among mothers of under-five children admitted in postnatal ward at tertiary care hospital Belagavi.

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Abstract

The nutritional status of children is one of the primary responsibilities of nurses in any healthcare setting. The capacity of nursing professionals to swiftly recognize nutritional deficiencies is vital for minimizing practice errors and achieving nutritional goals. The use of anthropometric measurements in relation to nutritional status among children under five has been suggested as a screening method for preventive primary care and monitoring childhood obesity within the population. Nevertheless, the reliability of measurements collected routinely has been called into question. This study aimed to evaluate the accuracy of height, length, and weight measurements obtained during well-child visits in primary care compared to those taken by trained research personnel. The objective of this research is to assess the knowledge level of staff nurses regarding the collection of anthropometric measurements for nutritional evaluations among pediatric patients by registered staff nurses. A descriptive cross-sectional

study was conducted using a random sample of 60 nurses employed in the postnatal ward at a tertiary care teaching hospital in Belagavi. A self-structured questionnaire was utilized to collect data. A scoring system was implemented to assess the knowledge level of nurses based on their responses to the questions.

Keywords: Evaluate. anthropometric measurement, nutritional status, postnatal ward, tertiary care teaching hospital.

1. Introduction

Anthropometric measurements denote non-invasive quantitative evaluations of the human body. According to the Centres for Disease Control and Prevention (CDC), anthropometry is a crucial instrument for assessing nutritional status in both children and adults. Generally, these measurements are employed within the pediatric population to evaluate overall health, nutritional adequacy, and the growth and developmental patterns of children. Growth metrics and recognized growth trends are regarded as the gold standards for healthcare professionals when assessing a child's health and well-being. Moreover, body measurements can assist in evaluating health and dietary conditions, as well as potential disease risks in adults. Furthermore, these measurements can be vital in determining adult body composition, which is critical for assessing underlying nutritional status and diagnosing obesity [1].

The essential elements of anthropometry encompass height, weight, head circumference, body mass index (BMI), and body circumferences that are utilized to assess adiposity (including waist, hip, and limb measurements), in addition to skinfold thickness. According to the guidelines established by the American Academy of Paediatrics and the Child Health and Disability Prevention (CHDP) Program Health Assessment, accurate serial anthropometric measurements can aid in detecting potential medical, nutritional, or social concerns in children. Any irregular anthropometric measurements, especially within the paediatric population, require further examination. Moreover, anthropometric measurements can be employed to assess body composition in athletes; this approach has been shown to improve competitive performance and help identify underlying medical issues, such as eating disorders. Fitness programs for athletes that are informed by anthropometric data have been proven to enhance cardiorespiratory fitness and strength [2].

Primary care providers employ these measurements to support parents and caregivers when children stray from healthy growth benchmarks. Measurements of weight, height, and length act as growth indicators to calculate the body mass index-for-age, which is advised as the most cost-effective, efficient, and precise metric in primary care for evaluating whether a child is overweight or obese [3].
Nutritional assessment consists of four key components: Anthropometric assessments, Biochemical Analysis, Clinical evaluation, and Dietary history. Anthropometry refers to the measurement of body weight, height, abdominal circumference, calf circumference, mid-arm muscle circumference, and subscapular skinfold. As noted by Gibson (1998), Anthropometric assessments are best performed in a hospital setting due to various benefits; the techniques used are safe and non-invasive for individuals, appropriate for large sample sizes, and the required equipment is both affordable and portable, as well as durable. Additionally, these measurements can be executed by personnel with relatively low skill levels [4].

Review of literature

A comparative analysis on the Assessment of Nutritional Status through Anthropometric Methods and the Evaluation of Knowledge and Attitude of Nursing Mothers towards Breastfeeding Practices highlights the importance of these practices in maintaining the nutritional status of children aged 0 to 2 years, who are often affected by daily habits. There exists a relationship between the apparent absence of solid meals for children and the persistence rates of child health in the country. It is essential to enhance these behaviours for the growth and success of children. During the critical developmental phase of the first two years, illnesses and poor health can significantly hinder children's potential for advancement. Breastfeeding is a fundamental human behaviour that not only benefits the health of both the infant and the mother but also offers substantial economic advantages for families and communities. The study will involve 200 nursing mothers from urban areas and 200 from rural regions. A purposive random sampling method was employed to gather data. Information was collected from nursing mothers through a structured survey aimed at examining their dietary habits and attitudes. After data collection, processing, and analysis, the post-intervention phase provided significant insights into breastfeeding practices and their importance [5].

A cross-sectional study design was employed to assess the reliability and accuracy of anthropometric measurements taken by student nurses. Six students, who had previously undergone training in anthropometry and had three months of practical experience at the Maternal Child Health Clinic (MCH), were chosen and divided into two groups. They were tasked with repeatedly measuring the weight, height/length, and MUAC of 320 infants. For every fifth child (n=60), an additional measurement was conducted by a gold standard nutritionist to evaluate their accuracy. The Intra-Class Correlation (ICC) coefficient was calculated to determine reliability, while the mean difference and Pitman’s statistic were utilized to assess the level of accuracy [6].

A cross-sectional study was conducted involving midwives and nurses working at antenatal and postnatal clinics in Ghana. Data was collected through a self-administered questionnaire. The data analysis utilized descriptive statistics, correlation, and linear regression techniques. The results reveal that almost 90% (n = 267) of the participants received nutrition education during their training, whereas 77.5% reported dissatisfaction with the time allocated for nutrition education, and 40% felt inadequately prepared from their education to provide nutrition care. Self-efficacy levels ranged from moderate to low [7].

Operational Definitions

Evaluate: Refers to judge or calculate the quality, importance, amount, or value of something.

Anthropometric measurement: Refer to non-invasive quantitative assessments of the body. As stated by the Centres for Disease Control and Prevention (CDC), anthropometry offers a significant evaluation of nutritional status in both children and adults.

Nutritional status: Is characterized as the outcome of the intricate interplay among food consumption, general health, and the social and physical surroundings, which affects an individual's survival, development, health, and overall well-being.

Postnatal ward: The postnatal ward refers to the section where mothers are received following childbirth. This environment is crucial as it was utilized in a study examining the elements that affect the use of antenatal care. The findings underscore the significance of the postnatal ward in comprehending

maternal health and its function in assisting new mothers and their infants during the period after delivery.

Tertiary care teaching hospital: A hospital that offers tertiary care, which represents a level of health care accessed through specialists in a large hospital following a referral from primary care and secondary care providers.

Objectives

- To evaluate the knowledge of staff nurses regarding anthropometric measurement in relation to nutritional status among mothers of under-five children admitted in postnatal ward.
- To evaluate the knowledge of staff nurses regarding anthropometric measurement in relation to nutritional status among mothers of under-five children with selected sociodemographic variables.

Hypothesis

H_1: There will be significant difference between knowledge score regarding anthropometric measurement in relation to nutritional status among mothers of under-five children admitted in postnatal ward.

H_2: There will be significant association between level of knowledge among staff nurses regarding anthropometric measurement in relation to nutritional status mothers of under-five children with selected sociodemographic variables.

Projected outcome: The findings of this research study will assist the investigator in assessing the anthropometric measurements in relation to nutritional status among nurses working in postnatal ward. Furthermore, it will suggest lifestyle changes aimed at reducing the impact of undernutrition and obesity among children in later life.

Materials and methods: A comparative study was conducted at tertiary care teaching hospital located in Belagavi, Karnataka, India, targeting staff nurses. Those staffs who provided consent to partake in the study for anthropometric measurements were included. A total of 60 nurses were participated.

Research methodology: The methodology employed for this study was descriptive in character.

Research design: In this investigation, the researcher employed a cross-sectional research design.

Population: The demographic comprised nurses working in postnatal ward enrolled at a tertiary care teaching hospital.

Sampling method: In order to evaluate the knowledge about anthropometric measurements in relation to nutritional status among nurses working in postnatal ward, in this study the investigator utilized, Random sampling technique was used, specifically, 60 nurses will be selected.

Data collection method: A structured interview schedule was chosen as the suitable approach for gathering data in this study. This technique is relevant for nurses, and a significant amount of information can be acquired through direct interviews while evaluating the knowledge about anthropometric measurements in relation to nutritional status

Development of tool: During the tool's development, the investigator examined both research and non-research literature and engaged in discussions with experts in the nutrition field. Formal discussions were also conducted with research specialists and peer group members. This process facilitated the selection of content for the tool's development.

Validity: To ensure the content validity, the tool was presented to 8 research experts specializing in nutrition and biostatistics. These experts were consulted to assess and confirm the items for their

adequacy, clarity, and suitability of the tool, and they were encouraged to provide comments and suggestions.

Reliability: To determine the reliability, the tool was tested by administering it to postgraduate medical students residing in tertiary Care Hospital, Belagavi. The reliability coefficient of the tool was calculated using the Spearman-Brown prophecy formula. The reliability of the structured questionnaire was established at r=0.582. Therefore, the investigator is authorized to proceed with the study. Additionally, the Guttmann split-half method collaborates this finding (Part-1, α=0.55 and Part-II, α=0.51). The structured questionnaire has been confirmed as reliable for conducting the main study.

Data collection procedure: Following the acquisition of permission from the medical officer at the Tertiary Care Hospital, the data collection took place in the month of February 20th, 2025. Prior to the interviews, the purpose of the interviews was communicated to all postgraduate students, accompanied by a self-introduction. A designated area within the hospital was chosen for conducting the interviews and the knowledge about anthropometric measurements in relation to nutritional status among staff nurses.

Data analysis plan: The information collected was examined in relation to the study's objectives, employing both descriptive and inferential statistics. The strategy for data analysis was crafted under the exceptional guidance of specialists in nursing and statistics. The data analysis plan included the following components. Sample characteristics would be detailed through frequencies and percentages. Data representation would utilize graphical formats wherever suitable.

Theoretical framework

Figure 1: The theoretical framework selected for this study is based upon the **"General system theory developed by Ludwig Von Bertalanffy",** a system consist of set of interacting compounds.

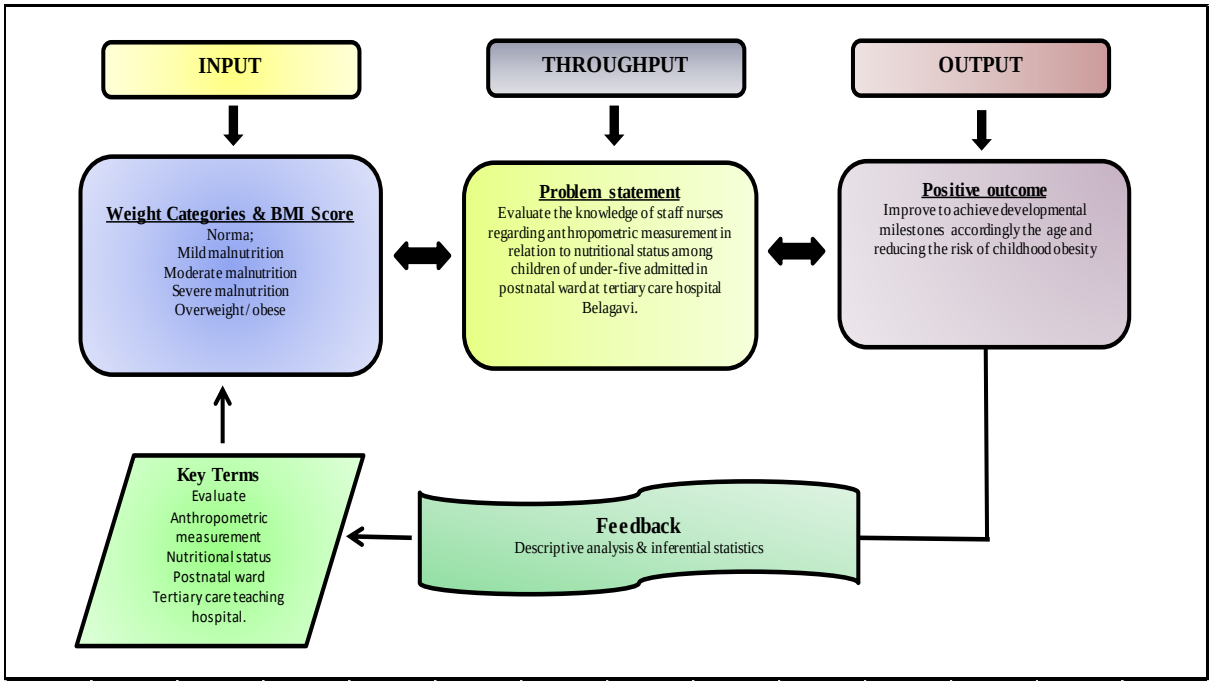
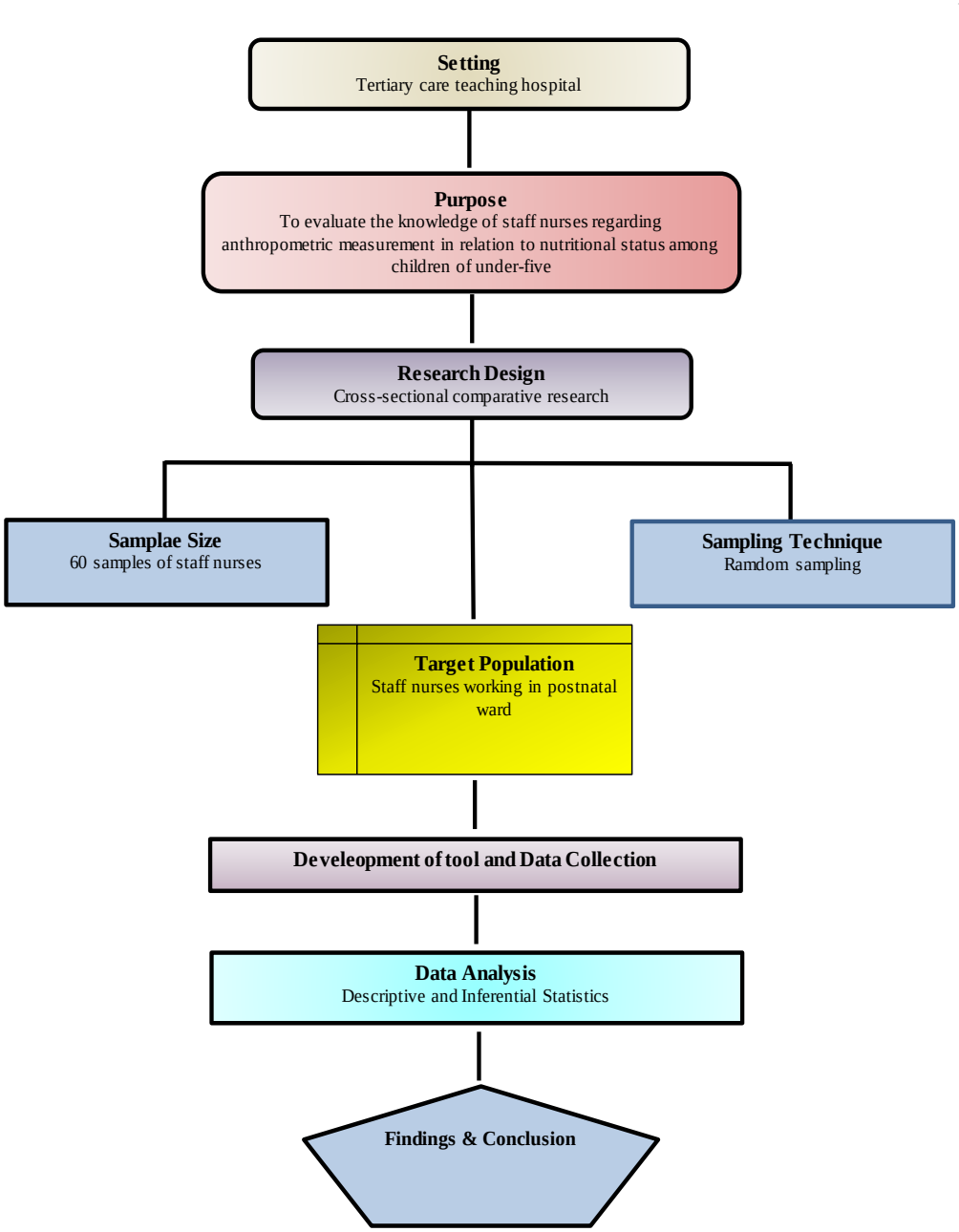


Figure 1: Schematic representation of research plan


Setting
Tertiary care teaching hospital
Purpose
To evaluate the knowledge of staff nurses regarding anthropometric measurement in relation to nutritional status among children of under-five
Research Design
Cross-sectional comparative research
Samplae Size
60 samples of staff nurses
Sampling Technique
Ramdom sampling
Target Population
Staff nurses working in postnatal ward
Develeopment of tool and Data Collection
Data Analysis
Descriptive and Inferential Statistics
Findings & Conclusion

Results

Descriptive Analysis of Demographic Variables

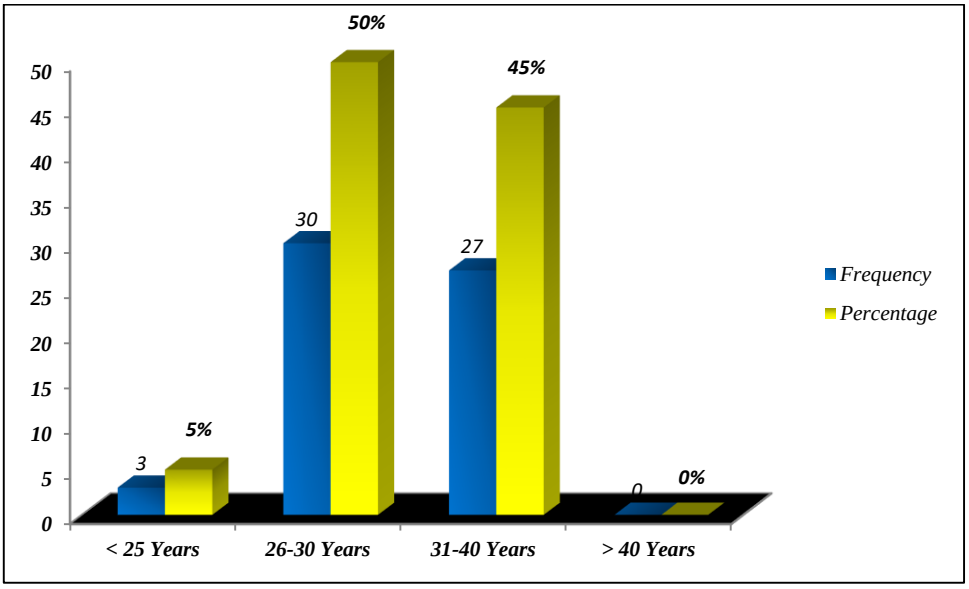
Table 1: Frequency and percentage distribution of mothers of under-five children

N= 60

Demographic Variables		Frequency *(f)*	Percentage *(%)*	Chi square
Age	< 25 Years	3	5	X^2= 5.374
	26-30 Years	30	50	DF= 12
	31-40 Years	27	45	P value= 0.9
	> 40 Years	0	0	
Religion	Hindu	15	25	X^2= 9.404
	Muslim	18	30	DF= 12
	Christian	10	16.66	P value= 0.6
	Others	17	28.33	
Education	Illiteracy	4	6.66	X^2= 9.274
	Primary school	16	26.66	DF= 12
	Secondary school	25	41.66	P value= 0.6
	Degree	15	25	
Occupation	Housewife	10	16.66	X^2= 10.881
	Labourers	2	3.33	DF= 12
	Private Employer	28	46.66	P value= 0.5
	Government Employer	20	33.33	
Type of family	Nuclear	36	60	X^2= 8.216
	Joint	24	40	DF= 8
	Extended	0	0	P value= 0.4*
Number of children	One	22	36.66	X^2= 10.88837627
	Two	28	46.66	DF= 12
	Three	8	13.33	P value= 0.5
	> Four	2	3.33	
Weight of children	< 10 kg	8	13.33	X^2= 8.581
	11-13 kg	22	36.66	DF= 12
	14-16 kg	20	33.33	P value= 0.7
	> 16 kg	10	16.66	
Health services availed from	P.H.C	7	11.66	X^2= 6.127
	SC	13	21.66	DF= 12
	C.H.C	10	16.66	P value= 0.9
	District Hospital	25	41.66	
	Private clinics	5	8.33	

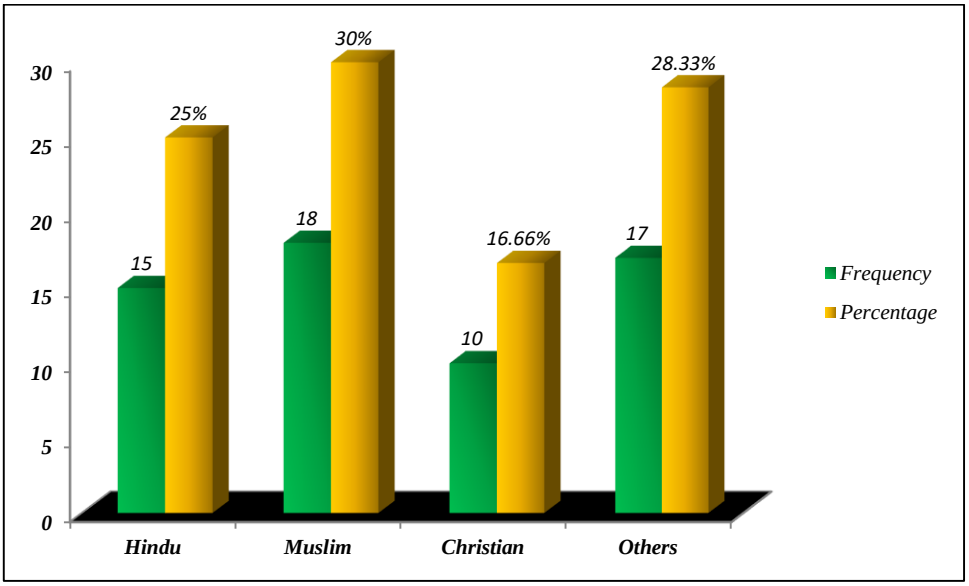
Table 1; Shows that,

Graph1: Age distributions



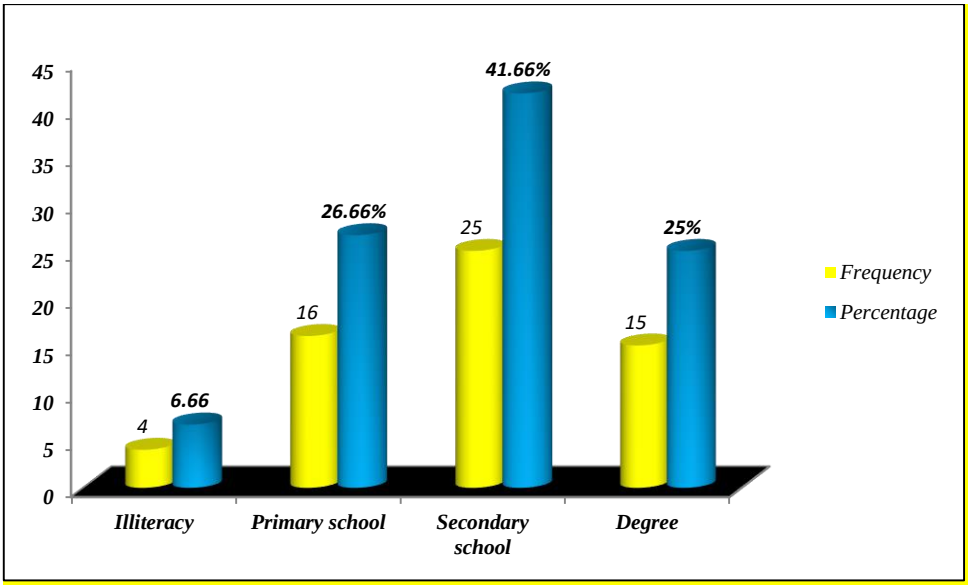
Accordance to the age, majority of the findings were, 30 (50%) of mothers belonged to 26-30 years, 27 (45%) of mothers belonged to 31-40 years, and 3 (5%) of mothers belonged to < 25 years.

Graph 2: Religion distribution



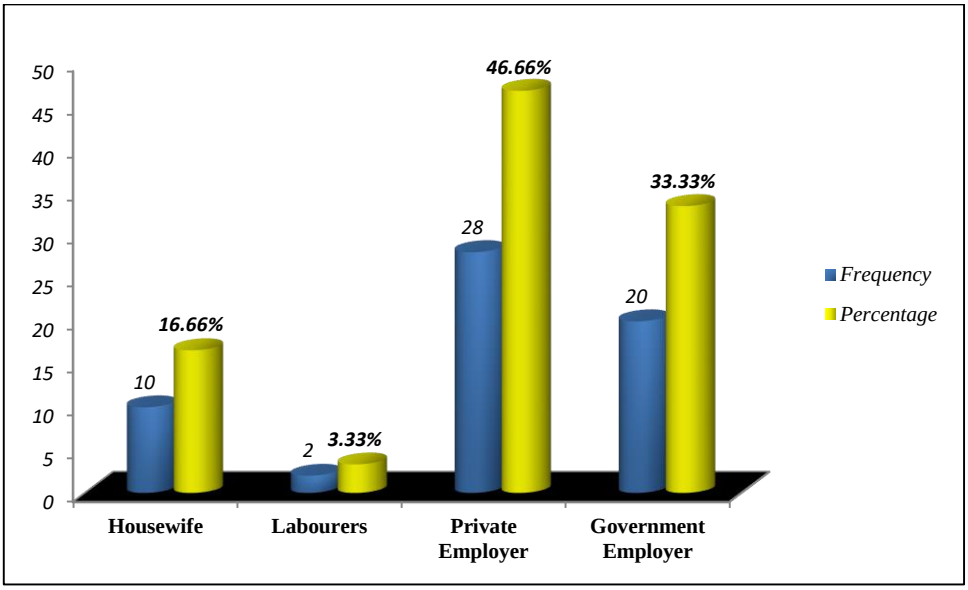
Accordance to the religion, majority of the findings were, 18 (30%) of mothers belonged to Muslim, 17 (28.33%) of mothers belonged to others, 15 (25%) of mothers belonged to Hindu, and 10 (16.66%) of mothers belonged to Christian.

Graph 3: Education distribution



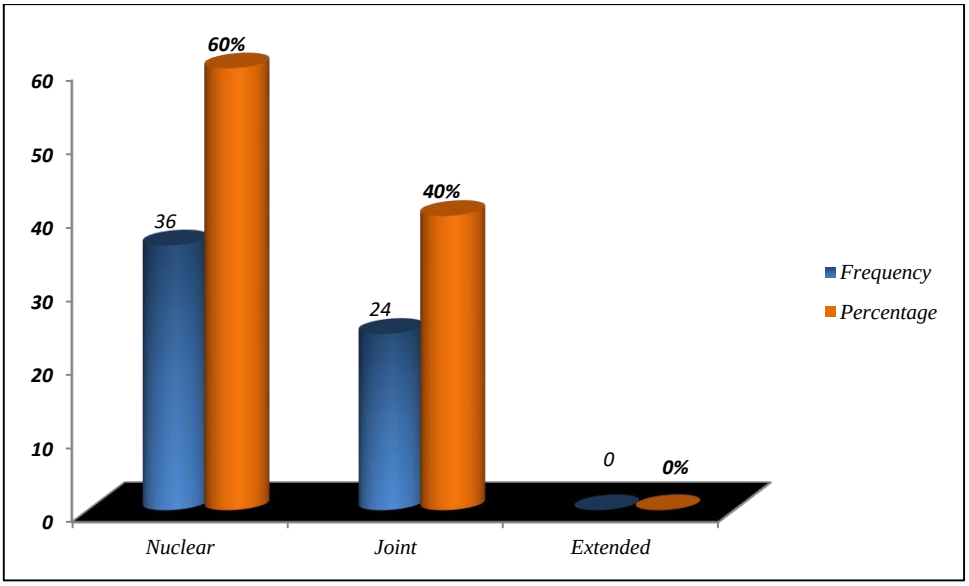
Accordance to the education, majority of the findings were, 25 (41.66%) of mothers belonged to Secondary school, 16 (26.66%) of mothers belonged to primary school, 15 (25%) of mothers belonged to degree, and 4 (6.66%) of mothers belonged to illiteracy.

Graph 4: Occupation distribution



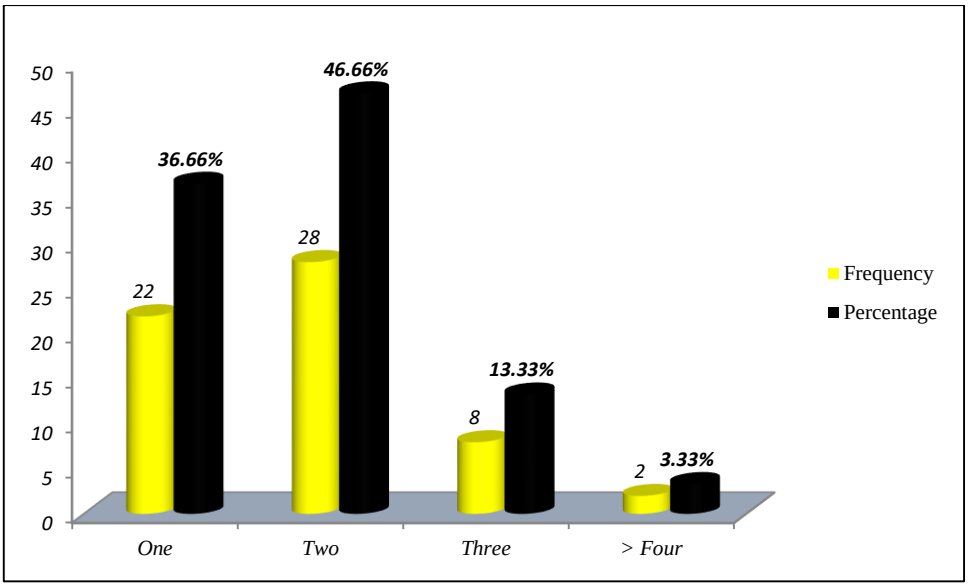
Accordance to the occupation, majority of the findings were, 28 (46.66%) of mothers belonged private employer, 20 (33.33%) of mothers belonged to government employer, 10 (16.66%) of mothers belonged to Housewife, and 2 (3.33%) of mothers belonged to labourers.

Graph 5: Type of family distribution



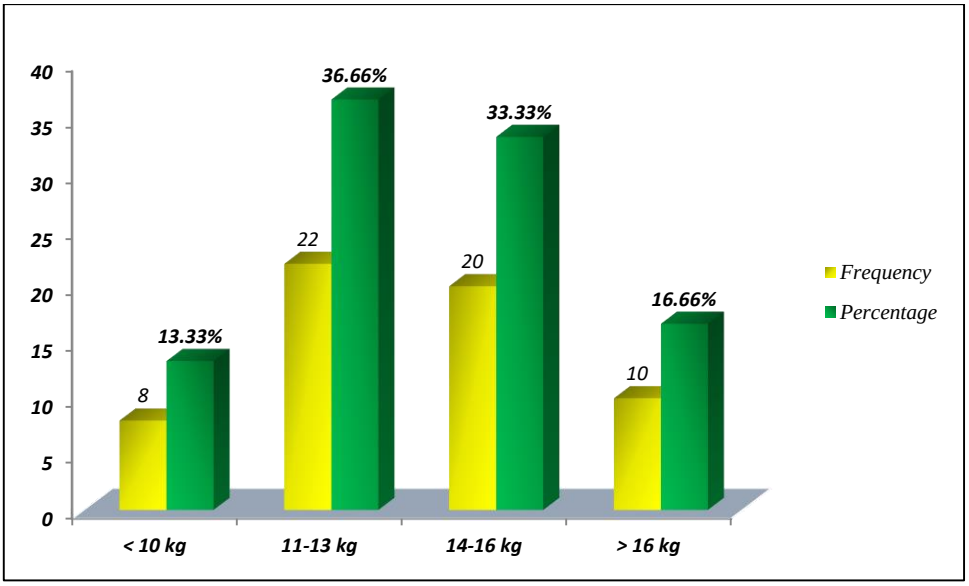
Accordance to the type of family, majority of the findings were, 36 (60%) of mothers belonged nuclear family, and 24 (40%) of mothers belonged to joint family.

Graph 6: Number of children distribution



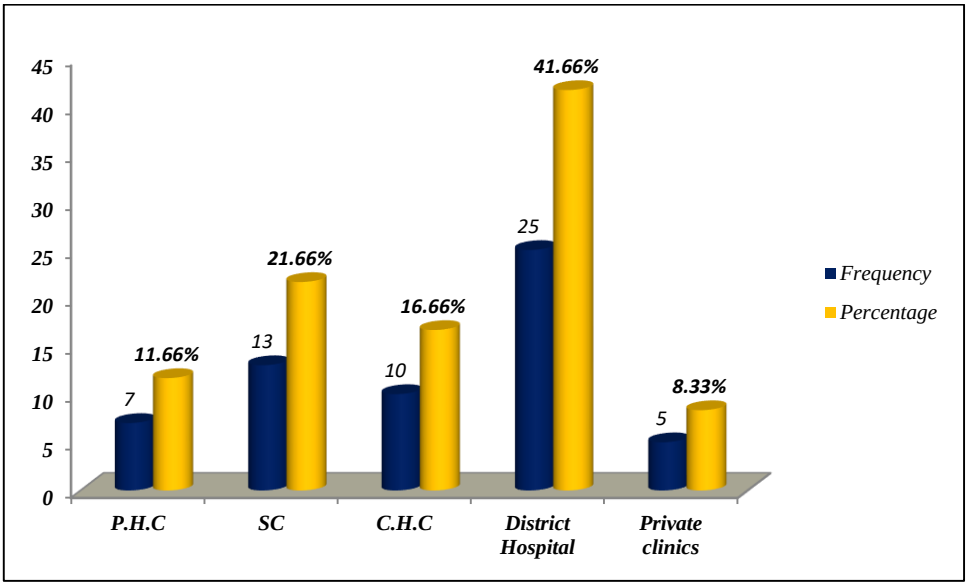
Accordance to the number of children, majority of the findings were, 28 (46.66%) of mothers had two children, 22 (36.66%) of mothers had one child, 8 (13.33%) of mothers had three children, and 2 (3.33%) of mothers had > four children.

Graph 7: Weight of children distribution



Accordance to the weight of children, majority of the findings were, 22 (36.66%) of mothers of under-five children weighing about 11-13 kg, 20 (33.33%) of mothers of under-five children weighing about 14-16 kg, 10 (16.66%) of mothers of under-five children weighing about > 16 kg, and 8 (13.33%) of mothers of under-five children weighing about < 10 kg.

Graph 8: Health services availed from distribution



Accordance to the health services availed from, majority of the findings were, 25 (41.66%) of mothers belonged to district hospital, 13 (21.66%) of mothers belonged to sub centre, 10 (16.66%) of mothers belonged to community health centre, and 5 (8.33%) of mothers belonged to private clinics.

Table 2: Prevalence of under nutrition and obesity among mothers of under-five children

N= 60

Age of children	Nutritional Status	Frequency *(f)*	Percentage *(%)*
1 Year	Normal	2	3.33
	Mild Malnutrition	4	6.66
	Moderate Malnutrition	5	8.33
	Severe Malnutrition	0	0
	Over weight/ Obese	0	0
	Total	**11**	**18.33%**
2 Years	Normal	2	3.33
	Mild Malnutrition	5	8.33
	Moderate Malnutrition	3	5
	Severe Malnutrition	2	3.33
	Over weight/ Obese	1	1.66
	Total	**13**	**21.66%**
3 Years	Normal	2	3.33
	Mild Malnutrition	4	6.66
	Moderate Malnutrition	4	6.66
	Severe Malnutrition	2	3.33
	Over weight/ Obese	1	1.66
	Total	**13**	**21.66%**
4 Years	Normal	2	3.33
	Mild Malnutrition	4	6.66
	Moderate Malnutrition	2	3.33
	Severe Malnutrition	1	1.66
	Over weight/ Obese	2	3.33
	Total	**11**	**18.33%**
5 Years	Normal	2	3.33
	Mild Malnutrition	5	8.33
	Moderate Malnutrition	2	3.33
	Severe Malnutrition	1	1.66
	Over weight/ Obese	2	3.33
	Total	**12**	**20%**
	Overall Total	**60**	**100%**

Table 2; Shows that,

In accordance to the age of 1 year, majority of the findings were 5 (8.33%) are belonged to moderate malnutrition, 4 (6.66%) are belonged to mild malnutrition, and 2 (3.33%) are belonged to normal.

In accordance to the age of 2 years, majority of the findings were 5 (8.33%) are belonged to mild malnutrition, 3 (5%) are belonged to moderate malnutrition, 2 (3.33%) are belonged to severe malnutrition, 1 (1.66%) are belonged to overweight/obese, and 2 (3.33%) are belonged to normal.

In accordance to the age of 3 years, majority of the findings were 4 (6.66%) are belonged to mild malnutrition, 4 (6.66%) belonged to moderate malnutrition, 2 (3.33%) are belonged to severe malnutrition, 2 (3.33%) are belonged to normal, and 1 (1.66%) are belonged to overweight/obese.
In accordance to the age of 4 years, majority of the findings were 4 (6.66%) are belonged to mild malnutrition, 2 (3.33%) belonged to moderate malnutrition, 2 (3.33%) are belonged to overweight /obese, 1 (1.66%) are belonged to severe malnutrition, and 2 (3.33%) are belonged to normal.
In accordance to the age of 4 years, majority of the findings were 5 (8.33%) are belonged to mild malnutrition, 2 (3.33%) belonged to moderate malnutrition, 1 (1.66%) are belonged to severe malnutrition, 2 (3.33%) are belonged to overweight /obese, and 2 (3.33%) are belonged to normal.

Table 3: Comparison between anthropometric parameters and nutritional status among mothers of under-five children.

N= 60

Age of the child	Parameters	Gender		Nutritional Status	Frequency *(f)*	Percentage *(%)*
		Male	**Female**			
1 Year	Length (cm)	71-80 cm	70-78 cm	Normal	2	3.33
	Weight (kg)	8-12 kg	8-11 kg	Mild Malnutrition	4	6.66
	Mid-upper arm circumference	> 13.5 cm	>13.5 cm	Moderate Malnutrition	5	8.33
	Head circumference	45-46 cm	45-46 cm	Severe Malnutrition	0	0
	Chest circumference	30-35 cm	30-36 cm	Over weight/ Obese	0	0
2 Years	Length (cm)	82-93 cm	82-92 cm	Normal	2	3.33
	Weight (kg)	10-15 kg	10-14 kg	Mild Malnutrition	5	8.33
	Mid-upper arm circumference	> 13.5 cm	> 13.5 cm	Moderate Malnutrition	3	5
	Head circumference	48-49 cm	48-50 cm	Severe Malnutrition	2	3.33
	Chest circumference	50-52 cm	50-54 cm	Over weight/ Obese	1	1.66
3 Years	Length (cm)	80-85 cm	80-84 cm	Normal	2	3.33
	Weight (kg)	11.3-18.3 kg	10.3-17.3 kg	Mild Malnutrition	4	6.66
	Mid-upper arm circumference	> 13.5 cm	>13.5 cm	Moderate Malnutrition	4	6.66

	Head circumference	49-50 cm	48-50 cm	Severe Malnutrition	2	3.33
	Chest circumference	51-53 cm	51-55 cm	Over weight/ Obese	1	1.66
4 years	Length (cm)	81-90 cm	80-90 cm	Normal	2	3.33
	Weight (kg)	14-20 kg	14-18 kg	Mild Malnutrition	4	6.66
	Mid-upper arm circumference	> 13.5 cm	> 13.5 cm	Moderate Malnutrition	2	3.33
	Head circumference	53-55 cm	52-56 cm	Severe Malnutrition	1	1.66
	Chest circumference	54-56 cm	55-56 cm	Over weight/ Obese	2	3.33
5 Years	Length (cm)	90-95 cm	90-94 cm	Normal	2	3.33
	Weight (kg)	18-20 kg	19-20 kg	Mild Malnutrition	5	8.33
	Mid-upper arm circumference	> 13.5 cm	> 13.5 cm	Moderate Malnutrition	2	3.33
	Head circumference	56-60 cm	57-60 cm	Severe Malnutrition	1	1.66
	Chest circumference	57- 60 cm	57-61 cm	Over weight/ Obese	2	3.33

Table 4: knowledge of staff nurses regarding anthropometric measurement in relation to nutritional status.

N= 60

Level of knowledge	Obtained score	Frequency (f)	Percentage (%)	Mean	Mean (%)	SD	Chi square
Very poor	**0-10**	3	**5**	2.6	**4.33**	**3.2**	X^2 value 17.486 DF= 12 P value= 0.13
Poor	**11-20**	5	**8.33**	2	**3.33**	**2.73**	
Average	**21-30**	13	**21.66**	3.4	**5.66**	**4.21**	
Good	**31-40**	30	**50**	4	**6.66**	**5.47**	
Very good	**41-50**	9	**15**	2	**3.33**	**1.71**	
Overall Total	**50**	60	**100%**	14	**23.31**	**17.32**	

***** P value < 0.05 level of significance

Table 4; shows that majority of the findings were 30 (50%) are perceived good knowledge with mean and standard deviation (6.66±5.47), 13 (21.66%) are perceived average knowledge with mean and standard deviation (5.66±4.21), 9(15%) are perceived very good knowledge with mean and standard deviation(3.33± 1.71), 5 (8.33%) are perceived poor knowledge with mean and standard deviation (3.33±2.73), and 3 (5%) are perceived very poor knowledge score with mean and standard deviation (4.33±3.2). Overall summary shows that there will be the significant association between levels of knowledge score regarding anthropometric measurement in relation to nutritional status.

Discussion

In the current study a cross-sectional research design used, the number of subjects about 60 staff nurses working in postnatal ward, the sampling technique of the study was random sampling, and the objectives of the study are; To evaluate the knowledge of staff nurses regarding anthropometric measurement in relation to nutritional status among children of under-five admitted in postnatal ward and to evaluate the knowledge of staff nurses regarding anthropometric measurement in relation to nutritional status among children of under-five with selected sociodemographic variables. The result findings shows that shows that majority of the findings were 30 (50%) are perceived good knowledge with mean and standard deviation (6.66±5.47), 13 (21.66%) are perceived average knowledge with mean and standard deviation (5.66±4.21), 9(15%) are perceived very good knowledge with mean and standard deviation(3.33± 1.71), 5 (8.33%) are perceived poor knowledge with mean and standard deviation (3.33±2.73), and 3 (5%) are perceived very poor knowledge score with mean and standard deviation (4.33±3.2).

In similar study, an explorative descriptive method has been adopted and 40 children of fewer than 5 were selected for the study. Obtained data by questionnaire on demographic proforma, physical examination and anthropometric measurements. The result of the study revealed that 42.5%of Children are according to weight for age, 65% of Children are according to height for age and 47.5% of children are according to their BMI for age, despite all the efforts by the government. The reproductive age women in this region have good knowledge about anaemia and its prevention but lack of practices also contribute to high prevalence of anaemia.

Conclusion

The following conclusions were drawn on the basis of the present study is to evaluate the knowledge of staff nurses regarding anthropometric measurement in relation to nutritional status among children of under-five admitted in postnatal ward at tertiary care hospital Belagavi. In this study accordance to the objectives, there will be significant difference between knowledge score regarding anthropometric measurement in relation to nutritional status mothers of under-five children, and there will be significant association between knowledge of staff nurses regarding anthropometric measurement in relation to nutritional status mothers of under-five children with selected sociodemographic variables.

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