EFFECTIVENESS OF MIXED CEREALS PORRIDGE ON

MALNUTRITION AMONG UNDERFIVE CHILDREN

IN SELECETED VILLAGES, SALEM

By

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CERTIFICATE

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"Duty is god: work is workshop,   he tiniest work is a flower place

at the feet of God"

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ABSTRACT

A study was done to evaluate the Effectiveness of Mixed Cereals Porridge on Malnutrition among under five Children in Selected Villages, Salem.

A Quasi experimental pre test post test with control group design was adopted. Data collection was done over a period of 4 weeks from 11.07.2011 to 07.08.2011.The investigator had selected the 30 samples each for experimental group and control group from Poolavari and Neikkarapatti Villages respectively through convenient sampling technique. Then the subjects from the experimental group were provided mixed cereals porridge for 27 days. Post test was conducted on every 5th day for both experimental and control group and the weight of the children were measured and analysed by Observational Proforma.

Findings of the study reveal that the mean pre-test and post-test weight of experimental group was 11.93and12.12.whereas in control group the mean pre test and post test weight was11.80 and 11.79. There was significant difference found in the Post test mean weight of under five children in experimental group and control group ('t' value was 2.41 at $p<0.001$ level). There was no significant association between the post test weight of under five children with their selected demographic variables in experimental and control group $p>0.05$ except age where significant association was found ($p<0.05$) the Hypothesis H_2 was retained.

The findings of the study showed that mixed cereals porridge produced a significant increase in body weight of malnourished under five children. This study would help the Child health nurse to motivate the under five children to consume mixed cereals porridge to maintain their good nutritional status.

CHAPTER – I

INTRODUCTION

"To eat is a necessity, but to eat intelligently is an art"

The importance of level of nutrition on health can never be underestimated. The word nutrition simply means the availability of nutrients and energy for body cells with respect to the requirements of the body and malnutrition pertain to the disproportion of body requirements and availability of nutrients. Malnutrition in under five children are mainly caused due to the synergic effect of improper or inadequate intake to food. **(Pelletien, 2005)**

Malnutrition is a very critical and notably a life threatening case due to the lack of important minerals, vitamins, fats and proteins. The mortality rate due to treatable diseases like cold or diarrhea is ten times higher in people suffering from malnutrition because of their compromised immune system**. (Dutta Parul, 2008)**

According to the estimates, the number of malnourished and underweight under-five children in India is at a staggering thirty seven million. In the whole world around 230 million under-five children are severely malnourished and above 50% of deaths among children under five years of age is due to malnutrition **(Van de Poel et al, 2007)**

Estimates from the United States illustrates that about one percentage of children are malnourished and the studies on hospitalized Under-five children in 2009 suggests that one in four children had acute malnutrition and 27% percentage of them had chronic malnutrition. **(Harohall.R, 2009)**

According to the estimates of The World Bank in 2009, India, has the second largest population of malnourished children when compared to other developing countries.

In developing countries malnutrition contributes to over 6 million child death. Half of all children under five years of age in south Asia and one third of those in Sub–Saharan Africa are malnourished. Under nutrition and malnutrition are the major causes of infant mortality in developing countries. **(Steven. M. Shiffirin, 2009)**

Food assisted child health nutritional programmes traditionally work by identifying under five children and the target their programs towards them. The global consensus has now suggested that making relatively small changes in the programmes can greatly increase their effectiveness in preventing malnutrition to a greater extent. **(Gretel, 2008)**

Need for the study

Today's children are tomorrow's citizens. Unless the nutritional needs of the children are adequately met, we cannot ensure healthy citizens of future. In the whole world around 8% of people are malnourished and according to statistics more than 160 million Under-five children are poorly nourished. **(U.N. Food and Agriculture, 2000,Jean Ziegler,2008**

Today, child malnutrition is prevalent in 7% of children under the age of 5 in China, 28% in Sub-Saharan Africa and 43% in India. Undernutrition is mainly seen in rural areas and 27-28% of them are underweight children. **(World Food Programme, 2009)**

All the supplementary nutritional programmes initiated nation-wide by many states are conducted for decades. However, a number of states have not yet introduced the supplementary nutritional programmes where rural poverty is high. So under nutrition is still the major nutritional problem among young children especially among tribal, slum preschoolers and school going children. **(Chakraborthy, 2005)**

A major factor adversely affecting the birth of healthy babies is the poor nutrition status of mother. In India, fifty one percentages of all children below five years of age are under nourished. It is estimated that around 50-60% of children are malnourished by the age of two years due to improper food intake. The malnutrition of preschool children in India is 1-2%. **(Dhaar GM ,Robbani.I, 2008)**

National family health survey found that almost 50% children under three years of age are affected with malnutrition. Studies show that 80% of the pre school children are under nourished. At any given time, there are about 80million children suffering from malnutrition of which 3-4% suffer from sever degree of malnutrition **(Park.K,2007)**

Malnutrition is still a major public health problem in developing countries including India. According to WHO there are about 10.8 million child death a year globally. This number attributed to Iron, Vitamin A, and Zinc deficiencies. Iron deficiency affect 2billion people and kills 80000 people per day. Up to 3 million of these death are directly or indirectly associated with malnutrition. **(Gupta.M.C,2003)**

Malnutrition is a major pediatric problem and it is responsible for high rate of morbidity and mortality. Mortality due to malnutrition in India accounted for 58% for the total mortality in 2006 .About 5,00,000 of infants and children dies every year in India due to gross malnutrition. About 75 to 80% of the hospitalized children suffer from some degree of malnutrition. Malnutrition is a great challenge for under developing countries. In India the death rate is highest in the group 0 - 4 years. This is result of malnutrition and infection. **(Selva.S.R, 2007)**

Some of the main factors leading to malnutrition are poverty increased prices of food stuffs, food intake practices, agricultural productivity etc. Malnutrition could also be caused due to other health issues such as diarrhoeal disease or chronic diseases

such as HIV/AIDS. In the rural areas under nutrition in various forms is a major health problem particularly among the land less people. **(Musaigen, 2001)**

Malnutrition affects the growth and development of the child. Stunted growth could be explained as a noticeable reduction in the rate of development. This condition of reduced growth is mainly caused due to malnutrition in early childhood, which also includes malnutrition during fetal development brought on by the malnourished mother .Malnutrition affect the intellectual developmental of the child. **(Tellier, 2007)**

Malnutrition deprives the body's capacity to carry out the normal function and development. Malnutrition is a major health problem in poor and under developed countries where the children are not adequately fed to meet the nutritional requirement. **(Dibley, 2001)**

Malnourished children have greatly increased risk for morbidity and mortality. The complications of malnutrition is a longer recovery period, impaired wound healing, muscle atrophy, impaired gastro intestinal, cardio vascular , renal functions, brain dysfunction , and sepsis. **(Plattsburg, 2010)**

Anthropometry is a very important tool, both for growth monitoring and for the assessment of nutritional status. The publication by WHO of internationally agreed growth standards in 1983 facilitated comparative nutritional assessment and the grading of childhood malnutrition. **(Dugganmp, 2010)**

Prevalence of malnutrition is very high in India; especially in rural area. A cross sectional study carried out in randomly selected six villages to estimate the prevalence and demographic and socioeconomic factors associated with malnutrition with IAP standard. The prevalence of malnutrition among the under five children

was50.46%.Children from lower socioeconomic status, with low birth weight were significantly malnourished.**(Deepak B Phalke, 2009)**

Cereals are the cheapest source of food energy and protein content. The main cereals crops include Rice, Wheat, Corn, Millet and Oats. Cereals are the rich source of vitamins, minerals, carbohydrates, fat, oils and protein. In developed countries cereals consumption is moderate and varied but still substantial. **(Faber, 2006)**

Different styles and combinations of cereals are seen in different parts of the country, some of the varieties of recipes seen in different parts of the country includes, khichdi, dalia, suji kheer, upma, idli, dokhla, bhaat-bhaji etc. The traditional foods are often altered by the mothers to make it suitable for their children. (**Nehru Science Centre, 2011)**

Porridge is a dish made by boiling crushed, or rolled cereals in water, Milk or Legumes or both may also be used along with the cereals for the preparation of porridge. Inclusion of multi cereals along with legumes could further improve the nutritional value of the porridge. **(Grant, 2001)**

Inclusion of cereal based diet can be an effective strategy for addressing childhood malnutrition in developing countries. Intake of mixed cereals porridge could reduce the prevalence of anemia, improve motor development and iron status. **(Brawn, 2003)**

Malnutrition is a serious concern in developing countries. In Kenya, Edom Nutritional Solutions has developed a mixed Cereals porridge and a maize flour product to combat malnutrition. In most cases malnourished adults has a history of severe malnutrition during their childhood. The nurses have a very important role in identifying the nutritional of children and resolving the condition. **(Bapen, 2005)**

The early stages of life, most importantly the first five years of life, are very crucial as far as the growth and development of a human is concerned. This is due to the fact that dietary and food intake pattern shapes up during this stage. The nurses play a key role in identifying the children at the risk of malnourishment. The children at the risk of malnourishment can be identified through nutritional assessment. High risk children need a comprehensive nutritional assessment, weighing the child at least once in a week, measuring length or height in cm, measuring head circumference and discussing the readings with the parents and children **(Hall. D. Ellimon DC, 2003)**

Malnutrition is one of the most common condition in children. In India which if not monitored and corrected will adversely affect the child's growth and development. Further the cereal porridge which is a cheap, higher nutritious and easily prepared food is found to reduce the incidence of malnutrition to a great extent. Hence the investigator felt the purpose to undertake this study.

Statement of the Problem

A Study to Evaluate the Effectiveness of Mixed Cereals Porridge on Malnutrition among Under five Children in selected villages, Salem.

Objectives

- To evaluate the existing nutritional status of children under five years of age in experimental and control group.

- To evaluate the effectiveness of mixed cereals porridge on malnutrition among under five children in experimental group.

- To associate the nutritional status of under five children in experimental and control group with their selected demographic variables.

Operational Definitions:

Effectiveness:

It is the significant difference in the pretest and post test nutritional status of under five children as measured through observational check list.

Mixed cereals porridge:

A soft food made by boiling cereals like Ragi, wheat, corn, rice, groundnut and green gram in water with jaggery.

Malnutrition:

Diseased state caused by a lack of calories and or essential minerals, protein, vitamins due to an insufficient diet or an excessive diet.

Under five children

Children below five years of age.

Assumptions

1. Mixed cereals porridge may improve the nutritional status of under 5 children.

2. Demographic variables may influence the nutritional status of under five children.

3. Children in rural area may have higher incidence of malnutrition.

Hypotheses

H_1: There will be significant difference between the post test nutritional status of under five children in experimental and control group at $p < 0.05$ level

H_2: There will be significant association between the nutritional status of under five children with their demographic variables at $p < 0.05$ level.

Delimitations

1. The study will be limited to under five children.

2. The study will be limited to only selected villages, Salem.

3. The study period will be limited to four weeks.

Projected outcome:

This study was conducted to determine the effectiveness of mixed cereals porridge on malnutrition among under-five children. The findings of the study will help the community health nurse to improve nutritional status among under five children using mixed cereals porridge.

Conceptual Framework

The investigator adopted the Wiedenbach's Theory of Helping Art of Clinical Nursing (1964) for conceptual framework.

Ernestine Wiedenbach proposed a prescriptive theory for nursing which is described as conceiving of a desired situation and the ways to attain it. According to this theory nursing practice consist of three steps which include

Step - I   Identifying the need for help

Step - II   Ministering the needed help

Step - III   Validating that the need for help was met

This theory views nursing as an art based on a goal or central purpose.

Identification involves the determination of a patient's need for help based on the existence.

Ministration refers to provision of help.

Validation refers to a collection of evidence that shows a patient's needs have been met and the functional ability has been restored.

Application:

Step-I: Identifying the need for help:

This involves determining the need for help. The investigator identified the under-five children with first degree malnutrition who need appropriate measures for their treatment.

Step-II: Ministering the needed help:

This refers to the provision of required help for the identifying need. It has two components.

      (i)   Prescription

      (ii)   Realities

i . Prescription

It refers to plan of care to achieve the purpose. In this the investigator had assessed the need of the under five children and planned according to it.

ii. Realities

It refers to the factors that come in to play in a situation involving nursing actions. It includes,

Agent   : The investigator

Recipient   : First degree malnourished under five children

Goal   : Improve the nutritional status

Means & Activities   : Administration of mixed cereals porridge

Framework & facilities : Home

Step-III: Validating that the need for help was met:

It refers to the collection of evidences that showed the nutritional status of under five children were improved. The validation was done by analyzing the findings and according to that the investigator found if the intervention was effective for under-five children in experimental group by showing improvement in their nutritional status.

CENTRAL PURPOSE
Improve the nutritional status of under five children

IDENTIFICATION OF NEED FOR HELP

Assessment of malnutrition among under five children by checking body weight.

Under five children are in need of nursing intervention for malnutrition.

Experimental Group

Pre test

Control Group

Pre test

MINISTERING THE NEEDED HELP

INTERVENTION

Administration of mixed cereals porridge for malnourished under five children

NO INTERVENTION

VALIDATING THE NEED FOR HELP

Posttest

Improvement in the nutritional status of experimental group

Effective

No changes in nutritional status of control group

Not Effective

FIG: 1.1 Conceptual Frame Work Based On Modified Wiedenbach's Helping Art Of Clinical Nursing (1964).

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Summary

This chapter dealt with introduction, need for the study, statement of the problem, objectives, operational definition, assumption, hypotheses, delimitations, projected outcome and conceptual framework.

CHAPTER – II

REVIEW OF LITERATURE

This chapter deals with a review of published and unpublished research studies and research materials for the present study. The review helped the researcher to develop an insight in to the problem and helped to build the foundation of the study.

Literature was reviewed theoretically, empirically and organized under the following headings,

- Review related to incidence of malnutrition

- Review related to mortality due to malnutrition

- Review related to effect of malnutrition

- Review related to managements and prevention of malnutrition

- Review related to government programmes for malnutrition

- Review related to various standards for assessing malnutrition

- Review related to effectiveness of mixed cereals porridge in prevention of malnutrition.

Review related to incidence of malnutrition:

A study was carried out with children between six and ten years of age who had outpatient consultation in a clinic in Manus, Brazil, to identify the occurrence of malnutrition and risk factors. Factors associated with under nutrition were analyzed using a random effects logistic regression. A cross sectional epidemiological research on a group of 347 children illustrated that the average occurrence of underweight, stunting, and wasting were 18. , 15.5 and 10.7% respectively, with reference to CDC growth curves and 14.3, 17.3 and 4.4% respectively which was supported by the evidences from NCHS growth curves.

Statistically the occurrence of wasting was higher according to CDC (Center for disease control) reference than that estimated using the NCHS (National Center for Health Statistics) reference (p-0.02). **(Maria M, et.al., 2008)**

A study was to assess the occurrence of protein energy malnutrition (PEM) in urban, rural and slum area of Chandigarh found that around 42% of children under five years of age had protein energy malnutrition and among them 22.7%, 14.5% and 0.7% of children had grade I,II,III,IV PEM respectively . The occurrence of PEM was very high in females (47.6%), in 1-3 years age group (53.80%), in slum area (67%) and children of labour class (60.5%). **(Swami.H.M, et.al., 2006)**

A study was to assess the nutritional status of preschool children (2-6 years) which was carried out in slum area of Udaipur city, Rajasthan the results illustrated that majority of the subjects were from nuclear family and had a very low monthly income of less than Rs1500. According to the research, the pattern of development illustrated that for both the male and female group height increased according to their age but the increase in weight was not increased in proportion to their age.More than 50%of these preschoolers had symptoms of anemia and protein energy malnutrition. The primary research further showed that the degree of malnutrition, according to IAP, was severe for majority of these subjects (66%) (Grade I and II). According to Waterlow's classification, the majority of these preschoolers were wasted (30%) or wasted and stunted (42%).**(Tripathy. M.S, et.al., 2006)**.

A study was conducted in a Sudanee displacement camp to assess the prevalence, risk factors, for malnutrition in displaced Sudanese children. 327 children were assessed for nutritional status and the major risk factors for protein energy malnutrition (PEM). According to the research, 186(56.1%) were malnourished and in

them 101(30.1%) were mildly, 43(13.1%) were moderately and 42(12.8%) were severely malnourished. According to Welcome classification, the most commone type of malnutrition was found to be under weight (38.2%), Marasmus, Kwashiorkor were detected in 6.4% and 0.9% respectively, there was no case of Marasmic kwashiorkor in the studied population. **(Ishag Adam, et.al., 2005)**

About 60%of children under five suffer from malnutrition in the world. A total of 13million children under five in Indonesia suffer from chronic malnutrition. Almost half of the nations 28 million children suffer from chronic malnutrition. **(World Food Programme**, **2005)**

Around 70% of children in the whole world who are malnourished live in India, resulting in the region having the highest concentration of childhood malnutrition. In the entire world one in two children is malnourished and in this 16% of them are from the republic of China and 64% from Bangladesh, occurrence of stunting and underweight are high in South Asia and 50% of preschool children are stunted. The Asian children also suffer from deficiency of micro nutrients. The micro nutrient deficiency seen in Asian children are due to multiple reasons, they could be due to biological, cultural and socio economic influences. **(Khor. G.L, 2003)**

A cross sectional study of under five population in Andhra Pradesh was carried out to find out the association of under nutrition with selected demographic variables such as age, sex, education of the mother, family, income, and economic status. Totally 612 under five children were included in the study. Height and Weight were measured according to the age group. Chi-square test was used to find out the association. The findings showed that out of 612 under five children, 323 (52.78%) males and 289 (42.22%) females were under weight according to their age. These children belonged to low socio economic status group. It showed that there was

significant association of under nutrition with economic status. **(Sharma and Gupta, 2001)**

Review related to mortality due to malnutrition:

A study was to reveal the mortality due to malnutrition in national level in India, 6 million under five children died due to malnutrition. .Reports revealed that nearly 3%of the Indian population suffers from some form of malnutrition **(Water sanitation and Health Department, 2007)**

Fifty five percent of the 12 million child deaths each year are related to malnutrition. Malnutrition develops due to diarrhea and malaria in most of the country. The death rate to malnutrition is 1,50,000 in global. **(Gernett, 2006)**

The high visibility of severe forms of malnutrition is like the tip of an Iceberg, shift the attention among from the much larger problem of mild and moderate forms. The profiles analysis shows that 4 Ethiopian children die every day because of protein energy malnutrition. **(Sherman, 2005)**

The global surveys from eighty five countries show that the value for percentage protein calories in healthy populations is constant at around 10%. As per ICMR standards, the recommendations for percentage protein calorie varies from 6.8% to 12% in different age and sex group. **(Mahajan, 2003)**

According to United Nations International Children's Emergency Fund **(UNICEF Reports, 2003)** under five death rates in Oromiya is 32.7% due to malnutrition.

The mortality due to malnutrition largely exceed the national average, with crude and under five death rate of 62/10,000 per day and 92/10,000 per day respectively, while nutritional survey measured wasting rates of more than 40% in the under five population. **(WHO, 2003)**

A study was conducted on nutrition problem of hospitalized children in a developing country, Thailand. Nutritional assessment reveals that the nutritional status of a patient. It there by helps to identify each patients need for specific nutritional care and facilitates early intervention. Generally, the common nutritional and nutrition related problems in hospitalized pediatric patients are high prevalence of malnutrition. Anemia and mineral deficiencies were found in children. **(Tienboon P, 2002)**

Review related to effect of malnutrition

A retrospective cohort study was to determine the effect of Early Childhood Protein Energy Malnutrition (EC-PEM) and current nutritional status as defined by anthropometric measures on the exfoliation and eruption patterns of teeth among adolescents in New York. Oral clinical examinations were conducted by using WHO diagnosis criteria. Anthropometric records (weight-for-age) from Haitian Foundation computerized data base on children from birth through 5-years old were utilized. Current heights and weights were ascertained. The result showed that both a delayed exfoliation of primary teeth and a delayed eruption of permanent teeth were associated with EC-PEM and current stunting in adolescence. The overall interpretation of the models is that malnutrition beginning in the earliest years extending throughout childhood influence the exfoliation and eruption of teeth. **(Poster, et.al., 2008)**

A cross sectional study was done to assess the association of malnutrition with increased blood pressure in childhood in Brazil .Blood pressure of 72 children older than 2years were assessed. The result showed that a greater percentage of children in the malnourished and recovered groups had increased systolic and diastolic BP after adjusting for Age, Sex and Height, compared to the controls (29,20 and 2%

respectively, p<0.001).Mean diastolic BP adjusted for Age, Sex, Race, Height, Weight and Birth order was significantly increased in malnourished and recovered children compared to controls. BP is increased in malnourished children and in those who recovered from malnutrition after an average period of 6 years. Malnutrition occurring during childhood may represent a risk factor for increased BP later in life **(James,2007)**

Review related to prevention and management of malnutrition:

A comparative study was conducted to assess the effect of Zinc delivered in a fortified food or a liquid supplement on the growth, morbidity and plasma Zinc concentration of young Peruvian children. The children consumed a mean of 22.26gm dry porridge and 96% of the possible doses. No significant difference in weight or length increments and rate of common illness were observed. Main plasma zinc supplements group (4.3microgm/dl) did not change significantly in the Zinc

 (-1.5microgm/dl:p<0.001) for group wise comparison. **(Brown and Romana, 2007)**

High energy food made with milk, oil, and sugar like skin milk casino hydrolytes or synthetic amino mixture may be used to reduce the nutritional deficiency in malnutrition and leads to rapid improvement in case of chronic cases. **(Nelson, 2006)**

A randomized nutritional study was conducted to evaluate home based therapeutic diet on malnourished children in Malaysia. Totally 219 children aged 1-5 years were selected by systemic random sampling in a selected community with under nutrition. Low cost home based protein rich food was given as a supplementary food to the children for a period of one year. Weight symptoms of poor nutritional status, incidence of under nutrition were recorded before intervention. The result showed that the overall recovery rate was 85%, the case fatality rate was 5%, out of 219 children

11 were wasting and edematous, and the incidence of under nutrition was decreased by 65%. **(Ciliberto, et.al, 2005)**

A study was to assess the effect of food intake of adding Amylase rich flour (ARF) from germinated wheat to supplementary food was conducted among children in a rural community. Nutrition centers under the Bangladesh Integrated Nutritional Project (BINP) a total of 166 malnutrition children of either sex, aged 6-24month, received one of 3diets randomly allocated to the community nutrition centers. The children were studied for 6 wks. Height for children who received ARF-SF than for children in the other 2 groups, but the difference were not statistically significant. The acceptability of ARF-SF was higher than that of the two other diets. Addition of ARF to existing standard supplementary food as used under the BINP programme was a simple and effective mean to increase the intake of food by changing its consistency, those who make it easier for malnourished children to ingest. **(Moha Khali, Dhoka, Bangladesh, 2005)**

A study was to determine supplementation trial among under weight and stunted on school children in Malawi. Totally 122 children were selected from the rural community. Weight and height were recorded and they were assigned randomly to experimental group (n-62) and control group (n-61). Maize and soy flour were used as a supplementary food for the period of 12 week. The post test intervention among experimental group (n-61) showed significant rise in weight (z-0.39) than the control group. **(Ruth, et.al, 2004)**

A descriptive study was conducted on the effectiveness of feeding practice on growth and development among the urban and rural preschool children in Uttar Pradesh. A sample of 80 was selected by stratified random sampling. An observational check list and Anthropometric measurement were used to collect the

needed information. The study revealed that being subjected to better feeding practice and environmental stimulation, urban children had better growth (10-25%) and developing performance compared to the rural children (7-18%). **(Ramanathan, 2001)**

A study was to find out the effectiveness of nutritional intervention in improving the development of preschool children in a slum in Dhaka, Bangladesh The children were fed the three meals and 2 snacks from locally available inexpensive food. For the 3-5 children who entered the programme a median increase of 8.7%weight and height was observed at 5wks(p<0.001), with the greatest improvement acquiring in those children with the lowest weight. Median increase of 2.7% and 4.7% of mental and motor development were noticed 6-10 month after the intervention. Gender and minor illness did not have a significant impact on a change in nutritional status and development. **(Rosenbugm, 2001)**

Government programmes for preventing malnutrition:

Therefore Government of India launched many nutritional programmes like supplementary Nutritional programme, special Nutritional Programme, Applied Nutrition Programme through ICDS scheme to improve the nutritional status of vulnerable children. Growth chart is maintained separately for each pre school child in ICDS Balwadi centers. Balwadi/ICDS center play a vital role in providing supplementary nutrition, non- formal education and creative activities for mothers, growth monitoring (to be more precise weighing children) to demonstrate clean eating habit , developing good habits such as washing of hands and brushing teeth, to educate mothers on preparation of recipes available in the same community area, cooking and testing of acceptable food items. **(Suraj Gupta, 2006)**

Kwashiorkor, and marasmus occurs mainly among pre school children for the low income groups due to inadequate dietary intake **(Swaminathan, 2003).**

Literature clearly emphasizes that the under nutrition is a preventable and curable nutritional disorder. Every endeavor should be made to combat this problem through multi-pronged approach like growth monitoring, nutritional supplementation and nutritional education. In spite of all the access to health care available, the problem of under nutrition still persists.

Review related to assessment of malnutrition:

A cross sectional study was undertaken in urban Dor-es-Salaam, Tanzanic in 2006. The studies involved 100 selected mothers of children 6-24 month old from house hold in Ilala municipality, one of the 3 municipality, that constitute the Dor-es-Salaam city council. Data were collected by structured questionnaire, spot check observation and Anthropometric measurement. The prevalence rate of stunting, under weight,wasting and morbidity were 43%, 22%, 3% and 80% respectively. **(Gilbert, 2006)**

A study on "anthropometric indices of measurement indicates of malnutrition in under five children" in Mangalore was aimed to evaluate the various nutritional assessment indices of preschool children. The study result denotes that weight for age is the best method of assessing nutritional status of under five children. **(Mohena, et.al., 2004)**

A study was to evaluate the effectiveness of nutritional status of n=under five children in an Anganwadi after a planned teaching programme on balanced diet in 2002, out of the sample studied 30% of the children had first degree of malnutrition, where as 70% of them had second degree malnutrition. After the planned teaching programme and reinforcement, the nutritional status has significantly improved, ie;

20% of the sample chosen have become welnourished, 40% of these improved from 2nd degree malnutrition to first degree malnutrition with in a month have should considerable change in their nutritional status. **(Smitha ThunddilParambil and Rached George, 2002)**

A study was done among 3-5 years children to find out the impact of malnutrition on development of children attending the nutritional programme for 6 months. The samples were chosen by stratified sampling. The tool used for the study was wood side developmental test. The impact of malnutrition based on Gomez classification on development was not statistically significant $(t-1.98(p>0.05))$. **(Popkin, 2001)**

Review related to effectiveness of mixed cereal porridge on malnutrition:

A food supplement cereal were supplemented to selected interventional group and comparison communities without intervention were assessed in Gujarath A total of 135 mothers with children in under two years were interviewed. Significantly higher prevalence of chronic malnutrition was found in children 0-11 month and in children 36-47 month in the intervention than in the control group. Difference in the complete under five group were statistically significant with height for age and weight for age and in favour of the control group children. High prevalence of global malnutrition (not shown) was found in children 12-23 month. **(Richard, 2007)**

A study was done to assess the effectiveness of ragi porridge in correction of iron deficiency anemia. Children in the experimental group and control group had been administered 500gm porridge of ragi for 30 days for girl between 6-12 years of age. The study result shows that the ragi porridge was reducing anemia from 45% to 17% in the experimental group whereas in the control group >40. The experimental group achieved on average 15.5% of the 25 motor development whereas un control

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group achived 14.4. The low cost fortified porridge can potentially have a significant effect in reducing anemia and increasing iron status and motor development of infants in poor setting. **(Beulab Angeline Vidhya, 2006)**

Infant food mixes that can be made at home from food grains available in the household. These mixes can be stored at least for a month and enable frequent feeding of infant. These are sattu like preparation which is quite familiar in the Indian community. One can take three part of any cereal (rice/wheat) or millet (ragi,bajra), one part of any pulse (moong, channa, arhar) and half part of groundnut. The food item should be roasted separately, and store in airtight containers. For feeding, take two table spoon of this infant food mix, add boiled hot water or milk, sugar or jaggery and add oil or ghee and mix well in to the porridge. **(National Guidelines On Infant and Young Child Feeding, 2004)**

Summary

This chapter dealt with literature related to incidence of malnutrition, mortality due to malnutrition, effect of malnutrition, management and prevention of malnutrition, government programmes for malnutrition, various standards for assessing malnutrition, and effectiveness of mixed cereals porridge in prevention of malnutrition.

CHAPTER – III

METHODOLOGY

Research methodology is a systematic procedure, which the researcher starts from the initial identification of the problem to its final conclusions. The role of methodology consists of procedures and techniques for conducting a study **(Sharma 2000)**

This chapter deals with a brief description of methodology which was undertaken by the investigator for the research study.

Research Approach

The selection of the research is a basic procedure for conducting the research study. In view of the nature of problem selected for the study and objectives to be accomplished, Quantitative Evaluative Approach was considered as an appropriate research approach to evaluate the outcome of malnutrition among the samples.

Research Design

Researchers overall plan for addressing a research question, including specifications for enhancing the integrity of the study. **(Polit and Beck, 2004)**

Quasi experimental pretest and post test with control group research design was used for this study.

Quasi experimental research design is a research design in which subjects are not randomly assigned to treatment conditions, but the researcher exercise certain control to enhance the study's internal validity. **(Polit and Beck, 2004)**

E	O_1	X	O_2
C	O_1		O_2

E   - Experimental group

C   - Control group

X   - Intervention

O_1 - Pre-test

O_2 - Post-test

Research Approach
Quantitative evaluative approach

↓

Research Design
Quasi experimental design

↓

Population
First degree malnourished under five children

↓

Setting

┌─────────────┴─────────────┐

Rural
Poolavari

Rural
Neikkarapatti

↓

Experimental group
Sample size – 30
Convenience sampling technique

Control group
Sample size – 30
Convenience sampling technique

↓

Pretest

Pretest

↓

Administration of Mixed cereals porridge

No Intervention

↓

Posttest

Posttest

└─────────────┬─────────────┘

Data Analysis
Descriptive and inferential statistics

Figure -3.1: Schematic Representation of Research Methodology

Population

Population is identified as the entire aggregation of cases that meet a designated set of criteria **(Polit and Beck, 2004)**

The population of this study comprised of all first degree malnourished under five children residing in selected villages, Salem.

Description of Setting

The study was conducted at Poolavari village and Neikkarapatti villages which are 3 kilometers from Sri Gokulam college of Nursing,Salem.Poolavari the village choosen for experimental group is a village with a population of about 3411 in which 209 belongs to under five population and among them 36 children were first degree malnourished. For the control group Neikkarapatti village was choosen, it comprised of 2430 population, in which 196 belongs to under five group out of which 32 children was first degree malnourished.

Sampling

Sample is the process of selecting a portion of population to represent the entire population. **(Polit and Beck, 2004)**

Sample

A subset of a population, selected to participate in a study. **(Polit and Beck, 2004)**

The sample of this study was first degree malnourished under five children who are present at Poolavari and Neikarapatti villages, Salem, during the study period and those who meet the inclusion criteria.

Sample size

Sample size consist of 30 subjects in experimental group and 30 in control group who full fill the inclusion criteria.

Sampling technique

Convenience sampling technique was used to select the samples.

Convenience sampling is a non probability sampling procedure in which the sampling units are selected because they are available to the investigator at the time of data collection **(B T Basavanthappa, 2007)**

Criteria for the sample selection

Inclusion criteria

Under five children

With only first degree malnutrition.

Exclusion criteria

Under five children

- with complications like mental retardation

- suffering with illness like diarrhoea, vomitting, fever

Variables

Independent variable: Mixed cereals porridge.

Dependent variable: Nutritional status of under five children.

Description of the Tool

Tool was developed after review of literature of books, journals, published and unpublished articles and after consultation with expert and guide.

Section-A: Demographic variables:

A structured interview schedule was used to assess the demographic data like age, sex, birth order, child is attending, type of diet, type of family, educational status of father and mother, occupation of the father and mother, and family income.

Section-B: Observational Proforma:

(Body weight---------in kg)

Interpretation:

Assessments of body weight with IAP standard were used to assess the malnutrition.

$$\text{Degree of malnutrition} = \frac{\text{Actual weight}}{\text{Expected weight}} \times 100$$

IAP classification of malnutrition:

When the child is having weight more than 80% of expected weight for age, considered as normal

Grade of malnutrition:

Grade I   –   Between 71-80% of expected weight.

Grade II   –   Between 61-70% of expected weight.

Grade III   –   Between 51-60% of expected weight.

Grade IV- 50% or less of expected for the age.

Validity and Reliability of the Tool

Validity of the tool was obtained on the basis of opinion of Medical and Nursing Experts (Two Medical Experts, Two Community Health Nursing specialists, three Pediatric Nursing specialists and one Nutritionist). The tools were found adequate and minor modifications was done in the recommended amount of feed to be given.

Reliability of the tool was checked by test re test method and the reliability coefficient was r= 1, which showed that the tools were reliable.

Pilot Study

The pilot study was conducted from 27.06.2011 to 03.07.2011 in Uthamasolapuram and Karipatti, Salem. Six first degree malnourished under five children were selected for pilot study through convenience sampling technique. The tools were administered and checked for its feasibility, language and appropriateness. The samples choosen were similar to characteristics to those of the population under study. The study was found feasible, practicable and it helped to select suitable statistical method.

Method of Data Collection

Ethical consideration

Written permission was obtained from the Panchayat president of Neikarapatty and Poolavari villages and informed consent was obtained from the parents of first degree malnourished under five children.

Data collection procedure

Data collection was done over a period of 4 weeks from 11.07.2011 to 07.08.2011. The investigator had visited the villages to identify the children who were meeting inclusion criteria. The investigator had selected the samples for experimental group from Poolavari village and for control group from Neikarapatti. The investigator had assessed the body weight of under five children and selected 60 first degree malnourished under five children from the above settings (30 from each village) through convenience sampling technique. Then the subjects from the experimental group were provided mixed cereal porridge for 27 days. The intervention was not given in the control group. Post test was conducted on every 5th day for both experimental and control group the weight of the children were measured.

Plan for Data Analysis

Descriptive statistics was used for categorizing data. Independent 't' test was used to determine the effectiveness of mixed cereal porridge and Chi-square test was used to associate the body weight of under five children with the selected demographic variables.

Summary

This chapter dealt with methodology, it consist of research approach, research design, description of the setting, variables, population, sampling, description of the tool, validity and reliability, pilot study, data collection procedure and plan for data analysis.

CHAPTER IV

DATA ANALYSIS AND INTERPRETATION

Research data must be processed and analyzed in an orderly fashion so that patterns and relationship can be discerned and validated, and hypotheses can be tested. Quantitative data analyzed through statistical analysis includes simple procedures as well as complex and sophisticated methods. **(Polit and Beck, 2004)**

Presentation of Data:

The data collected were organized as per the following sections,

Section-A:

Distribution of under five children according to their selected demographic variables in experimental and control group.

Section-B:

Comparison of mean Pretest weight of under five children in Experimental and Control group.

Section-C:

i) Comparison of mean pretest and post test weight of under five children in experimental and control group.

ii) Comparison of post test mean weight of under five children in Experimental and Control group according to their demographic variables.

iii) Comparison of mean weight of five post test observations of under five children in experimental and control group.

Section-D: Hypotheses Testing:

i) Effectiveness of mixed cereal porridge on nutritional status of under five children in Experimental and Control group.

ii) Association between the post test weight of under five children in experimental and control group with their selected demographic variables.

Section -A

Distribution of under five children according to their Demographic Variables in Experimental and Control group

Table – 4.1:

Frequency and percentage distribution of under five children according to their demographic variables in experimental and control group   n=60

Demographic variable of child	Experimental group(30)		Control group(30)	
	Frequency	%	Frequency	%
Age				
2.1-2.5yrs	2	6.7	6	20
2.6-3yrs	3	10	8	26.7
3.1-3.5yrs	10	33.3	4	13.3
3.6-4yrs	11	36.7	4	13.3
4.1-4.5yrs	2	6.7	2	6.7
4.6-5yrs	2	6.7	6	20
Gender				
Male	12	40	18	60
Female	18	60	12	40
Child is attending Anganwadi				
Yes	6	20	10	33.3
No	24	80	20	66.7
Type of Diet				
Vegetarian	2	6.7	-	-
Non vegetarian	28	93.3	30	100
Order of Birth				
First	9	30	12	40
Second	14	46.7	10	33.3
Third	7	23.3	8	26.7
Type of family				
Joint family	4	13.3	5	16.7
Nuclear family	25	83.3	23	76.7
Extended family	1	3.3	2	6.7

Distribution of under five children in experimental and control according to their age shows that 11(36.7%) under five children in experimental group belong to 3.6-4yrs of age,10(33.3%) belong to 3.1-3.5yrs of age,3(10%) belong to 2.6-3yrs of age,2(6.7%) belong to 2.1-2.5 yrs of age,2(6.7%) belong to 4.1-4.5yrs of age,2(6.7%) belong to 4.6-5yrs of age whereas in control group 8(26.7%) under five children belong to2.6-3yrs of age,6(20%) belong to2.1-2.5 yrs of age,6(20%) belong to 4.6-5yrs of age,4(13.3%) belong to 3.1-3.5yrs of age,4(13.3%)belong to 3.6-4yrs and 2(6.7%) belong to 4.1-4.5yrs of age. This reveals that highest percentage of under five children in experimental group 11(36.7%) belong to 3.6-4 yrs of age and in control group 8(26.7%) belong to 2.6-3yrs of age (Table 4-1).

Distribution of under five children according to the gender shows that in experimental group majority of under five children 18(60%) are females and 12(40%) of them are males whereas in control group majority 18(60%) of them are males and 12(40%) of them are females. This reveals that majority of them in experimental group are females and in control group are males (Table 4-1).

Distribution of under five children according to attending Anganwadi shows that in experimental group majority 24(80%) of them are at home and 6(20%) of them are going to Anganwadi whereas in control group majority 20(66.7%) of them are at home and 10(33.3%) under five children are going to Anganwadi. This reveals that in both the groups most of them are at home (Table4-1).

Distribution of under five children according to the type of diet shows that in experimental group most if them 28(93.3%) are non vegetarians and 2(6.7%) of them are vegetarians whereas in control group all 30(100%) of them are non vegetarians. This reveals that in experimental and control group almost all of them are non vegetarians(Table 4-1).

Distribution of under five children according to order of birth shows that in experimental group majority 14(46.7%) of them are in the second order of birth,9(30%) of them are in the first order of birth, 7(23.3%) of them are in the third order of birth, where as in control group majority 12(40%) of them are in first order of birth, 10(33.3%) of them are in second order of birth, 8(26.6%) of them are in the third order of birth. This reveals that majority of children in experimental group are in second order of birth and in control group are in first order of birth(Table 4-1).

Distribution of under five children according to type of family shows that in experimental group majority 25(83.3%) of them belong to nuclear family,4(13.3%) of them belong to joint family and 1(3.3%) of them belong to extended family whereas in control group majority 23(76.7%) of them belong to nuclear family, 5(16.7%) of them belong to joint family and 2(6.7%) belong to extended family. This reveals that in both experimental and control group most of them belonged to nuclear family(Table 4-1).

Table 4.2:

Frequency and percentage distribution of under five children according to the selected demographic variables of parents in experimental and control group

n=60

Demographic variable of parents	Experimental group(30)		Control group(30)	
	Frequency	%`	Frequency	%
Education level of Father				
Middle school	6	20	7	23.3
Primary school	20	66.7	19	63.3
No formal education	4	13.3	4	13.3
Education level of mother				
High school	2	6.7	2	6.7
Middle school	4	13.3	6	20
Primary school	16	53.3	17	56.7
No formal education	8	26.6	5	16.7
Occupation of father				
Clerical worker	7	23.3	6	20
Semiskilled worker	8	26.7	8	26.7
Un skilled worker	15	50	16	53.3
Occupation of mother				
Unskilled worker	8	26.7	4	13.3
Unemployed	22	73.3	26	86.7
Family monthly income				
Rs.9787-7323	6	20	10	33.3
Rs.7322-4894	8	26.7	8	26.7
Rs.4893-2936	16	53.3	12	40

Distribution of under five children according to the education level of father shows that in experimental group majority 20(66.7%) of fathers had completed primary school,6(20%) fathers had completed middle school, 4(13.3%) fathers had no formal education where as in control group 19(63.3%) fathers had completed primary school,7(23.3%) fathers had completed middle school and 4(13.3%) fathers had no formal education. This reveals that in experimental and control group majority of the fathers had completed primary school education (Table4-2).

Distribution of under five children according to the education level of mothers shows that in experimental group 16(53.3%) mothers had completed primary school, 8(26.6%) mothers had completed formal education, 4(13.3%) mothers had completed middle school, and 2(6.7%) mothers had completed high school whereas in control group 17(56.7%) mothers had completed primary school, 6(20%) mothers had completed middle school, 5(16.7%) mothers had no formal education, and 2(6.7%) mothers had completed high school. This reveals that majority of mothers in experimental group and control group had completed primary school (Table4-2)..

Distribution of under five children according to occupation of father shows that in experimental group 15(50%) fathers are unskilled workers, 8(26.7%) fathers are semiskilled workers, and 7(23.3%) fathers are clerical workers, whereas in control group 16(53.3%) fathers are unskilled workers,8(26.7%) fathers are semiskilled workers and 6(20%) of fathers are clerical workers. This shows that in experimental and control group around 50% of the fathers are unskilled workers(Table4-2)..

Distribution of under five children according to occupation of mother shows that in experimental group majority 22(73.3%) of the mothers are unemployed, 8(26.7%) mothers are unskilled workers whereas in control group 26(86.7%) mothers

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are unemployed, 4(13.3%) mothers are unskilled workers. This reveals most of the mothers are unemployed in both groups (Table4-2).

Distribution of under five children according to the family monthly income shows that in experimental group 16(53.3%) of the children's family monthly income is between Rs.4893-2936,8(26.7%) of their family monthly income is between Rs.7322-4894,6(20%) of their family monthly income is between Rs.9787-7323 whereas in control group 12(40%) of their family monthly income is Rs.4893-2936, 10(33.3%) of their family monthly income is between Rs.9787-7323, and 8(26.7%) of their family monthly income is between Rs.7322-4894. This reveals that majority of the children's family monthly income in experimental and control group is between Rs.4893-2936 (Table4-2).

Section-B

Comparison of mean Pre test weight of under five children in Experimental and Control group.

TableNo:4.3:

Comparison of Mean Pre test weight of Under five children in Experimental and Control Group.

n=60

Group	Pre test		Difference in Mean
	Mean	**SD**	
Experimental group	11.93	1.04	0.13
Control group	11.80	1.39	

The above table shows that in experimental group the mean pre-test weight is 11.93± 1.04 whereas in the control group the mean pre test weight is 11.80±1.39 revealing a difference of 0.13.

This reveals that the mean pre-test weight is higher among children in experimental group (11.93) when compared to control group (11.80).

Section-C

a) Comparison of Mean Pre test and Post test weight of under five children in

Experimental and Control group

TableNo:4.4:

Comparison of Mean, SD and difference in Mean of Pre test and Post test weight of Under five children in Experimental and Control Group.

n=60

Group	Pre test		Post test		Difference in Mean
	Mean	**SD**	**Mean**	**SD**	
Experimental group	11.93	1.04	12.12	1	0.19
Control group	11.80	1.39	11.79	1.42	0.01

The above table shows that in experimental group the mean pre-test weight is 11.93± 1.04 whereas the mean post test weight is 12.12 ±1 revealing a difference of 0.19.However, in the control group the mean pretest weight is 11.80±1.39 and the post test weight is 11.79±1.42 revealing a difference of 0.01

This reveals that the difference between the mean pre- test and post- test weight is higher among children in experimental group (0.19) when compared to control group(0.01).

b) Comparison of Post test Mean weight of Under five children in Experimental and Control group according to their demographic variables
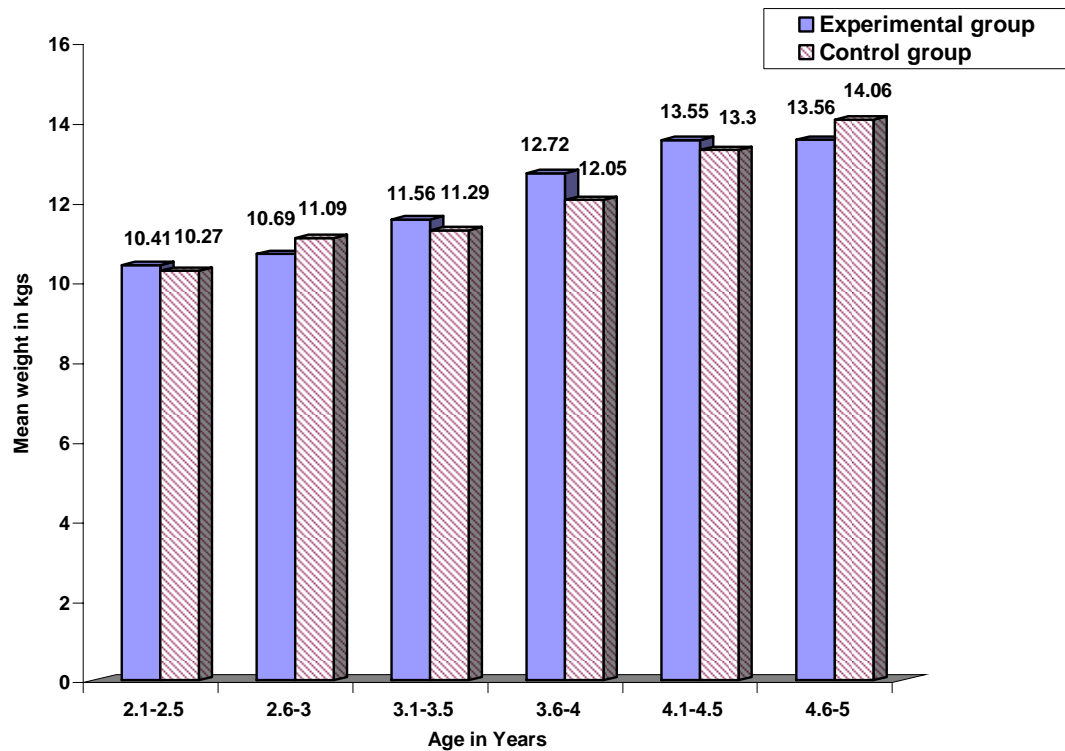
Figure-4.1: Comparison of Post test Mean weight of under five children in Experimental and Control group according to their age in years

The above figure shows that the Mean weight of Under five children in Experimental group (11.50,12.72,13.55) is higher than the Mean weight of Under five children in Control group(11.29,12.05,13.3) for children belonging to3.1-3.5yrs.3.6-4yrs and4.1-4.5yrs respectively. The highest difference in mean weight is found for children in the age group of 3.6-4yrs.

Hence it can be interpreted that the Mixed cereal porridge has improved the mean weight for children in the age group of 3.6-4yrs.

Figure-4.2: Comparison of Post test Mean weight of Under five children in Experimental and Control group according to their Gender

The above figure shows that the Mean weight of Under five children in Experimental group (11.12) is higher than the mean weight of Under five children in Control group (10.86) for male children when compared to female children where the mean weight of control group is higher(13.26).

Hence it can be interpreted that the mixed cereal porridge has increased the mean weight for Male children than Female children.
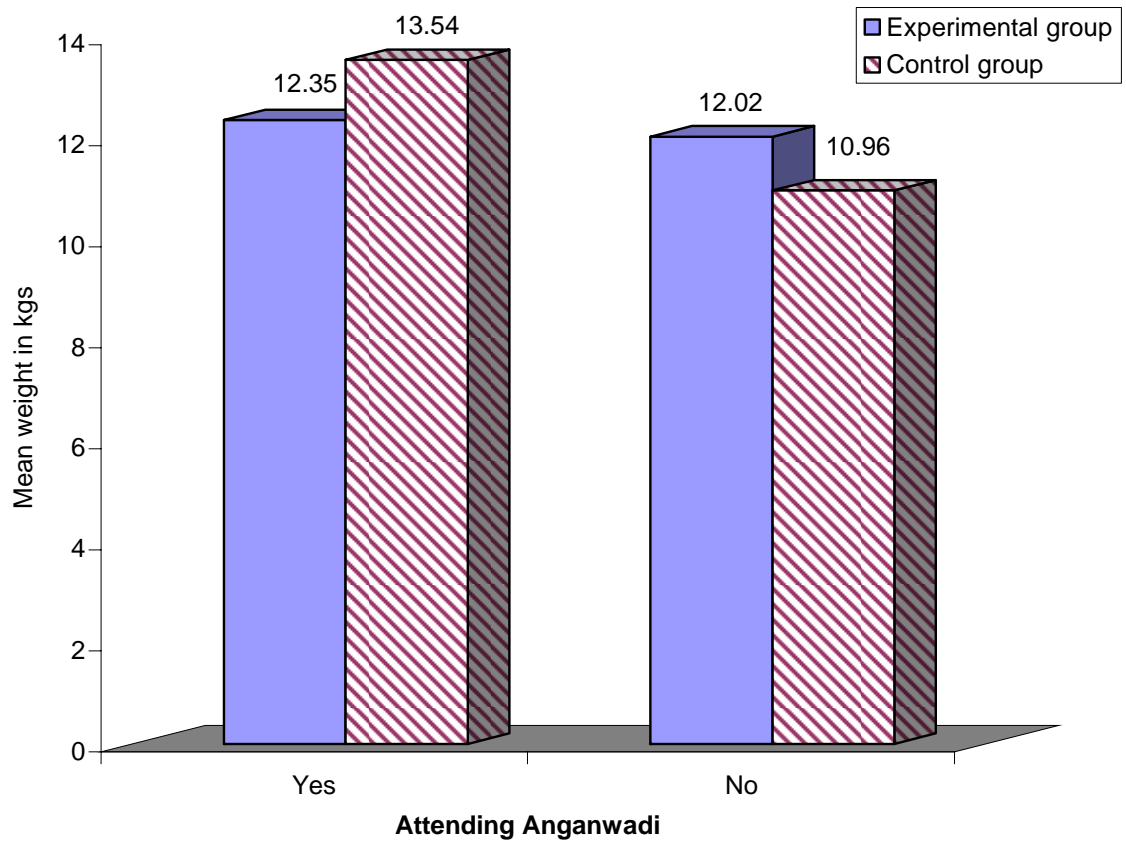
Figure-4.3: Comparison of Post test Mean weight of Under five children in Experimental and Control group according to child is attending Anganwadi

The above figure shows that the mean weight of under five children in Experimental group (12.02) is higher than the mean weight of Under five children in Control group(10.96) for those who have not attended Anganwadi.

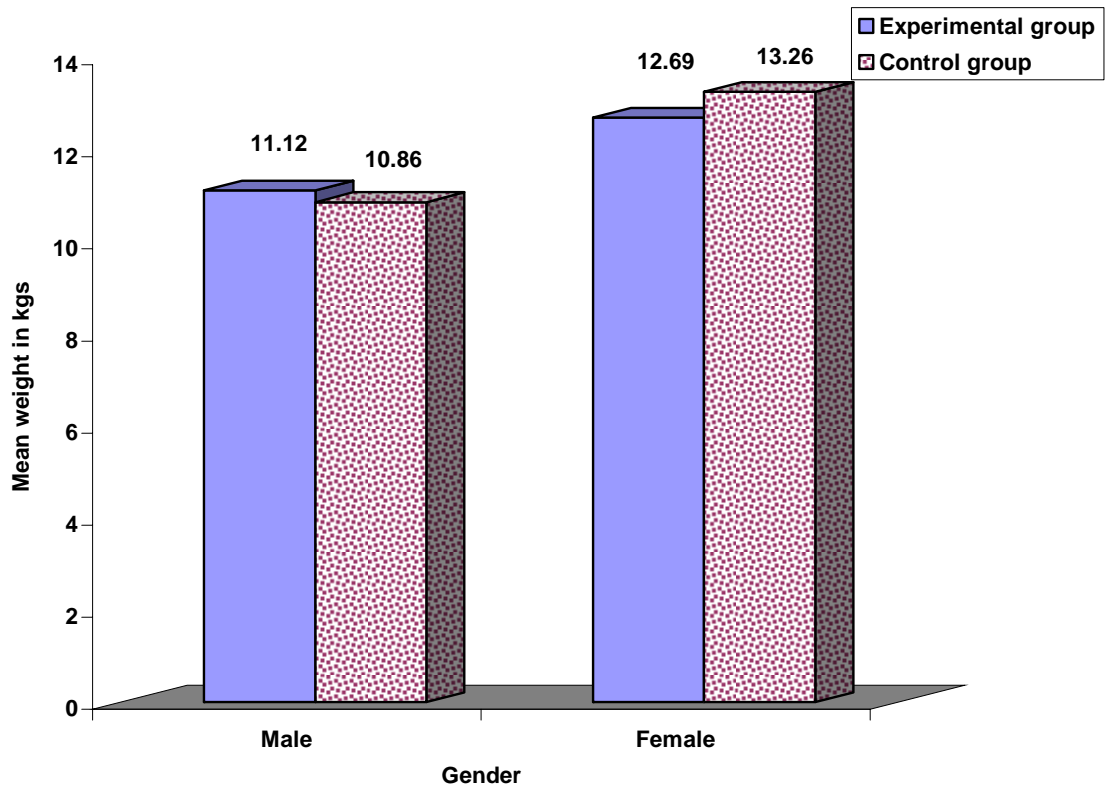Hence it can be interpreted that the mixed cereal porridge has increased the mean weight of children who have not attended Anganwadi.
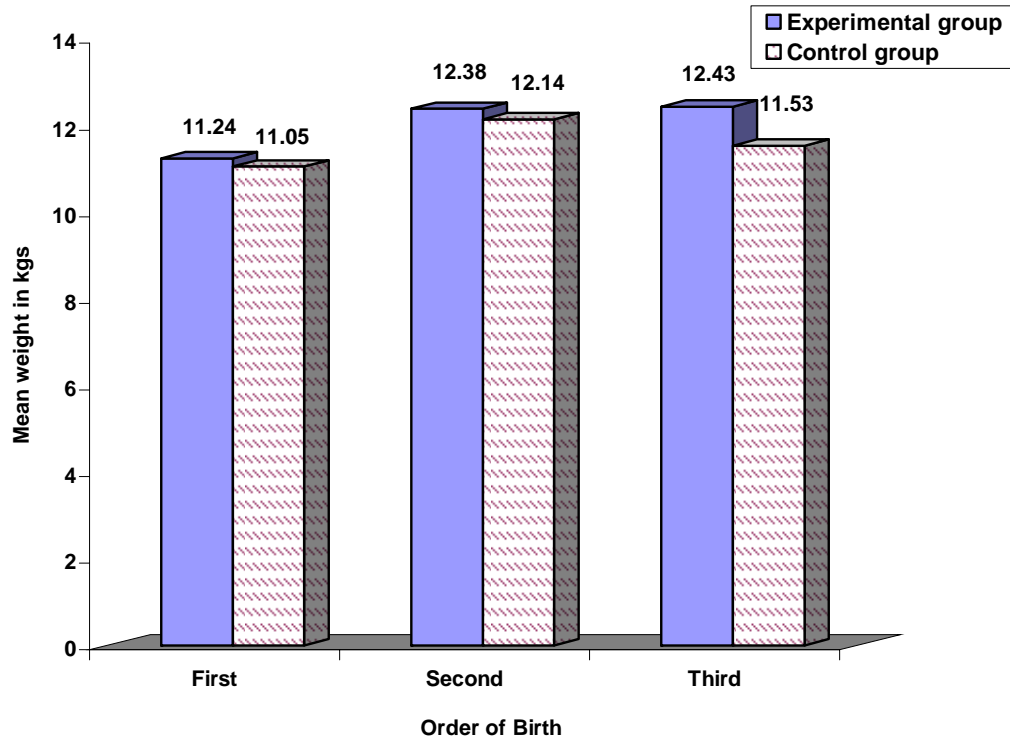
Figure-4.4: Comparison of Post test Mean weight of Under five children in Experimental and Control group according to their order of birth.

The above figure shows that the mean weight of under five children in Experimental group (11.24,12.38,12.43) is higher than the mean weight of Under five children in Control group(11.05,12.14,11.53) for all order of birth . The highest difference in mean weight is found for children in the third order of birth.

Hence it can be interpreted that the Mixed Cereal Porridge has increase the mean weight of children in third order of birth
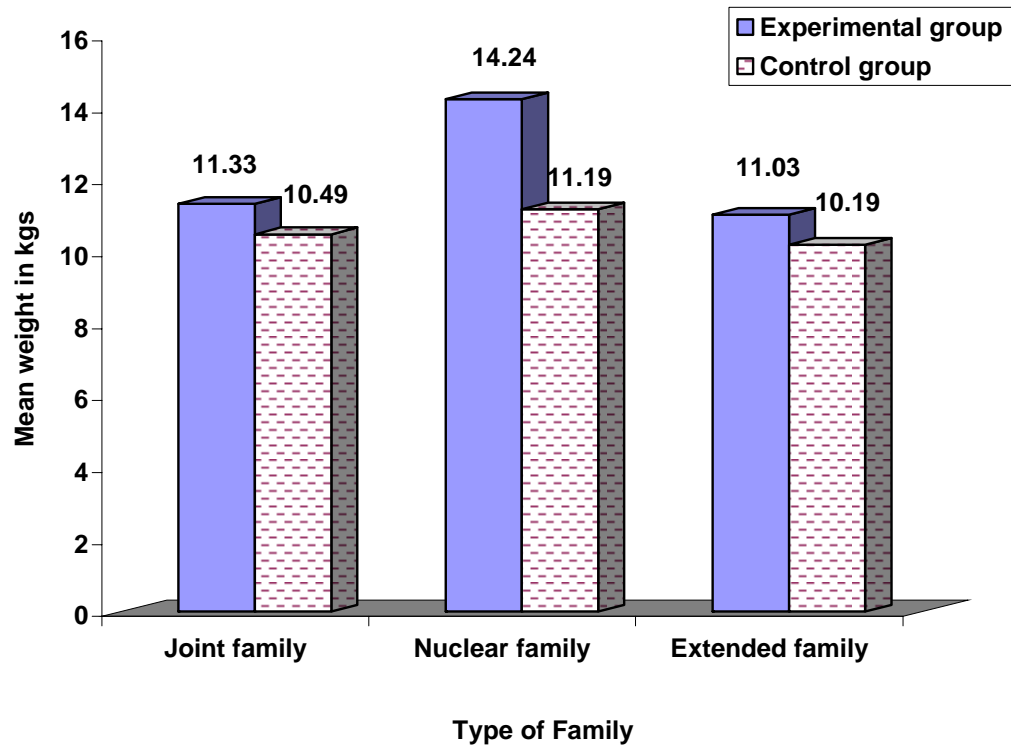
Figure-4.5: Comparison of Post test Mean weight of Under five children in

Experimental and Control group according to type of family.

The above figure shows that the mean weight of under five children in Experimental group (11.33, 14.24, 11.03) is higher than the mean weight of Under five children in Control group(10.49, 11.19, 10.19) for all the types of family. The highest difference in mean weight is found for nuclear family.

Hence it can be interpreted that the Mixed Cereals Porridge has increased the mean weight of children from nuclear family.
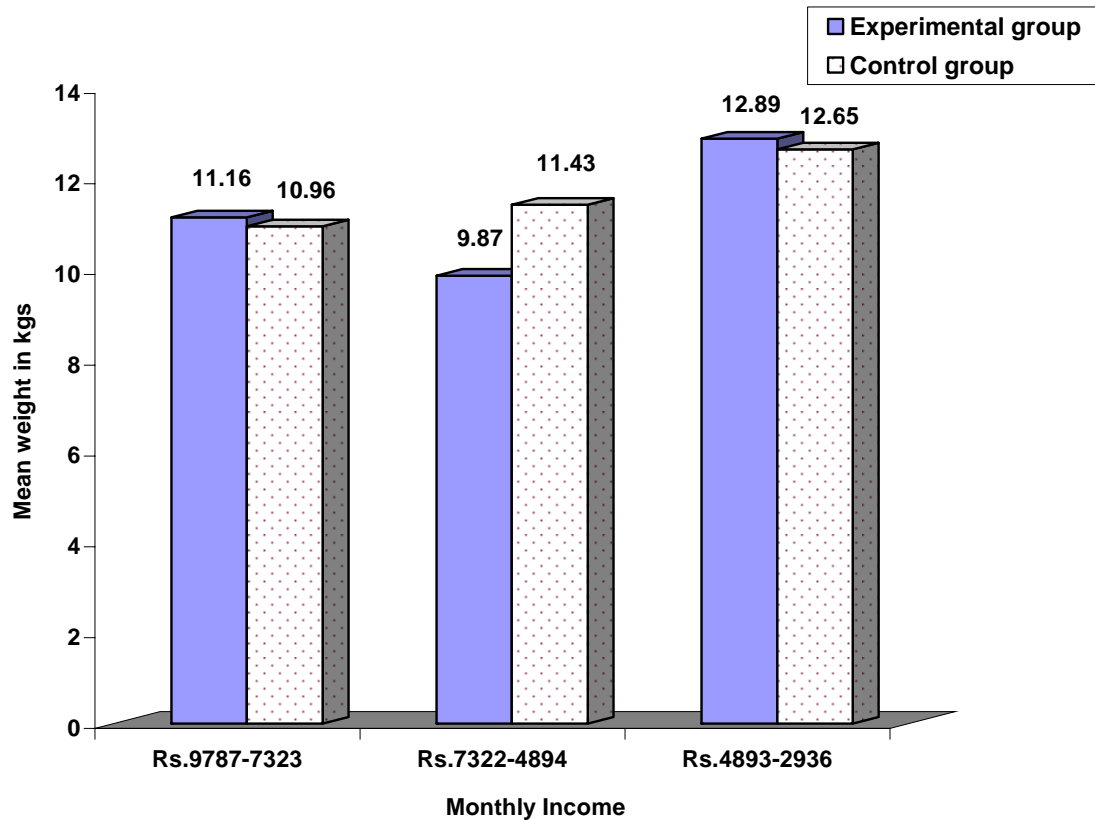
Figure – 4.6: Comparison of Post test Mean weight of under five children in Experimental and Control group according to monthly income.

The above figure shows that the mean weight of under five children in Experimental group (11.16,12.89) is higher than the mean weight of Under five children in Control group(10.96,12.65) for monthly income between Rs.9787-7323 and Rs.4893-2936 respectively with more or less similar difference in mean weight. However, for children from family monthly income Rs.7322 – 4894, the mean weight of control group (11.43) is higher than the experimental group (9.87).

Hence it can be interpreted that the Mixed cereal porridge had increased the mean weight for children from families having monthly income between Rs.9787-7323 and Rs4893-2936.

c) Comparison of mean weight of five post test observations of under five

children in experimental and control group
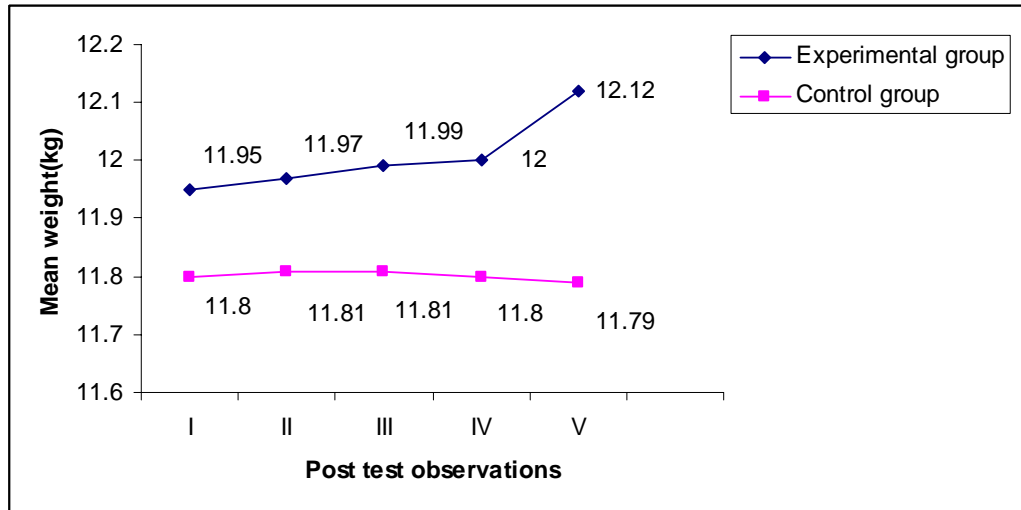
Figure – 4.7: Comparison of Mean weight of five post test observations of under five children in experimental and control group.

The above figures shows that the comparison of mean weight of five post test observation in experimental group (11.95, 11.97, 11.99, 12 and 12.12) is higher than the mean weight of under five children in control group (11.8, 11.81, 11.81, 11.80 and 11.79) for all the five observations. Further the difference in the Mean weight of Experimental and Control group increased as the number of observation increased

Hence, it can be interpreted that the mixed cereals porridge is improving the nutritional status of children's in the experimental group.

Hypotheses testing

H₁: There is significant difference between the nutritional status of under five children in Experimental and Control group at p<0.05 level

Table-4.5:

Effectiveness of Mixed cereals porridge on Nutritional status of Under five children in experimental and control group

n=60

Group	Mean	SD	't' value
Experimental group	12.12	1	2.41*
Control group	11.79	.42	

*Significant at p<0.001 level; table value – 2.39, df-59

The above table shows that in experimental group the mean post test score is 12.12±1 whereas in control group the mean post test score is 11.79±1.42 and 't' value is 2.4. Which is higher than the table value at 0.001 level. Hence significant difference is found in the post test mean weight of under five children in experimental group and control group (P<0.001).

This reveals effectiveness of mixed cereal porridge in improving the nutritional status of malnourished children. Hence the research hypothesis (H₁) is retained.

H$_2$:   There is significant association between the nutritional status of under five children with their demographic variables at p<0.05 level.

Table-4.6:

Association between post test weight of under five children and their selected demographic variables in experimental and control group

n=60

S. No	Demographic variables for child	Experimental group (n=30)			Control group (n=30)		
		df	table value	χ^2	df	table value	χ^2
1	Age	5	11.07	18.80*	5	11.07	25.5*
2	Gender	1	3.84	1.53	1	3.84	0.625
3	Anganwadi	1	3.84	1.29	1	3.84	25.67
4	Type of Diet	1	3.84	1.24	1	3.84	0
5	Order of birth	2	5.99	1.97	2	5.99	0.6
6	Type of family	2	5.99	3.34	2	5.99	0.10

* significant at p<0.05 level

The above table showed that there is no significant association between weight of under five children and their selected demographic variables in both experimental and control group (P>0.05) except age where significant association is found (p<0.05).

Hence hypothesis (H$_2$) is rejected related to demographic variables of children (P>0.05) except age of the children where it is accepted (P<0.05)

Table-4.7:

Association between post test weight of under five children and the selected demographic variables of parents in experimental and control group

n=60

S. No	Demographic variables for parent	Experimental group (n=30)			Control group (n=30)		
		df	table value	χ^2	df	table value	χ^2
1	Education level of father	2	5.99	7.03*	2	5.99	4.6
2	Education level of mother	3	7.82	8.2*	3	7.82	5.54*
3	Occupation of father	2	5.99	13.67*	2	5.99	13.12*
4	Occupation of mother	1	3.84	7.03*	1	3.84	2.30
5	Family Monthly income	2	5.99	14.3*	2	5.99	13.12*

* significant at p<0.05 level

The above table shows that there is significant association between weight of under five children and   selected demographic variables of parents in   experimental and control group(p<0.05) except education level of father and occupation of mother in control group where no significant association is found (p>0.05) . Hence hypothesis (H$_2$)is accepted with post test weight of under five children and selected demographic variables of parents in Experimental and   Control group except education level of father and occupation of mother in Control group where it is rejected.

Summary

This chapter dealt with data analysis and interpretation in the form of tables and figures based on the objectives. Frequency and percentage distribution of weight among under five children with their selected demographic variables.

The 't' test was used to determine the effectiveness of Mixed cereal porridge on Malnutrition of under five children. Chi-square test was used to find out the association between the post test weight among under five children with their selected demographic variables in both experimental and control group.

CHAPTER-V

DISCUSSION

The present study was conducted to evaluate the effectiveness of mixed cereals porridge on Malnutrition among under five children in selected villages, Salem. Quasi experimental pretest and post test with control group research design with Quantitative Evaluative Approach was adopted. The sample was selected by using convenience sampling technique. The sample comprised of 30 in experimental group and 30 in control group. The data was collected from them with the help of observational proforma.

Distribution of under five children according to their Demographic variables in Experimental group and Control group.

In experimental group, 36.7% of them were in 3.6-4 years of age, 60% were female, 80% were at home, 93.3% of them were non vegetarian, 46.7% of them were in second order of birth, and 83.3% of them belong to nuclear family.

In control group, 26.7% of them were in 2.6-3 years of age, 60% of them were male, 66.7% of hem were at home,100% of them were non vegetarian,40% of them were in first birth order, and 76.7% of them belong to nuclear family.

 In experimental group 66.7% of fathers had completed primary school, 53.3% of mothers had completed primary school, 50% of fathers were unskilled workers, 73.3% of mothers were unemployed, and 53.3% of the children's family monthly income was between Rs.4893-2936.

In control group 63.3% of fathers had completed primary school, 56.7% of mothers had completed primary school, 53.3% of fathers were unskilled workers, 86.7% of mothers were unemployed, and 40% of the children's family monthly income is between Rs.4893-2936.

The findings compared with a cross-sectional study was done by **Sapthika.V.S and Greeshma.C.P, (2008)** to determine the prevalence of malnutrition and the factors associated with it. The findings related to demographic variables showed that, the risk of being malnutrition in the under five children from the poor socio-economic status is almost four times than the children from rich socio-economic status and children from joint family were found protective against stunting than from nuclear family. It reveals the fact that malnutrition is common among under five children and also it is more prevalent among the poor socio economic category.

Objective-1: **To evaluate the existing nutritional status of under five children in experimental and control group.**

In experimental group the mean pre-test weight was 11.93± 1.04 whereas in the control group the mean pretest weight was 11.80±1.39 revealing a difference of 0.13.

National Family Health Survey (2005) conducted a study in Bihar to investigate the prevalence of malnutrition among under five children. It was concluded that 42.5% are underweight, 48% are stunted and 19.8% are wasted. It also revealed that the prevalence of underweight among children in India is amongst the highest in the world.

Gowtham.V.P. and Gurung.K.K, (2007) had done a cross-sectional study to determine the prevalence of under-nutrition ,the results of the study showed that the prevalence of underweight, stunting and wasting was 27%, 37% and 11% respectively.

This study supports the fact that prevalence of underweight is common among under-five population and there was a need to take necessary steps to reduce its impact on the health of the children.

Objective-2: To evaluate the effectiveness of mixed cereals porridge on malnutrition among under five children in experimental group.

There was significant difference found in the posttest weight of under five children in experimental and control group. The overall 't' value was 2.41* at P<0.05 level.

This findings were supported by a study conducted by,

Kasthoorba, et.al., (2008) to assess the effectiveness of mixed cereal porridge on malnourished under five children at Uttar Pradesh. 100 subjects were selected and 50 grams of mixed cereal porridge was given for a period of 8 weeks. The findings of the study showed that there was a significant difference 0.21 in the weight of under five children after the intervention.

The overall findings of the study showed that the oral supplementation of mixed cereals porridge was effective to the malnourished under five children and has brought minimal changes at the body weight.

Objective-3: To associate the nutritional status of under five children in experimental and control group with their selected demographic variables.

There was no significant association between weight of under five children and their selected demographic variables in both experimental and control group (P>0.05) except age where significant association was found (p<0.05).

Hence hypothesis (H$_2$) was rejected related to demographic variables of children (P>0.05) except age of the children where it was accepted (P<0.05).

As per **National Family Health Survey (2003)** reports, the education level of mother, occupation of father, monthly income and age also influences the nutritional status of the children.

This shows that the age, education of father, education of mother, occupation of father, occupation of mother and the monthly income has effects on the nutritional status of the malnourished under five children.

Summary

This chapter dealt with the discussion of the study with reference to the objective and supportive studies. All the three objectives and two hypotheses are retained in this study.

CHAPTER – VI

SUMMARY, CONCLUSION, IMPLICATIONS AND RECOMMENDATIONS

This chapter deals with summary, conclusion, implications for nursing practice and recommendations for further research.

Summary

The purpose of this study was to determine the effectiveness of Mixed cereals porridge on malnutrition among under five children in selected villages, Salem.

A Quasi experimental design was chosen for the study. The conceptual framework for the study was based on Modified Wiedenbach's Helping Art of clinical nursing (1964) Demographic information was assessed using a structured interview schedule. The sample consisted of 60 under five children, 30 in experimental and 30 in control group from selected villages, Salem.

The data were analysed using descriptive and inferential statistics to test the hypothesis, independent 't' test and chi-square was used. The $p < 0.001$ level of significance was used to test the hypothesis.

Main findings of the study includes

- In experimental group 36.7% of them were in 3.6-4 years of age, 60% were female, 80% were at home, 93.3% of them were non vegetarian, 46.7% of them were second order of birth, and 83.3% of them belongs to nuclear family.

- In control group 26.7% of them were in 2.6-3 years of age, 60% of them were male, 66.7% of hem were at home,100% of them were non vegetarian,40% of them were first birth order, and 76.7% of them belongs to nuclear family.

- In experimental group 66.7% of father's had completed primary school, 53.3% of mothers had completed primary school, 50% of fathers were unskilled

workers,73.3% of mothers were unemployed, and 53.3% of the children's family monthly income is between Rs.4893-2936.

- In control group 63.3% of fathers had completed primary school, 56.7% of mothers had completed primary school, 53.3% of fathers were unskilled workers, 86.7% of mothers were unemployed, and 40% of the children's family monthly income is between Rs.4893-2936.

- In experimental group the mean pre-test weight was 11.93 ± 1.04 whereas in the control group the mean pretest weight was 11.80 ± 1.39 revealing a difference of 0.13

- In experimental group the mean pre-test weight was 11.93 ± 1.04 whereas the mean post test weight was 12.12 ± 1 revealing a difference of 0.19.However, in the control group the mean pretest weight was 11.80 ± 1.39 and the post test weight was 11.79 ± 1.42 revealing a difference of 0.01

- In experimental group the mean post test score was 12.12 ± 1 whereas in control group the mean post test score was 11.79 ± 1.42 and 't' value is 2.4. Which was higher than the table value at 0.05 level. Hence significant difference was found in the post test mean weight of under five children in experimental group and control group $(P<0.05)$.

- There was no significant association between weight of under five children and their selected demographic variables in both experimental and control group $(P>0.05)$ except age where significant association is found $(p<0.05)$.

- There was significant association between weight of under five children and selected demographic variables of parents in experimental and control group$(p<0.05)$ except education level of father and occupation of mother in control group where no significant association was found $(p>0.05)$. Hence

hypothesis (H$_2$) was accepted with post test weight of under five children and selected demographic variables of parents in Experimental and Control group except education level of father and occupation of mother in Control group where it was rejected

Conclusion

A study was done evaluate the Effectiveness of Mixed Cereals Porridge on Malnutrition among Under five Children in selected villages, Salem. The settings were Poolavari and Neikkarapatti Village. The samples were selected by convenience sampling technique and sample size was 60, 30 were assigned to experimental and 30 were assigned to control group. The results of the study showed that mixed cereal porridge was effective in improving the nutritional status of under five malnourished children.

Implications

The findings of the study have implication in different branches of nursing i.e, Nursing practice, Nursing education, Nursing administration and Nursing research.

Nursing Practice

The community health nurse plays an important role in health care delivery system.

1. Regular screening of under five children to detect malnutrition and control it's complications.

2. Conduction of camps in Anganwadies in order to rule out malnutrition among under five children.

3. Educating the Anganwadi workers on the early assessment of malnutrition and its prevention

Nursing administration:

➤ The nurse administrator need to incorporate mixed cereal porridge as a dietary supplement for the under five children with malnutrition

➤ Organize in-service education regarding malnutrition for community health workers and reduce it's impact on health status of children.

➤ Plan policies and guidelines on practice of home based interventions in treating malnutrition.

Nursing education:

▪ Educating the Anganwadi workers on prevention of malnutrition.

▪ Educating the nursing students on assessment of malnutrition.

Nursing research:

❖ The study findings serve as an evidence base on the usage of mixed cereal for first degree malnutrition.

Recommendations

Recommendations for further research include:

1. A similar study can be done on a large sample.

2. An extensive descriptive study can be conducted to assess the health status of the under five children.

3. A similar study can be done for children of other age groups.

4. A comparative study can be done on the effectiveness of mixed cereal porridge on malnutrition of under five children in urban and rural area.

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LETTER SEEKING PERMISSION TO CONDUCT A RESEARCH PROJECT

From

      Mrs. POOJA.S.MOHAN,

      Final year M.Sc. (N),

      Sri Gokulam College of Nursing,

      Salem.

To

      The Principal,

      Sri Gokulam College of Nursing,

      Salem, Tamil Nadu.

Respected Sir/Madam,

      Sub: Permission to conduct research project - request- reg.

      I**, Pooja S Mohan,** Final Year M.Sc., (Nursing) student of Sri Gokulam College of Nursing, is conducting research project in partial fulfilment of Tamil Nadu Dr.M.G.R. Medical University, Chennai, as a part of the requirement for the award of M.Sc., (Nursing) Degree.

      Topic: "A study to Evaluate the Effectiveness of mixed cereal porridge on malnutrition among under five children in selected villages at Salem".

      I request you to kindly do the needful.

                    Thanking you.

Date : 13.07.2011   Yours sincerely,

Place : Salem

                             (Pooja S Mohan)

LETTER GRANTING PERMISSION TO CONDUCT THE RESEARCH

PROJECT

SRI GOKULAM COLLEGE OF NURSING
3/836, Periyakalam, Neikkarapatti, Salem - 636 010.
Phone : 0427 - 6544550 Fax : 0427 - 2270200, 2447077
Email : sgcon2001@yahoo.com, sgcon2001@gmail.com

Date : 8l.7l2011

From

      Mrs. POOJA.S.MOHAN,
      Final year M.Sc. (N),
      Sri Gokulam College of Nursing,
      Salem.

To

      The Panchayat President
      Neikkarapatti,
      Salem.

Through

      The Principal
      Sri Gokulam College of Nursing,
      Salem.

Respected Sir/Madam,

      Sub: Permission to conduct research project - request- reg.

      I**, Pooja S Mohan,** Final Year M.Sc., (Nursing) student of Sri Gokulam College of Nursing, is conducting research project in partial fulfilment of Tamil Nadu Dr.M.G.R. Medical University, Chennai, as a part of the requirement for the award of M.Sc., (Nursing) Degree.

      Topic: "A study to Evaluate the Effectiveness of mixed cereal porridge on malnutrition among under five children in selected villages at   Salem".

      I   request you to kindly do the needful.
                             Thanking you.

Place: Salem

Date: 8/7/2011

Kindly do the needful

S.கேம்பர்
தலைவர்
முதல் நிலை ஊராட்சி
நெய்க்காரப்பட்டி,
சேலம்-10,

VICE - PRINCIPAL
Sri Gokulam College of Nu
SALEM - 636 010

Yours Obediently,

(POOJA.S.MOHAN)

LETTER GRANTING PERMISSION TO CONDUCT THE RESEARCH PROJECT

SRI GOKULAM COLLEGE OF NURSING
3/836, Periyakalam, Neikkarapatti, Salem - 636 010.
Phone : 0427 - 6544550 Fax : 0427 - 2270200, 2447077
Email : sgcon2001@yahoo.com, sgcon2001@gmail.com

Date : 8|7|2011

To,

The Panchayat President,

Poolavari,

Salem.

Respected Sir/Madam,

Sub: Permission to conduct Research project-Reg.

This is to introduce **Ms.Pooja.S.Mohan,** a final year M.Sc (Nursing) student of our college. She is to conduct a research project which is to be submitted to the Tamil Nadu Dr. M.G.R. Medical University, Chennai in partial fulfilment of University requirement for the award of M.Sc (Nursing) Degree.

Topic: A study to Evaluate the Effectiveness of mixed cereal porridge on malnutrition among under five children in selected villages at Salem

Kindly permit to conduct a research project in Poolavari community, Salem ,from 11-07-2011 to -7-08-2011 .I assure that the collected data would be kept confident and used only for the study purpose.

Thanking you,

Yours sincerely,

Date:12.07.11

Place: Salem

(DR. A. JAYASUDHA)
PRINCIPAL
Sri Gokulam College of Nursing
SALEM – 636 010.

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ANNEXURE - C

LETTER REQUESTING OPINION AND SUGGESTIONS OF EXPERTS FOR CONTENT VALIDITY OF THE RESEARCH TOOLS

From

      Mrs. POOJA.S.MOHAN,

      Final year M.Sc. (N),

      Sri Gokulam College of Nursing,

      Salem.

To

Respected Madam,

      Sub: **Requisition the opinion and suggestions of experts for establishing content validity of the tools.**

  I, Mrs.POOJA.S.MOHAN a final year M.Sc., (Nursing) student of Sri Gokulam College of Nursing College, Salem have selected statement of the problem mentioned below for the research study to be submitted to the Tamil Nadu Dr. M.G.R. Medical University, Chennai for the partial fulfilment of Master's Degree in Nursing.

      Topic: A study to Evaluate the Effectiveness of mixed cereal porridge on malnutrition among under five children in selected villages at   Salem.

      I request you to kindly validate the tool developed for the study and give your expert opinion for necessary modification. I will be grateful to you for this.

            Thanking you.

                           Yours sincerely,

Place : Salem

Date :   (Pooja. S. Mohan)

Enclosed:

1. Certificate of validation
2. Observational proforma for evaluation of tool and structured interview schedule
3. Intervention of the study

TOOL FOR DATA COLLECTION

SECTION-I

STRUCTURED INTERVIEW SCHEDULE TO ASSESS THE

DEMOGRAPHIC DATA

Instruction:

Read the questions carefully, place a tick mark (✓) against the correct response. Each question should be given one answer. Answer the all questions.

Sample No: ☐ ☐

Date

Base line proforma:

I. Demographic variable for child:

1.Age:

1.1). 1-1.5yrs ☐

1.2). 1.6-2yrs ☐

1.3). 2.1-2.5yrs ☐

1.4). 2.6-3yrs ☐

1.5). 3.1-3.5yrs ☐

1.6). 3.6-4yrs ☐

1.7). 4.1-4.5yrs ☐

1.8). 4.6-5yrs ☐

2.Gender:

2.1) Male ☐

2.2).Female ☐

3.Child is attending:

3.1) Anganwadi ☐

3.2) Play School ☐

3.3) Kinder garden ☐

3.4) Primary school ☐

3.5) At home ☐

4. Type of diet:

   4.1) Vegetarian ☐

   4.2)Non vegetarian ☐

5. Order of birth

   5.1) One child ☐

   5.2) Two children ☐

   5.3) Above Two ☐

II. Demographic variable for parents:

   6. Type of family:

     5.1) Joint family ☐

     5.2).Nuclear family ☐

     5.3)Extended family ☐

   7. Educational level:

    Father

     7.1) Profession ☐

     7.2) Graduate ☐

     7.3)Intermediate ☐

     7.4) Higher school ☐

     7.5) Middle school ☐

     7.6) Primary school ☐

     7.7). Illiterate ☐

    Mother:

     7.8) Profession ☐

     7.9) Graduate ☐

     7.10) Intermediate ☐

     7.11). Higher school ☐

     7.12) Middle school ☐

     7.13) Primary school ☐

     7.14) Illiterate ☐

8. Occupation:

Father

8.1) Profession ☐

8.2) Semi profession ☐

8.3). Clerical worker ☐

8.4) Skilled worker ☐

8.5) Semi skilled worker ☐

8.6) Unskilled worker ☐

8.7) Unemployed ☐

Mother:

8.8) Profession ☐

8.9) Semi profession ☐

8.10) Clerical worker ☐

8.11) Skilled worker ☐

8.12) Semi skilled worker ☐

8.13) Unskilled worker ☐

8.14) Unemployed ☐

9. Total income of the family:

9.1) Above Rs.19575 ☐

9.2) Rs.19574-9788 ☐

9.3) Rs.9787-7323 ☐

9.4)Rs.7322-4894 ☐

9.5) Rs.4893-2936 ☐

9.6) Rs.2935-980 ☐

9.7) Below Rs. 979 ☐

OBSERVATIONAL PROFORMA

Instruction to the observer:

The observer is instructed to perform the assessment based on the given protocol

Weight of the child _____ in Kg

Interpretation:

Assessments of body weight with IAP standard were used to assess the malnutrition.

Degree of malnutrition = $\underline{\text{Actual weight}} \times 100$

Expected weight

INTERVENTION OF THE STUDY

Mixed cereals porridge:

A soft food made by boiling cereals like Ragi, Rice, Wheat, Corn, Groundnut and Green gram in water with jaggery.

Preparation

Clean all the ingredients such as Rice, Corn, Wheat, Ragi, Green gram dhal, Ground nut with water dry it in sun light. Roast all the ingredient with out oil. Grind it in to a fine powder, and Filter all the coarse parts. Mix this fine powder with jaggery and boil it with water .When the consistency of the ingredients changes to porridge take it from the fire. The investigator powdered the ingredients and tool measured amounts of the powder and packed it as small sachet. This was given to the mothers of the children and the investigator supervised the mothers during the preparation.

Recommended Amount of Mixed Cereal Porridge:

Sl No	Age Group	Recommended amount / day SREELAKSHMI (2007)	Rice (gm)	Wheat (gm)	Ragi (gm)	Corn	Green gram dhal (gm)	Gro und nut (gm)	Jaggey (gm)	Water (ml)
1.	1-3 yrs	Cereals – 120 gm pulse – 30gm, jaggery-25gm Nuts–20gm,	7.5	7.5	7.5	7.5	7.5	5	6.25	200
2.	3-5 yrs	Cereals-210gm Pulse-45gm jaggery-25gm Nuts-25gm	13.12	13.12	13.12	13.12	11.25	6.25	6.25	250

Frequency of mixed cereal porridge feeding per day:

One time per day

The chemical composition of food (per 100g) (WHO Standard)

Cereals	Protein (g)	Fat (g)	CHO (g)	Calcium (g)	Calorie (g)	Iron (g)	Vit – B_1
Rice	8.5	0.6	77.4	0.01	349	2.8	0.21
Wheat flour (whole)	11	1.1	49	0.02	238	3	0.45
Ragi	7.1	1.3	72.7	0.33	343	2.1	0.42
Corn	10.4	1.9	72.4	0.03	349	6.2	037
Oats	13.6	1.3	72.7	0.33	331	5.4	0.54
Green gram DHAL	24	1.2	59.9	0.14	334	8.4	0.47
Ground nut	26.7	40.1	20.3	0.05	549	1.6	0.90
Jaggery	0.4	8.4	57.8	0.13	332	11.1	-

Normal height and weight of children (0-5 years):

Age year month	Weight (kg)		Height (cm)	
	Boys	Girls	Boys	Girls
Birth	3.40	3.36	50.6	50.2
0-3	5.72	5.62	60.4	59.5
0-6	7.58	7.26	66.4	65.2
0-9	9.07	8.71	71.2	70.1
1-0	10.07	9.75	75.2	74.2
1-3	10.75	10.40	78.5	77.6
1-6	11.43	11.11	81.8	80.9
1.6-2	12.56	12.29	87.7	86.6
2.1-2.5	13.61	13.43	92.1	91.4
2.6-3	14.61	14.42	96.2	95.9
3.1-3.5	15.56	15.38	99.8	99.5
3.6-4	16.51	16.42	103.4	103.2
4.1-4.5	17.42	17.46	106.7	106.8
4.6-5	18.37	18.37	108.7	109.1

STANDARDS FOR ASSESSING MALNUTRITION

IAP classification of malnutrition:

When the child is having weight more than 80% of expected weight for age, considered as normal

Grade of malnutrition:

Grade I – Between 71-80% of expected weight.

Grade II – Between 61-70% of expected weight.

Grade III – Between 51-60% of expected weight.

Grade IV- 50% or less of expected for the age.

Measurements Protocols For assessing malnutrition

Need to measure and record body weight (kg)

1. Weigh subject with minimal clothing and shoes removed

2. Place the weighing machine in flat surface

3. Adjust zero error

4. Ask the child to stand in straight posture and look straight

5. The investigator should stand in front of the child and look down to note the reading

6. Ask the child to step off the scale.

ANNEXURE - E

CERTIFICATE OF VALIDATION

This is to certify that the tool developed by Mrs. POOJA.S.MOHAN, Final Year M.Sc(N) student of Sri Gokulam College of Nursing, Salem, (affiliated to the Dr.M.G.R.Medical University) is validated and can proceed with this tool and conduct the main study for dissertation entitled **"A Study to Evaluate the Effectiveness of mixed cereals porridge on malnutrition among under five children in selected villages, salem**

Date: Signature
Place:
                                                                                    Name and designation

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APPENDIX – G

CERTIFICATE OF EDITING

Certified that the dissertation paper titled "**A study to Evaluate the Effectiveness of mixed cereals porridge on malnutrition among under five children in selected   villages Salem**" by **Mrs. POOJA S MOHAN,** has been checked for accuracy and correctness of English language usage in the tool is lucid, unambiguous, free of grammatical / spelling errors and apt for the purpose.

Signature : *Sr. G. Savija*
English Teacher

Date : 9 , 1 , 12

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Measuring the weight of First degree Malnourished Under five Child

Child is having Mixed Cereals Porridge