

DISSERTATION ON

**“A STUDY TO ASSESS THE EFFECTIVENESS OF RAGI
KANJII VERSUS SOYAMILK IN IMPROVING THE
NUTRITIONAL STATUS OF MALNOURISHED PRE-
SCHOOL CHILDREN AT INSTITUTE OF CHILD
HEALTH AND HOSPITAL FOR CHILDREN,CHENNAI”**

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CERTIFICATE

This is to certify that this dissertation titled “**A study to assess the effectiveness of ragi kanjii versus soya milk in improving the nutritional status of malnourished pre-school children at Institute of Child health and Hospital for children, Chennai**” is a bonafide work done by **Mrs. M.R.Remya**, second year MSc Nursing student, College of Nursing, Madras Medical College, Chennai – 600003 submitted to The Tamilnadu Dr.M.G.R. Medical university, Chennai in partial fulfilment of the requirements for the award of Degree of Master of Science in Nursing, Branch -II, Child health nursing, under our guidance and supervision during the academic period from 2014 – 2016.

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A study to assess the effectiveness of ragi kanjii versus soya milk in improving the nutritional status of malnourished pre-school children at Institute of Child health and Hospital for children, Chennai

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"Feeling gratitude and not expressing it is like wrapping a present and not giving it"

- *William Arthur Ward*

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ABSTRACT

TITLE: A study to assess the effectiveness of ragi kanjii versus soya milk in improving the nutritional status of malnourished pre-school children at Institute of Child Health and Hospital for Children, Chennai.

Worldwide, the most common cause of malnutrition is inadequate food intake. Severe acute malnutrition should be recognized as a medical emergency with one million children under five dying in India due to malnutrition related causes. Preschool aged children in developing countries are often at risk of malnutrition because of their dependence on others for food, increased protein and energy requirements, immature immune system causing a greater susceptibility to infection, and exposure to non-hygienic conditions.

Need for the study: The effects of malnutrition are many, which make the child prone to other diseases. Thus proper supplementation and appropriate education to the mothers will definitely help in reducing the mortality and morbidity in children.

Objectives: To evaluate the efficacy of ragi kanjii on the nutritional status of the pre-school malnourished children, to evaluate the efficacy of soya milk on the nutritional status of the pre-school malnourished children, to compare the efficacy of ragi kanjii over soya milk on the nutritional status of pre-school malnourished children and to associate efficacy of ragi kanjii and soya milk on nutritional status with the selected demographic variables.

Key words: Malnourished, ragi kanjii, soya milk, pre school child

Methodology:

Research Approach: Quantitative research approach

Research Design: Quasi experimental design – Non randomized control group design.

Sampling technique: Malnourished pre-school children were selected by convenient sampling technique. 60 samples were selected.

Data collection procedure: A comparative study was carried out to find the effectiveness of ragi kanjii versus soya milk in improving the nutritional status of malnourished preschool children. 60 preschool aged children with malnutrition were selected from the medical ward at ICH, Egmore, Chennai. Thirty children for each experimental and control group. For experimental group 200 ml of soya milk was administered once daily for a period of 14 days. For control group 200 ml of ragi kanjii was administered once daily for a period of 14 days. Post test was conducted on the 15th day for both the groups.

Data analysis: Data were analysed with descriptive statistics like frequency distribution, percentage distribution, graphical representation, mean, standard deviation and inferential statistical like chi-square, student independent “t” test, proportion test.

Study result: Mean weight gain of children given ragi kanjii was found to be 110 grams and mean weight gain of children given soya milk was found to be 176 grams. The findings showed that there is a statistically significant improvement in children taking soya milk when compared to ragi kanjii with a “t” value of **11.89**. Thus the hypothesis was statistically proved.

Conclusion: The investigator thereby concluded that the implementation of soya milk in improving the nutritional status of children would be beneficial in promoting the health of the children of our Nation.

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B	Certificate of content validity
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D	Tools for Data collection 1. Demographic data 2. Data related to the nutritional status 3. Preparation of the supplements
E	Informed consent form
F	Coding
G	Certificate of English editing

LIST OF ABBREVIATIONS

ABBREVIATIONS	EXPANSIONS
NFHS	National family health survey
WHO	World health organization
UNICEF	United Nations children's fund
MGRS	Multi center growth reference study
WFLH	Weight for length or height
SAM	Severe acute malnutrition
MAM	Moderate acute malnutrition
Fig	Figure
X ²	Chi-square
P	Probability level
T	Assessment of significance
H	Hypothesis
SD	Standard deviation
N/n	Number of subjects/ Frequency
IAP	Indian academy of pediatrics
BMI	Body mass index
SIF	Soya based infant formulas
CMF	Cow's milk based formulas
HM	Human milk
ICH	Institute of Child health and Hospital for children, Egmore, Chennai
CI	Confidence interval

CHAPTER – 1

INTRODUCTION

“Malnutrition can be as common in poverty as in wealth, one for the lack of food, the other for the lack of knowledge of food.”

— [T.K. Naliaka](#)

Pre-schoolers are emerging as creative persons who are preparing for their future role in society. Pre-schoolers continue to need physical affection and love from their parents. Stability in relationship and their environment is essential to these children. The combined biologic, psychosocial, cognitive, spiritual and social achievements during the preschool period prepare pre-schoolers for their most significant change in life style entrance to school. Their control of bodily functions, experience of brief and prolonged periods of separation, ability to interact cooperatively with other children and adults, use of language for mental symbolization and increased attention span and memory prepare them for the next major period: The school years. Pre-schoolers are age groups of children between three to six years of age. The nurse is responsible for assisting the parents in understanding the changes that occur in the appearance, skill, and behaviour of pre-schoolers. In addition parents need guidance in health maintenance, health promotion, accident prevention and health supervision.

1.1 Background of the study:

American Medical Association (2009) defines **Nutrition** as the science of food, the nutrients and the substances there in; their action, interactions and balance in relation to health and disease, and the process by which the organisms ingests, digests, absorbs, transports, utilizes and excretes food substances. Food provides the nutrients needed to fuel, build and maintain all body cells. The essential nutrients should contain:

- Specific biological functions
- Removing it from diet leads to decline in human biological function, such as the normal function of the blood cells or nervous system.
- Adding the omitted substance back to diet before permanent damage occurs, restores to normal those aspects of human biological function by its absences.

Food and Agricultural Organization of the United States (2015) states **Malnutrition** at an early stage leads to reduced physical and mental development during childhood.

The World Health Organization (2010) defines malnutrition as the cellular imbalance between the supply of nutrients and energy and the body's demand for them to ensure growth, maintenance, and specific functions.

Causes of malnutrition can be grouped into the following headings:

1. Basic causes: Inadequate education, Poor political, Economic and Ideological super structure, poor political resources.

2. Underlying causes: Inadequate access to food, Inadequate care of mother and children, insufficient health services and unhealthy environment.

3. Immediate causes: Inadequate dietary intake, underlying disease condition.

Fig 1.1: Clinical effects of malnutrition

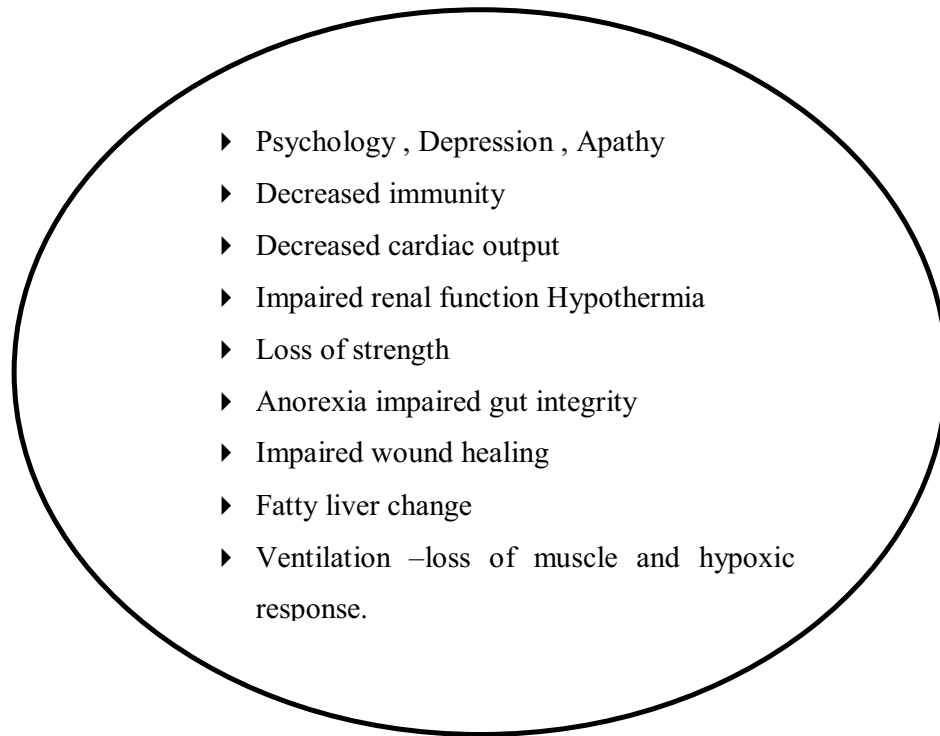
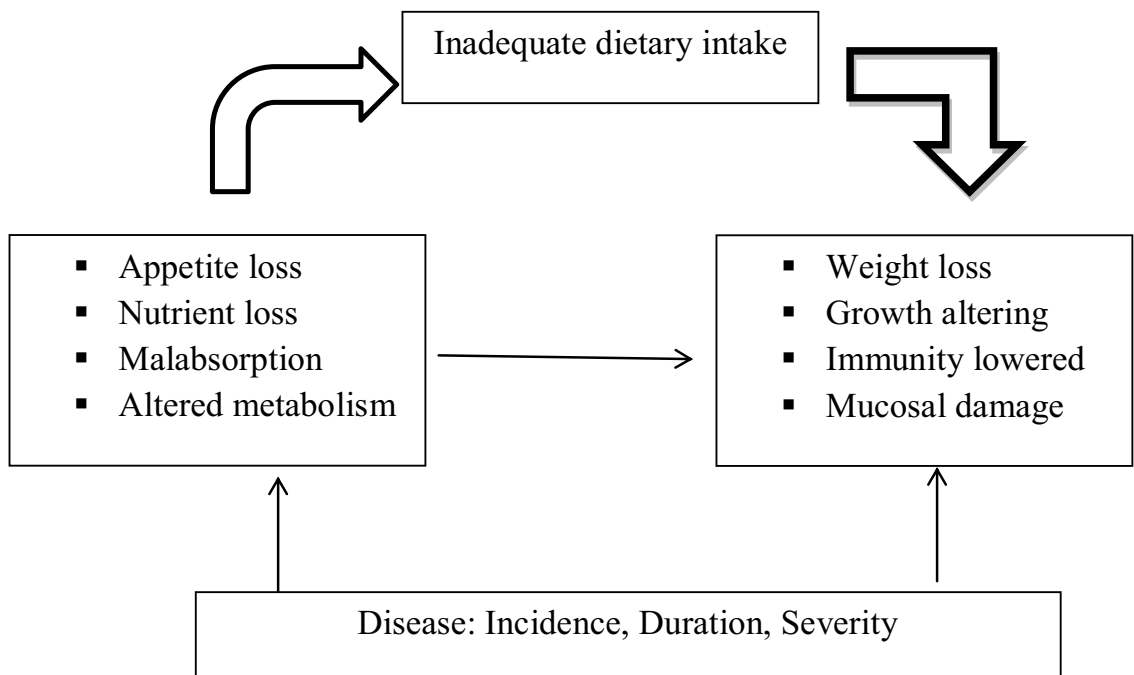


Fig 1.2: Malnutrition /Infection cycle:



1.2 Need for the study:

Globally: UNICEF / WHO / World Bank Group (2015) - 50 million children under 5 years of age were wasted, of which 16 million were severely wasted in 2014. Approximately 1 out of every 13 children in the world was wasted in 2014. Nearly a third of all wasted children were severely wasted, with a global prevalence in 2014 of 2.4 per cent. In 2014, there were 667 million under 5 children in the world, of which 159 million were stunted, 41 million were overweight, and 50 million were wasted.

In India : UNICEF (2015) - Severe acute malnutrition should be recognized as a medical emergency with one million children under five dying in India due to malnutrition related causes, say activists. A new study in Barn, Rajasthan and Berhampur in Madhya Pradesh has found that preventable deaths continue to hit children in the poorest areas of the country. Every year one million under five children die due to malnutrition related causes in India. In Madhya Pradesh, according to NFHS 3, 40% children were stunted down from [NFHS 2 - 49%], 60% underweight up from [NFHS 2 - 54%] and 33% wasted [NFHS 2 - 20%]. The rise in these nutritional indicators in the state is worrisome and it is essential that strategies for addressing this are adopted on a war footing. Regarding Rajasthan the report said that according to NFHS-3, 20% of children under five are wasted, an increase from 11.7% in NFHS-2, 24% are stunted as opposed to (52% in NFHS-2) and 44% are underweight (50.6% in NFHS-2). The NFHS-3 data also shows that children under five belonging to scheduled tribes in Rajasthan have the highest prevalence of severe acute malnutrition.

Nutritional statistics of Tamilnadu (2013) of under five children: District of Coimbatore revealed: Normal – 57.25%, moderately malnourished - 25.32%, severely malnourished - 17.41%.

TABLE 1.1: Nutrition requirement of pre-schooler**(K.PARK 2015)**

Age	Energy	Protein	P:E ratio
1-3 years	82Kcal/Kg/day	0.94g/Kg/day	4:6
4-6 years	75Kcal/Kg/day	0.94g/Kg/day	4:6

TABLE 1.2: Nutritive value of ragi / soya / jaggery

CONSTITUENTS	RAGI (100gms)	SOYA (100gms)	JAGGERY (100gms)
Protein(g)	7	36.5	0.4
Fat(g)	1	19.9	0.1
Carbohydrate(g)	72	30.2	95
Energy(Kcal)	328	416	383
Fibre(g)	4	9.3	0
Calcium (mg)	344	277	80
Phosphorous(mg)	283	704	40
Iron (mg)	4	15.7	2.6

In 2006 WHO released a new set of growth standards and charts, based on the data from the MGRS. The WHO recommends the application of these standards for all children worldwide, regardless of ethnicity, socioeconomic status and type of feeding. In preschool children BMI-for-age and WFLH provide similar information hence there is no need to monitor both indicators. There is an extraordinary prevalence of malnutrition in Indian scenario and the investigator has come across much number of children with malnutrition while caring for children in the preschool age. This motivated the investigator to take the topic to compare the effectiveness of nutritional supplement.

1.3 Statement of the problem:

A study to assess the effectiveness of ragi kanjii versus soya milk in improving the nutritional status of malnourished pre-school children at Institute of Child health and Hospital for children, Chennai

1.4 Objectives:

- To evaluate the efficacy of ragi kanjii on the nutritional status of the malnourished pre-school children
- To evaluate the efficacy of soya milk on the nutritional status of the malnourished pre-school children
- To compare the efficacy of ragi kanjii versus soya milk on the nutritional status of malnourished pre-school children
- To associate efficacy of ragi kanjii and soya milk on nutritional status with the selected demographic variables.

1.5 Operational definitions:

Effectiveness: It refers to the outcome of nutritional status such as anthropometric achievement of malnourished preschool children after the administration of ragi kanjii or soya milk

Consumption: It means taking adequate quantity of healthy food which helps in preventing malnutrition.

Ragi kanjii: Ragi kanjii is prepared by drying ragi sprouts in shade, and then grinding them into a smooth powder. One and half kilogram powder is added to 6 litres of water and cooked. Jaggery (300gms) is added to this cooked preparation for taste.

Soya milk: Soya milk is prepared by soaking 900 grams of dry soybeans overnight and grinding them with water. Then the filtrate is cooked with jaggery (300gms) in 6 litres of water.

Nutritional status: It is the existing health status of children measured by the anthropometric measurements.

Malnourished: Children who do not consume appropriate quantity of nutritious food ultimately ending with altered nutrition status.

Pre School children: They are the children who have not entered regular schooling and fall in the age group of 3-5 years of age.

1.6 Assumptions:

1. Preschool children may be experiencing malnutrition.
2. Preschool children may be consuming nutritional supplements.
3. Providing soya milk over may enhance the nutritional status of children to some extent than ragi kanjii.

1.7 Hypotheses:

H₁: There will be an improvement in nutritional status of preschool children receiving soya milk than children receiving ragi kanjii.

H₂: There will be an association between the selected demographic variables and the nutritional status of children receiving ragi kanjii and soya milk

1.8 Delimitations:

- The study is limited to a time period of four weeks.
- The study is limited to children aged three to five years.
- The study is delimited to children's hospital, Chennai.

CHAPTER –II

REVIEW OF LITERATURE

This chapter deals with the information collected in relation to the present study. The investigator collected the related literature after extensive review and discussion with the experts in the field. The reviews thus collected is organized and presented under the following sections.

2.1 Review of literature related to the study:

Section A: Studies related to malnutrition among preschool children.

Section B: Studies related to effects of ragi kanjii on malnutrition.

Section C: Studies related to effects of soya milk on malnutrition.

Section A: Studies related to malnutrition among preschool children

Damaris K Kinyoki et.al, (2015) conducted a cross-sectional nutritional survey among the five year children from the households across three livelihood zones of Somalia. Two-stage cluster sampling was used and the survey was conducted using the predictors of three anthropometric measures. Analysis was done using Bayesian binomial regression, controlling for both spatial and temporal dependence in the data. The estimated national prevalence of wasting, stunting and low mid-upper arm circumference was 21 %, 31 % and 36 %, respectively. Although fever, diarrhoea, sex and age of the child, household size and access to foods were significant predictors of malnutrition, the strongest association was observed between all three indicators of malnutrition and the enhanced vegetation index.

Hasanain Faisal Ghazi et.al., (2015) a cross-sectional design used to identify factors contributing to malnutrition among three to five years old children in Baghdad city, Iraq . Two hundred and twenty children aged three to five years were chosen randomly .Calculation was done using Kish's formula.

Both questionnaire responses and anthropometric measurements were used in this study. Study stated that childhood malnutrition is still a major public-health problem in Baghdad. This study showed that malnutrition is significantly related to insecure living areas and at least one family member having been killed in the past five years.

Ram Milan Prasot et.al., (2014) undertook a cross-sectional study by house to house visit covering 400 children of ages one to six in rural Lucknow, Uttar Pradesh. Study revealed that 57.4% children were malnourished.

Samuel Menahem et.al., (2014) conducted a case-control study on 449 children aged 6–59 months in Bangladesh, using a structured questionnaire. Data was analysed using Logistic regression analysis. The study revealed that the major associated/risk factors for acute malnutrition among these children were older age of the child, undernourished mother, jobless father or father with a low-paying job, low total family income, and poorer breastfeeding practices. Some of these factors may operate in synergy to increase the risk of acute malnutrition.

Fernanda de Souza Menezes et.al., (2013) conducted a prospective cohort study on 385 preschool children admitted in intensive care unit over a two year period. Samples were selected randomly. Results showed 175 patients (45.5%) were malnourished on admission. Sixteen patients of the malnourished group (9.14%) and 25 patients (11.9%) of the non-malnourished group died. Malnutrition was associated with greater length of mechanical ventilation and length of Intensive care unit stay, but not with mortality on univariate analysis. Malnutrition was associated with greater length of ventilation on the multiple logistic regression model

Abolfazl Payandeh et.al., (2012) conducted a *cross* sectional population based study on 70339 preschool children in north east Iran. The primary outcome variables were; weight, height, age and gender of the children. The sex and age specific rate and overall rate of underweight, stunting, and wasting

were calculated. The rate of underweight, stunting, and wasting was 7.5%, 12.5% and 4.4% respectively. There were significant differences in stunting and wasting rate between boys and girls. The overall rate of stunting was significantly higher than the overall rates of underweight and wasting. The rate of malnutrition increased with child's age.

Basit A et.al., (2012) carried out a case control study among 162 children aged one to five years attending the paediatric outpatient department in six rural health care centres at Udupitaluk of Karnataka in Southern India. A semi-structured questionnaire was used to interview the caregivers of the children and the nutritional status was graded according to the Indian Academy of Paediatrics. Lack of exclusive breast feeding, level of education of the caregiver and environmental factors like source of water did not have an association. Childhood illness, short birth interval and consumption of diluted milk were some of the significant contributory factors noted among this population. Study concluded information, education and communication (IEC) campaigns alleviating food fads and promoting birth spacing are needed.

DaljeetKaur et.al., (2011) conducted a study among 14,649 children aged from 4 to 24 months in poor rural area wl-sheng-uyan, China regarding complementary feeding practice. Approximately one third of children started complementary feeding at 4 to 6 month old and 16.4% children fed cereal foods before 4 months old about 20% children were fed formula milk daily after weaning time. The study revealed that the poor feeding practice and lack of knowledge among mothers in some selected rural area at China played a negative role in children's growth.

Fahmina Anwar et.al., (2011) carried out a community based cross sectional study on 80 preschool children in India. Study revealed 37.5% of the studied children were anthropometrically normal. In other words, nearly two thirds of the children were in the zone of malnutrition by anthropometric failure. Findings from the current study suggest that conventional measures of under

nutrition may be missing out a considerable proportion of undernourished children present in the population. Underestimating this proportion might prevent undernourished children from receiving the benefit of the extra supplementation they deserve.

Joshi et.al., (2011), a descriptive study in western Nepal on 2600 children aged 4-14 years reported 58% children (4-14 years) were malnourished in which 53% mother has inadequate knowledge about diet.

Maheswari .K (2011) conducted a comparative study to identify the malnourished children between the age groups of 1 to 5 years of age in Salem district. Descriptive design was used; cross-sectional survey approach was used to collect the data. Out of 687 children, 200 malnourished children were identified as per IAP classification by purposive sampling technique. The results revealed increased percentage of female children were malnourished when compared to male children. There was significant relationship between sex, age and malnutrition. First degree malnutrition was common when compared to second and third degree malnutrition.

Mercedes de Onis et.al., (2011) conducted five hundred and seventy-six national representative longitudinal surveys to quantify the prevalence and trends of stunting among children using the WHO growth standards including anthropometric data. The result showed an overall decrease in malnutrition in developing countries but stunting remains a major public health problem in many of them. The data summarize the progress achieved in the last two decades and help identify regions needing effective interventions.

Padmavathi .B (2011) conducted a comparative study was done to assess the nutritional status of preschool children in selected government and private school at Raichur. Descriptive survey design was used and the samples were selected using simple random sampling technique. Anthropometric measurements of the children were assessed. The chi-square value computed between the nutritional status and the family income ($\chi^2 = 13.909$) was found to

be significant at 5% level, which implies that there was a significant relationship between the nutritional status and the family income. Conclusion of the study was that the nutritional status of preschool children was influenced by the monthly family income.

Khadilkar et.al., (2010) conducted a study to evaluate the growth performance of affluent Indian preschool children and comparison with the new WHO growth chart in Pune, India. A cross-sectional, multicentric preschool based study was conducted on 193 children. Percentage of children stunted (height for age < - 2SD), underweight (weight for age < - 2SD), wasted (weight for height < - 2SD) and low BMI (BMI for age < - 2SD) according to the WHO standards 2006, and WHO/NCHS standards, were calculated. The study showed the z scores for height, weight, BMI and weight for height for study population were below the who 2006 standard median. From ages 2-5 years, the mean z scores showed consistent improvement when compared with the WHO charts. Interestingly, the BMI did not differ much from the WHO standards.

Section B: Studies related to effects of ragi kanjii on malnutrition

Amir Gull et.al., (2014) assessed the nutritional and health attributes of finger millet and its utilization in value added foods. Finger millet being staple food in different parts of India and abroad is promoted as an extremely healthy food. Its nutritional and functional properties have been reviewed and found best among all cereals grains. Vitamins, minerals, fatty acids and antioxidant properties of this make its strong contribution to human nutrition. This could be a strategic grain used to complement the diet in rural/marginal regions where energy-protein malnutrition affects most of the population. Finger millet can be used in different food formulations for making value added products due to its well-balanced protein profile and gluten free properties. Although the consumption pattern of this millet is specific and continue to remain as such, therefore its popularization in the broader range is essential and specific design

of foods acceptable to the population can help in promoting the consumption of this millet.

Ashwini G.Rane et.al., (2014) analysed the proximate principles of finger millet in the present study. Six samples with 0hr, 4hr, 6hr, 8hr, 12hr, and 24hr of sprouting were taken and compared with Wheat sample. Fresh samples were taken for proximate principles and mineral analysis daily. The proximate analysis and antimicrobial activity reveal that finger millets were found to contain higher amounts of carbohydrates, dietary fibres, calcium, phosphorus and vitamin C when compared with wheat.

Vandenplas et.al.,(2014) reviewed the safety of SIF in relation to anthropometric growth, bone health (bone mineral content), immunity, cognition, and reproductive and endocrine functions. The review included cross-sectional, case-control, cohort studies or clinical trials that were carried out in children fed SIF compared with those fed other types of infant formulas and that measured safety. Wherever possible, a meta-analysis was carried out. The study found that the anthropometric patterns of children fed SIF were similar to those of children fed CMF or HM. Despite the high levels of phytates and aluminium in SIF, Haemoglobin, serum protein, Zinc and Calcium concentrations and bone mineral content were found to be similar to those of children fed CMF or HM. The study did not find strong evidence of a negative effect on reproductive and endocrine functions. Immune measurements and neurocognitive parameters were similar in all the feeding groups. The study concluded that modern SIF are evidence-based safety options to feed children requiring them. The patterns of growth, bone health and metabolic, reproductive, endocrine, immune and neurological functions are similar to those observed in children fed CMF or HM.

Melese Temesgen et.al., (2013) conducted a randomized control trial was done on 120 preschool malnourished children who were selected randomly from a village. The samples were given ragi cake of 55 grams once daily for a

period of one month and the anthropometric measurements were analysed. Statistical evidence showed an improvement in the nutritional status of the children.

Bhanuprava Mallick et.al., (2012) conducted a quasi experimental study on 60 preschool malnourished children. Purposive sampling technique was used. Ragi porridge was given to the experimental group for 15 days. Opinionnaire and standard questionnaire were used. The study showed a significant improvement in nutritional status of the children.

Patil Y. R et.al., (2012) carried out an open-label, prospective, interventional, and exploratory clinical trial to evaluate the efficacy of RagiSatwa on 30 preschool children suffering from mild to moderate malnutrition. Administration of “RagiSatwa” for 90 days showed a significant increase in mean score of BMI, height for age, weight for height, mid arm circumference, weight for age & abdominal girth. It also enhanced blood biochemical parameters.

Suresh C. M et.al., (2012) did a community based interventional study on 3694 under five malnourished children (both moderate and severely malnourished). Samples were selected randomly. One group was given only education on supplementary food and other group was given ragi supplement with education. Significant improvement in the nutritional status of children was noted in children supplemented with ragi.

Rao S et.al., (2011) conducted experimental study on 200 children who were selected randomly from the outpatient department of a hospital in Mangalore. Samples taking ragi for a month showed a significant rise in the growth pattern.

Kamalanathan G et.al., (2010) conducted an feeding trial on 25 children aged 2.5 to 5 years who had their breakfast, lunch and evening snack at the balwadi [nursery] for 6 days a week. The menu was planned to meet 2/3rd of the allowances recommended by the Indian Council of Medical Research. It

included 100 g of a high-protein food providing 20 g protein of which 2:1 parts came from ragi and horse gram respectively. Another 15 children not attending the balwadi were the controls. After 6 months the 15 controls were compared with 15 children of similar initial height and bodyweight from the first group. The mean increase in height, bodyweight and Haemoglobin was significantly greater for the first group than for controls at the 1% level.

Nazni P et.al., (2010) selected three primary schools situated in Salem District, Tamilnadu, India. A total number of 150 school children, 61 from primary school I, 46 from primary school II and 43 from primary school III comprised the study sample. About 80 primary school children with Grade II malnutrition were selected for the experimental study. Home diet without any supplementation was followed by Group I (n=20, control group), potato flour biscuit was supplemented to Group II (n=20), wheat biscuits was given to Group III (n=20) and ragi biscuits were given to Group IV (n=20) for the period of 3 months. Parameters like anthropometric measurements, haemoglobin content clinical picture and cognitive performance were analysed before and after supplementation. Results of Group I (control group) showed no significant difference in height, weight and clinical picture and cognitive performance after three months on their home diet. In Group II, III and IV significant increase in all the above parameters was noticed. More increase was found in Group IV (supplemented with ragi biscuits) children. About cognitive performance better results was obtained in Group II followed by Group III (supplemented with wheat biscuits) and Group IV (supplemented with ragi biscuits). Least was obtained by control group children who are in their home diet.

Section C: Studies related to effects of soya milk on malnutrition

Andres A et.al., (2015) compared reproductive organs volumes and structural characteristics in children at age 5 years who were enrolled in the beginning study long-term cohort. The samples were on soya supplements. Among girls, no significant differences were found in breast bud, ovarian, or

uterine volumes; counts of ovaries with cysts; ovarian cysts numbers; ovarian cyst size; and uterine shape between the diet groups. Among boys, no significant differences were found in breast bud, testes, or prostate volumes or structural characteristics between the diet groups.

Iuel-Brockdorf A.S et.al., (2015) conducted an experimental study to evaluate the acceptability of new formulations of six corn-soy blended flours (CSB) and six lipid-based nutrient supplements (LNS) with different quantities of milk and qualities of soy to be used for the treatment of moderate acute malnutrition (MAM). Furthermore, the acceptability of foods currently used for the prevention and treatment of malnutrition in Burkina Faso and to identify possible barriers that could affect the acceptability of the new formulations of supplementary foods. The study was carried out prior to a randomized controlled trial evaluating the effectiveness of these new formulations. The study involved an observed test-meal and a three-day take-home ration of the experimental food supplements to 6 to 30months old healthy children, followed by questionnaire-based interviews about the acceptability of these supplements. Interviews and focus group discussions were carried out to explore the acceptability of foods currently used for the prevention and treatment of malnutrition. The results suggest that both LNS and CSB products with different quantities of milk and qualities of soy are equally well accepted among healthy children in rural Burkina Faso based on general appreciation of the supplements and organoleptic properties. All experimental foods received good ratings and there was no significant difference between the foods. However, after the take-home ration, 58% of participants receiving CSB reported having left-overs at the end of the day compared to 37% (n=33) of the participants receiving LNS (p=0.004), suggesting that CSB was not as readily consumed as LNS. Yet, both CSB and LNS products were perceived as easy to administer and the frequency of feeding was estimated to be adequate. The study also found that similar foods, used for the prevention and treatment of malnutrition, were well appreciated in the study location. LNS were to a higher degree

associated with medicine or foods with medicinal properties, but both LNS and CSB were perceived as beneficial to child health.

Mudryj et.al., (2015) collected cross-sectional data from the 2004 Canadian Community Health Survey to classify soy consumers and non-consumers. Soy consumers were further divided into two groups based on their soy protein intake. Sample weights were applied and logistic regression analysis was used to explore the association between nutrient intakes and soy consumption, with cultural background, sex, age and economic status being included as covariates. On any given day, 3.3 % (n 1085) of Canadians consume soy foods, with females, Asian Canadians and adults with post-secondary education being more likely to be soy consumers. As a whole, children and adults who had consumed at least one soy food during their 24 hour dietary recall had higher energy intakes, as well as increased intakes of nutrients such as protein, fibre, vitamin C, vitamin B6, naturally occurring folate, thiamin, calcium, phosphorous, magnesium, potassium and lowered intakes of saturated fat. These data indicate that soy food consumption is associated with improved diet quality of Canadians.

Hemavathy V et.al., (2014) did a pre experimental study on 60 preschool children (3-6 years) who were selected by non-randomized purposive sampling technique. The study was conducted in Anakaputhur area at Chennai. Samples were given soya milk for a month period. Statistical analysis using MC Nemer chi square test shows there is significant improvement ($p < 0.001$) between the pre-test and post-test grade of malnourished children after having soya milk

Niyibituronsa et.al., (2014) used a multistage and stratified sampling technique to randomly select 294 households for inclusion in the survey. One child per household was considered for anthropometric measurements. Four child feeders were trained to process soybean into milk to feed malnourished children in two villages. Two others were trained to make soybean sauce from

roasted soybean flour to feed malnourished children. Data was analysed by regression models using GenStat 14th edition and the magnitude of weight gain due to each of the treatments was predicted at 5% level of significance. A linear mixed model was used to estimate and compare weight gain among children fed on soybean milk and soybean flour supplement in comparison with the control group. Soybean products were found to affect weight gain of children ($P = 0.04$). The mean weight gain was 0.9 (± 0.5) kg within three months of intervention. The difference in weight gain between the two treatment groups was not significant. To improve the nutritional status of malnourished children under five years further intervention is needed in terms of education and training on soybean based diet formulation.

Subhasree Ray et.al., (2014) conducted a study to strengthen the Government health machinery in Nashik District, Maharashtra. Along with existing nutritional intervention, a small modification in diet by soya was introduced to fulfil the deficit of 300 Kcal approximately. Good quality fat and protein were added to the Anganwadi meal with daily micronutrient supplementation. The supplementation was continued for 30 days in 25 SAM children of 3 to 5 years. The baseline and end line body weight measurements were taken and compared to see the improvement. After 30 days of intervention the supplemented SAM children showed statistically significant increased body weight ($P < 0.01$) with an overall healthy nutritional status. The study showed that public-private collaborative systematic strategy with proper monitoring and evaluation can actually eliminate malnutrition in an effective manner by improving linear growth of the SAM children.

Doder .V et.al., (2012) conducted an experimental study among 240 children between the ages of 2 and 15 years in 3 communities that use or do not use soya beans was evaluated by conventional methods. There were significant differences ($p < 0.05$) in the nutritional status of pre-school (2-5yrs) and school-age children (6-15 years) in these three communities. A community producing and using soya beans, had a significantly higher percentage ($p < 0.05$) of

nutritionally normal and a lower percentage of severely malnourished children than the other two villages.

Ghatge N.S (2012) stated supplementary feeding must be the additional nutrients which are providing for the optional growth and desirable change in health status. Hence effort had been made to formulate soyaladoo. The organoleptically high scored soyaladoo evaluated nutritionally for major nutrients such as energy (470.0kcal), proteins (20.1 g) and fats (22.0 g) content found more in soyaladoo. The micro nutrients such as iron (6.3 mg), zinc (3.8 mg) and calcium (286.5 mg) were also observed higher range in soyaladoo. Such soyaladoo was given @ 50 g/ child/day. The soyaladoo supplemented group shown high significant change than in major food groups that is cereals and legumes in group .Highly significant change was seen in fat and oil in soyaladoo supplemented group.

Preethi Rahul et.al., (2012) enumerated the benefits of [jaggery](#): prevents anaemia , eases pre-menstrual syndrome , relieves muscle cramps, boosts immunity , regulates blood pressure , relieves flatulence and acidity, acts as an expectorant, warms the body , eases hiccups , detoxifies the body.

Rajalakshmi . G (2010) conducted a study on children from 1 to 4 years old suffering malnutrition, who are treated with soya have a better chance of recovering height and weight. Sample of 83 undernourished children from 1 to 4 years old was taken and 3 experimental and 3 control groups were formed. The results found that the experimental group from 1 to 2 years old increased in weight and size by over 80%. There was a greater impact in the group given with soya, in which there was a clear improvement. The degree of malnutrition dropped and nutritional status was improved.

Samuel J Fomon M.D (2010) conducted a study for infants of 4 to 6½ months of age, for periods of 38 to 73 days while receiving a libitum feeding of a formula in which the protein was derived from soya bean. No other source of calories was provided. The content of protein in the formula was 1.14 gram/100

ml (6.8% of the calories supplied by protein) and the mean intake of protein by the infants was 1.7 gram/kg/day. The rate of gain in weight of the infants was normal and retentions of nitrogen (15 metabolic balance studies) were at least as great as those of normal full-term infants of similar ages fed human milk.

2.2 CONCEPTUAL FRAMEWORK

Conceptual framework is an organized phenomenon which deals with concepts that are assembled by virtue of their relevance to a common theme. Here, the conceptual framework was based on **modified Karl ludwig von Bertalanffy general system theory (1972)**. Bertalanffy proposed that the classical laws of thermodynamics applied to closed systems, but not necessarily to "open systems". General systems theory is a general science of 'wholeness'.

This new vision of reality is based on awareness of the essential interrelatedness and inter-dependence of all phenomena - physical, biological, psychological, social and cultural.

Theory is based on the following principles:

- Parts that make up the system are interrelated.
- Health of overall system is contingent on subsystem functioning.
- Open systems import and export material from and to the environment.
- Permeable boundaries (materials can pass through)
- Relative openness (system can regulate permeability)
- Second Principle of Thermodynamics (ENTROPY)
 - Entropy must increase to a maximum
 - Negentropy increases growth and a state of survival
- Synergy (extra energy causes nonsummativity--whole is greater than sum of parts)
- Equifinality vs. "one best way."

Theory is explained as follows:

Input-Throughput-Output

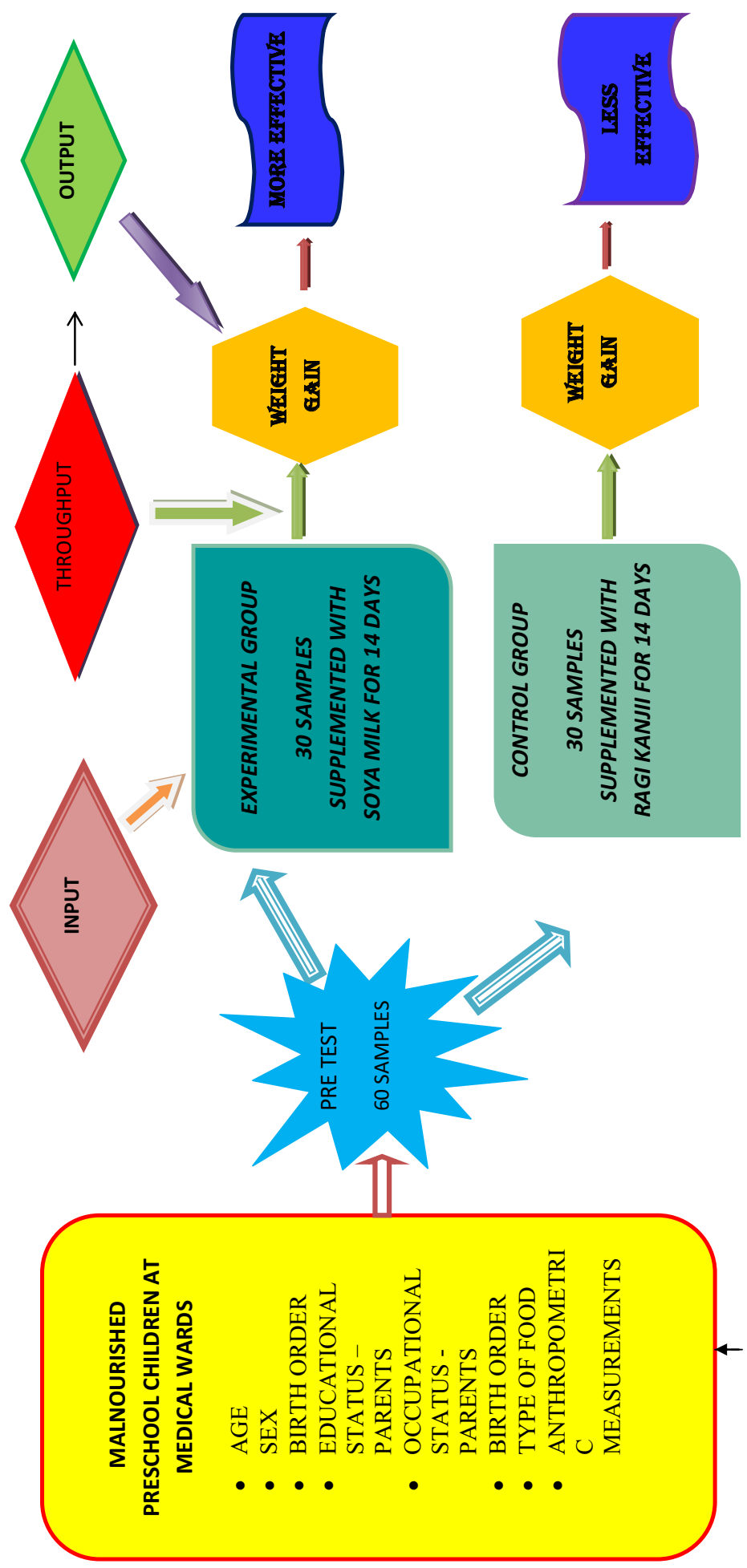
- Inputs
 - ▶ Maintenance Inputs (energetic imports that sustain system)
 - ▶ Production Inputs (energetic imports which are processed to yield a productive outcome)
- Throughput (System parts transform the material or energy)
- Output (System returns product to the environment)
- TRANSFORMATION MODEL (input is transformed by system)

Based on the Theory:

INPUT: Based on the demographic profile which included age of the child, sex of the child, religion, type of family, birth order of the child, immunization status, total number of live children in the family, type of food, educational status of mother, educational status of father, occupational status of mother, occupational status of father, monthly income, living area and the grade of malnutrition. The samples were divided into two groups. One group was given ragi kanjii and the other group was given soya milk once daily for a period of 14 days.

THROUGHPUT: The input is allowed to interact with the system to yield an output.

OUTPUT: The weight gain was assessed in both the groups on day fifteen.



F 2.1 CONCEPTUAL FRAME WORK BASED ON LUDWIG VON Y 1972.

CHAPTER III

METHODOLOGY

This chapter includes research approach, research design, variables, setting, population, sample, sample size, sampling technique, development and description of the tool, content validity, pilot study, data collection procedure, ethical considerations and plan for data analysis.

3.1 Research approach:

Quantitative research approach was considered as an appropriate approach, was adopted for the study.

3.2 Data collection period:

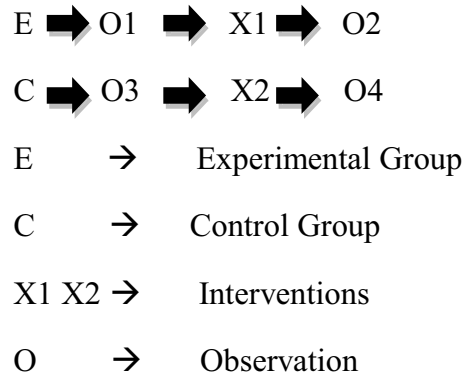
The data collection period was four weeks, from 16-07-2015 to 17-08-2015.

3.3 Study setting:

The selection of setting was done on the basis of the feasibility for conducting the study, availability of the sample, convenience to the investigator, geographical proximity and cooperation from the authority. The study was conducted at the Institute of Child health and Hospital for Children, Chennai-08. This hospital was started in the year 1968. It is a multi-speciality hospital having 837 beds situated in the heart of the city. There are about 27 departments and 7 medical units. The institute has been rendering meritorious service and has been providing an avenue for the research. In the above clinic children come from different culture, religion, language and socioeconomic background. In this setting there is a separate unit where children get admitted with malnutrition. On an average annually 9000 children visit outpatient department with altered nutritional status. Out of this 1200 children get admitted with malnutrition annually.

3.4 Study design:

The research design used in this study was Quasi experimental design.



3.5 Study population:

The study population includes malnourished pre-school children between ages of three to five years.

3.6 Sample size:

60 children (30 – experimental, 30 – control)

3.7 Sampling criterion:

3.7.1 Inclusion criteria:

1. Preschool children diagnosed with malnutrition.
2. Mothers who can understand Tamil.
3. Mothers who are willing to feed the child with ragi kanjii or soya milk

3.7.2 Exclusion criteria:

1. Children with congenital anomalies.
2. Children with mal absorption syndrome.
3. Children with other comorbid illness.
4. Children unable to take orally.
5. Children with malnutrition having complications.

3.8 Sampling technique:

Convenient sampling technique was assigned to select the samples from the population.

3.9 Research variables:

Dependent variables: Weight gain among malnourished pre-school children.

Independent variables: ragi kanji / soya milk.

3.10 Development and description of tool:

3.10.1 Development of tool:

After an extensive review of literature based on the objectives and validation by the medical, nursing and the statistical experts, the tool was developed for this study.

3.10.2 Description of tool:

The tool constructed for the study based on the objectives is grouped under the following sections:

Section A: Demographic data. This includes age, sex, religion, birth order, immunization status, type of food, religion of the child. This also includes the educational status of parents, occupational status of parents, monthly income, living area and the total number of the children in the family.

Section B: Nutritional status assessment tool: Bio physiological measurements were measured using weighing scale, stadiometer and inch tape. WHO growth charts was used to assess the malnutritional status.

Section C: Ragi kanji and soya milk administration details.

3.10.3 Content validity:

Content validity was determined by experts from Nursing, Nutritional and Medical. They suggested certain modifications in tool. Questions like child's wishes in preparation of the food, weaning in children in the basic survey of the nutritional status was suggested by the medical expert and the changes were done accordingly.

3.11 Ethical consideration:

The proposal of the study was approved by the experts prior to the pilot study by the Ethics committee of Madras medical college, Chennai-03. Each parent was informed about the purpose of the study. Informed consent was obtained. Assurance was given to them that confidentiality and privacy would be maintained. The parents were informed that they were having the freedom to leave the study with their own reason.

3.12 Pilot study:

A pilot study was conducted at Institute of child health and hospital for children, Chennai; by obtaining prior permission from the authorities. The study was conducted with ten patients, who fulfilled the inclusion criteria. The sample on which the pilot study was conducted was excluded from the main study. The data related to the variables were collected. The pre and post assessment of the nutritional status was assessed to both the groups. No inconveniences were faced during the pilot study and the setting was found to be feasible. Results were analysed.

3.13 Reliability:

After the pilot study reliability of the tool was assessed by using interrater method and its correlation coefficient r -value was 0.86. The correlation found the tool to be highly reliable for this study.

3.14 Data collection procedure:

A self-introduction was given by the investigator and the informed written consent was obtained from the parents of the children and the benefit of the nutritional supplement was explained to the parents. The objectives and purpose of the study were explained and confidentiality was maintained. The data collection procedure was done for the period of 4 weeks and the time taken for the data collection for each child was 10-20 minutes. The investigator selected 60 samples (30 participants given ragi kanji and 30 participants given soya milk) by convenient sampling technique based on the inclusion and exclusion criteria. Pre-assessment of the anthropometric measurements and post-assessment of the anthropometric measurements was assessed in both groups. Height was recorded using stadiometer, weight using weighing machine and the circumferences using Inch tape. The first 30 samples were treated as experimental group and were given soya milk for 14 days. The next 30 samples were treated as control group and given ragi kanjii to avoid interchange of interventions. Post assessment was done on the 15th day for both the groups.

Intervention protocol:

	Experimental group	Control group
Place	Institute of child health	Institute of child health
Intervention	200 ml of soya milk	200 ml of ragi kanjii
Duration	14 days	14 days
Frequency	Once daily	Once daily
Time	10 am	10 am
Administered by	Investigator	Investigator

After the pre-test the supplements were administered for both the groups. Experimental group - 200 ml of soya milk was prepared by soaking 30 grams of soya in water over night, after straining the grinded matter it was cooked with 10 grams of jaggery in water. It was distributed to the samples at free of cost and under direct supervision of investigator. Intervention was done for 14 days.

For control group - 200 ml of ragi kanjii was prepared by cooking 50 grams of powdered ragi with 10 grams of jaggery in water. It was distributed to

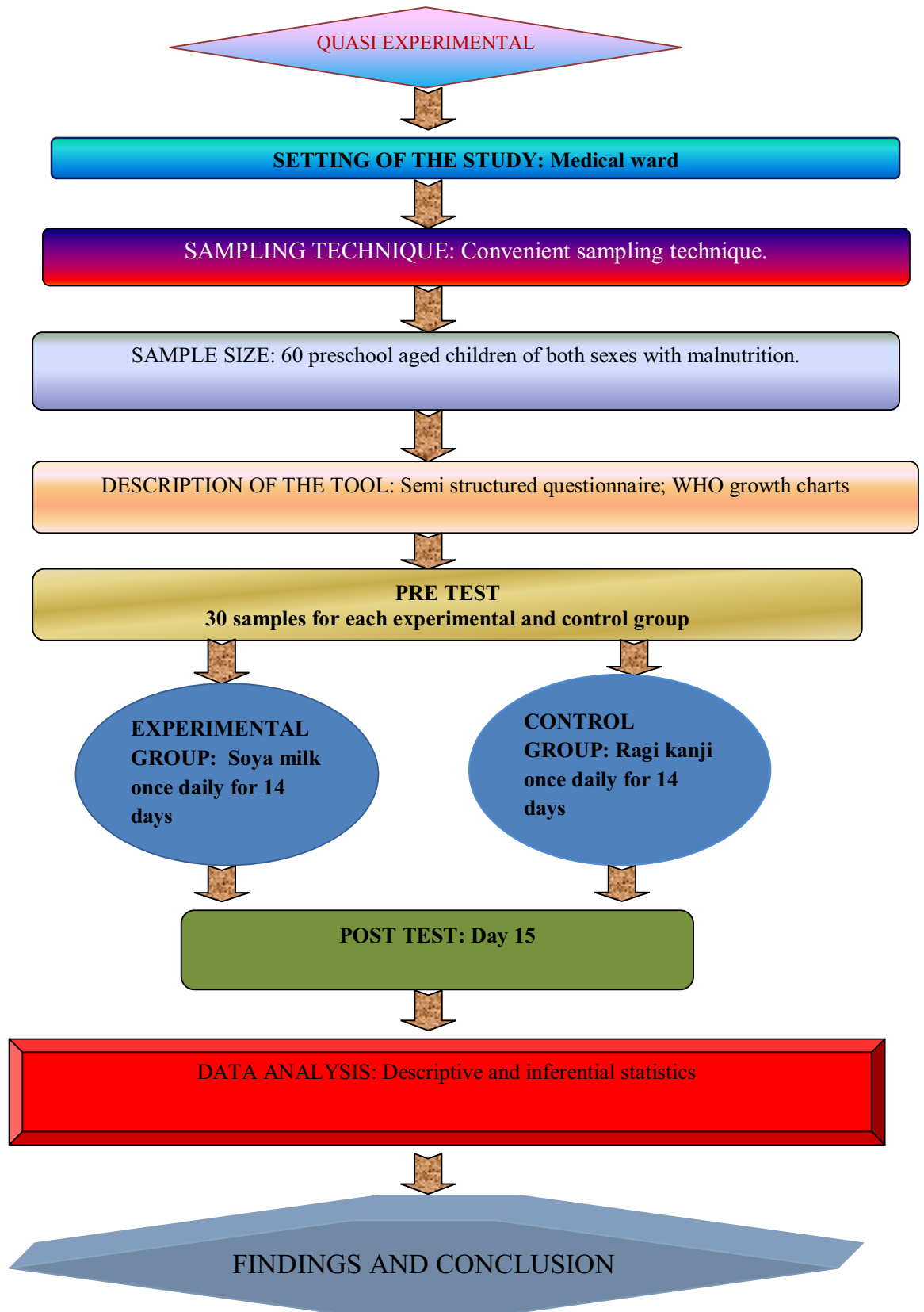
the samples at free of cost and under direct supervision of investigator. Intervention was done for 14 days. Post-test was done on the fifteenth day for both the groups.

3.15 Data entry and analysis:

The obtained data was analysed by using both descriptive and inferential statistics.

- ❖ Organize the data
- ❖ Frequency and percentage distribution of the demographic variables.
- ❖ Weight gain scores were analysed in mean and standard deviation.
- ❖ Association between weight gain score and demographic variables was analysed using chi square test.
- ❖ Difference between soya milk and ragi kanjii on nutritional assessment was analysed using proportion test.
- ❖ Difference between ragi kanjii and soya milk was analysed using student independent t-test. P value of $p \leq 0.05$ was considered statistically significant.

3.16 (Fig 3.1) Schematic representation of study design:



CHAPTER IV

DATA ANALYSIS AND INTERPRETATION

The data collected have been analysed using appropriate statistical methods and the results are as described below.

Organization of the data:

Section A : Description of demographic variables in the experimental and control group.

Section B : Pre and Post-test assessment of the nutritional status of the preschool children.

Section C : Comparing the effectiveness of the supplement among the experimental and control group.

Section D : Association of the post-test level of nutritional status with the demographic variables.

SECTION A : Description of demographic variables in the experimental and control group.

Table 4.1: Distribution of demographic variables of malnourished pre-school children

Demographic variables		Ragi(n=30)		Soya(n=30)	
		Frequency	In %	Frequency	In %
Age	3-4 years	10	33.3	14	46.7
	4-5 years	20	66.7	16	53.3
Sex	Male	18	60	16	53.3
	Female	12	40	14	46.7
Religion	Hindu	16	53.4	15	50
	Muslim	7	23.3	7	23.3
	Christian	7	23.3	8	26.7
Type of family	Nuclear family	18	60	19	63.3
	Joint family	11	36.7	9	30
	Single parent family	1	3.3	2	6.7
Birth order	First	12	40	10	33.3
	Second	16	53.3	18	60
	Third	2	6.7	2	6.7
Immunisation	Immunized but not regularly	1	3.3	3	10
	Immunized regularly	10	33.4	7	23.3
	Immunized up to date	19	63.3	20	66.7
Total children	One	2	6.7	2	6.7
	Two	24	80.	21	70
	Three	4	13.3	7	23.3
Type of food	Vegetarian	2	6.7	1	3.3
	Mixed	28	93.3	29	96.7

Table 4.1 shows:

Age: Thirty three per cent of the children who were given ragi kanjii were in the age group of 3-4 years and 66.7% of the children were in the age group of 4-5 years. Forty six per cent of the children who were given soya milk were in the age group of 3-4 years and 53.3% of the children were in the age group of 4-5 years.

Gender: About 60% of the children who were given ragi kanjii were male and 40% of the children were female. About 50% of the children who were given soya milk were male and 46.7% of the children were female.

Religion: Fifty three per cent of the children who were given ragi kanjii were Hindu, 23.3% of the children were Muslim and 23.3% of the children were Christian. About 50% of the children who were given soya milk were Hindu, 23.3% of the children were Muslim and 26.7% of the children were Christian

Birth order: About 40% of the children who were given ragi kanjii were born first in the family, 53.3% of children were born second and 6.7% of the children were born third in the family. Thirty three per cent of the children who were given soya milk were born first in the family, 60% of the children were born second and 6.7% of the children were born third in the family.

Type of family system: About 60% of the children who were given ragi kanjii belong to nuclear family, 36.7% of the children belong to joint family and 3.3% of the children belong to single parent family. Sixty three per cent of the children who were given soya milk belong to nuclear family, 30% who were given soya milk belong to joint family and 6.7% of the children who were given soya milk belong to single parent family.

Immunization status: Three per cent of the children who were given ragi kanjii were immunized but not regularly, 33.4% of the children were immunized regularly and 63.3% of the children were immunized up to date. Ten per cent of the children who were given soya milk were immunized but not

regularly, 23.3% of the children who were immunized regularly and 66.7% of the children who were immunized up to date.

Total number of children: Six per cent of the children who were given ragi kanjii belong to the family containing one child, 80% of the children belong to the family containing two children and 13.3% of the children belong to the family containing three children. Six per cent of the children who were given soya milk belong to the family containing one child, 70% of the children belong to the family containing two children and 23.3% of the children belong to the family containing three children.

Type of food: About six per cent of the children who were given ragi kanjii were vegetarians, 93.3% of the children were taking mixed diet and only non-vegetarians were nil. About 3% of the children who were given soya milk were vegetarians and 96.7% of the children who were given soya milk were taking mixed-diet.

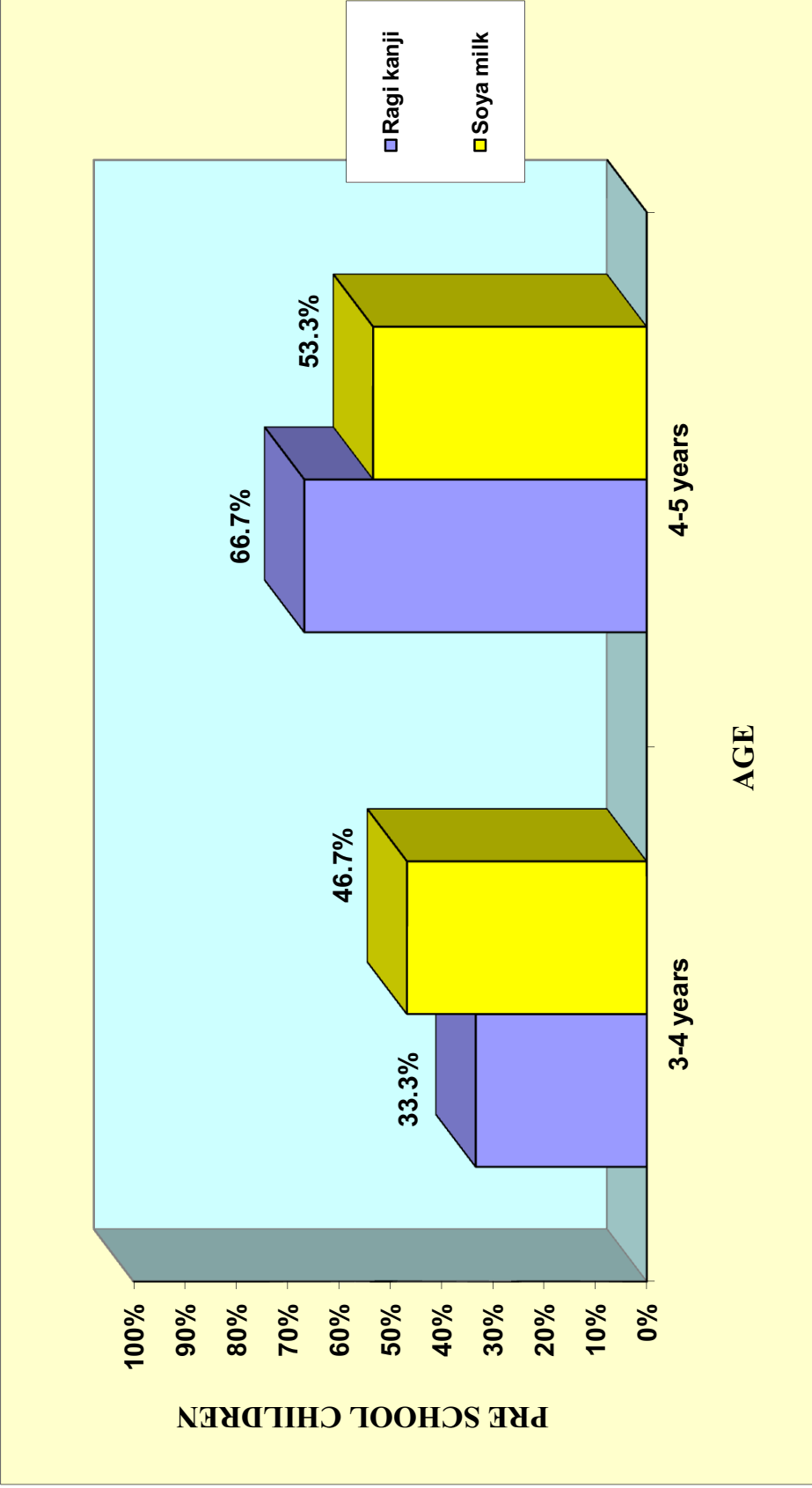


Fig 4.1: Age wise distribution of malnourished preschool children in both the groups

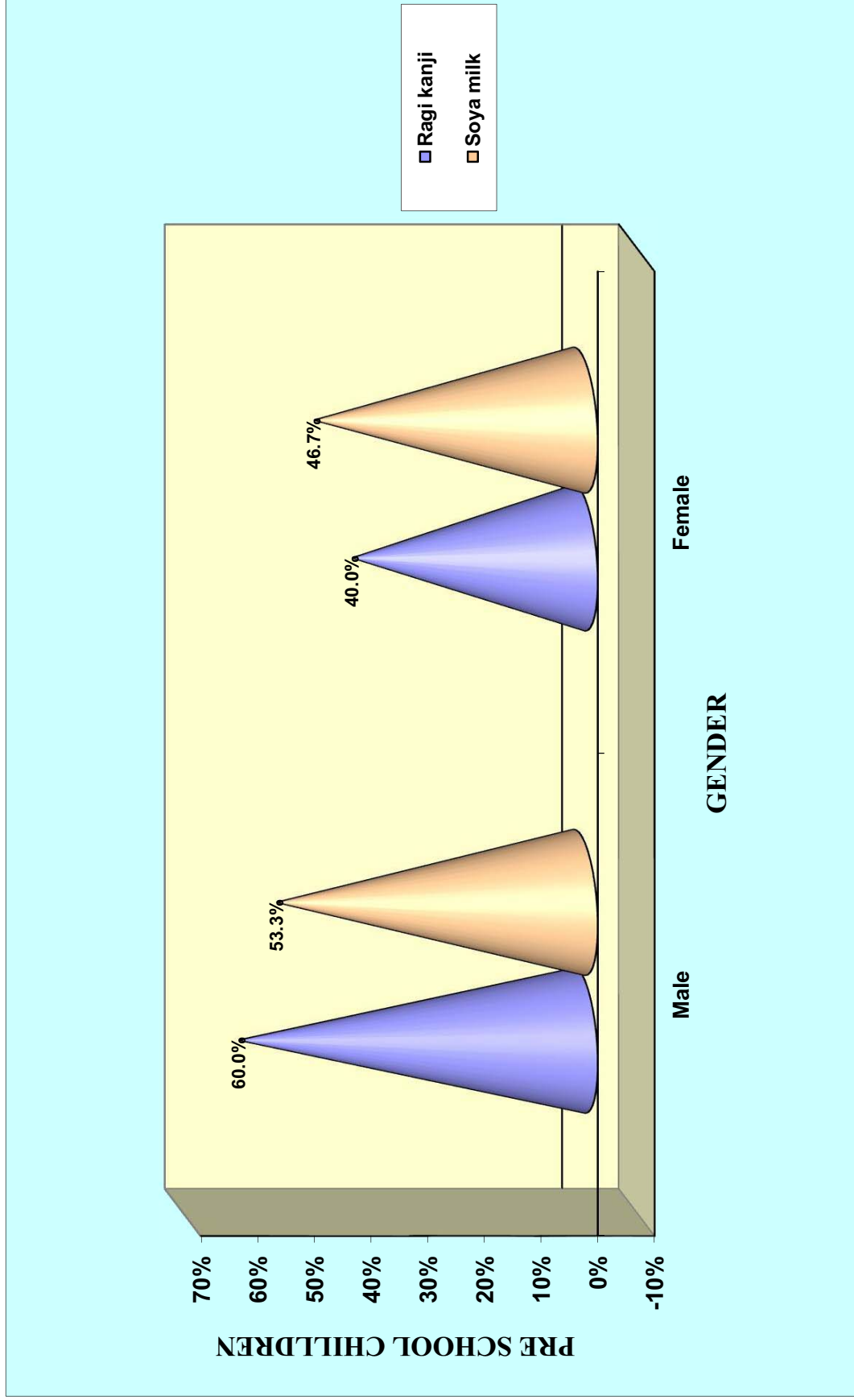


Fig 4.2: Gender wise distribution of malnourished preschool children in both the groups

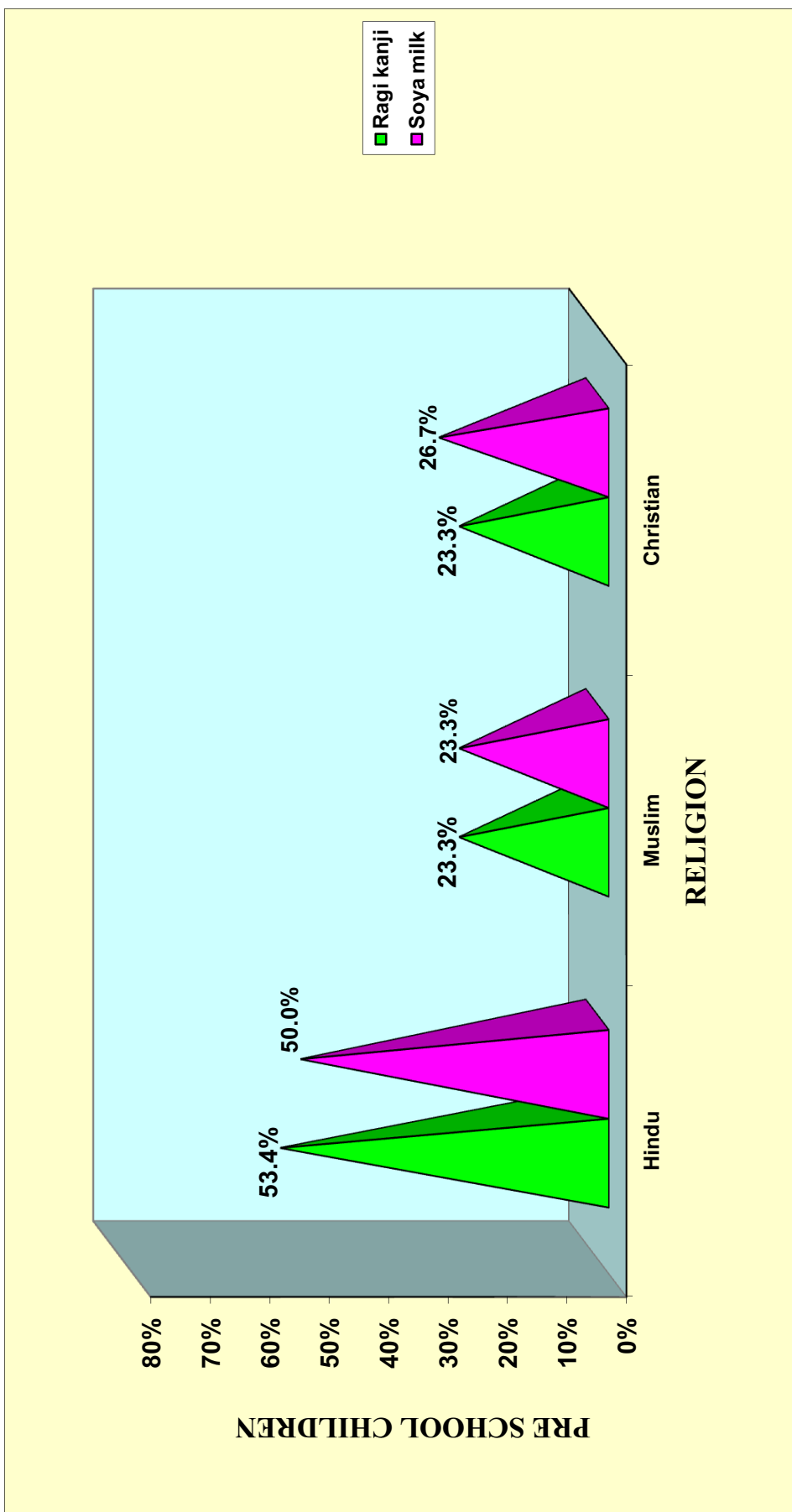


Fig 4.3: Religion wise distribution of malnourished preschool children in both the groups

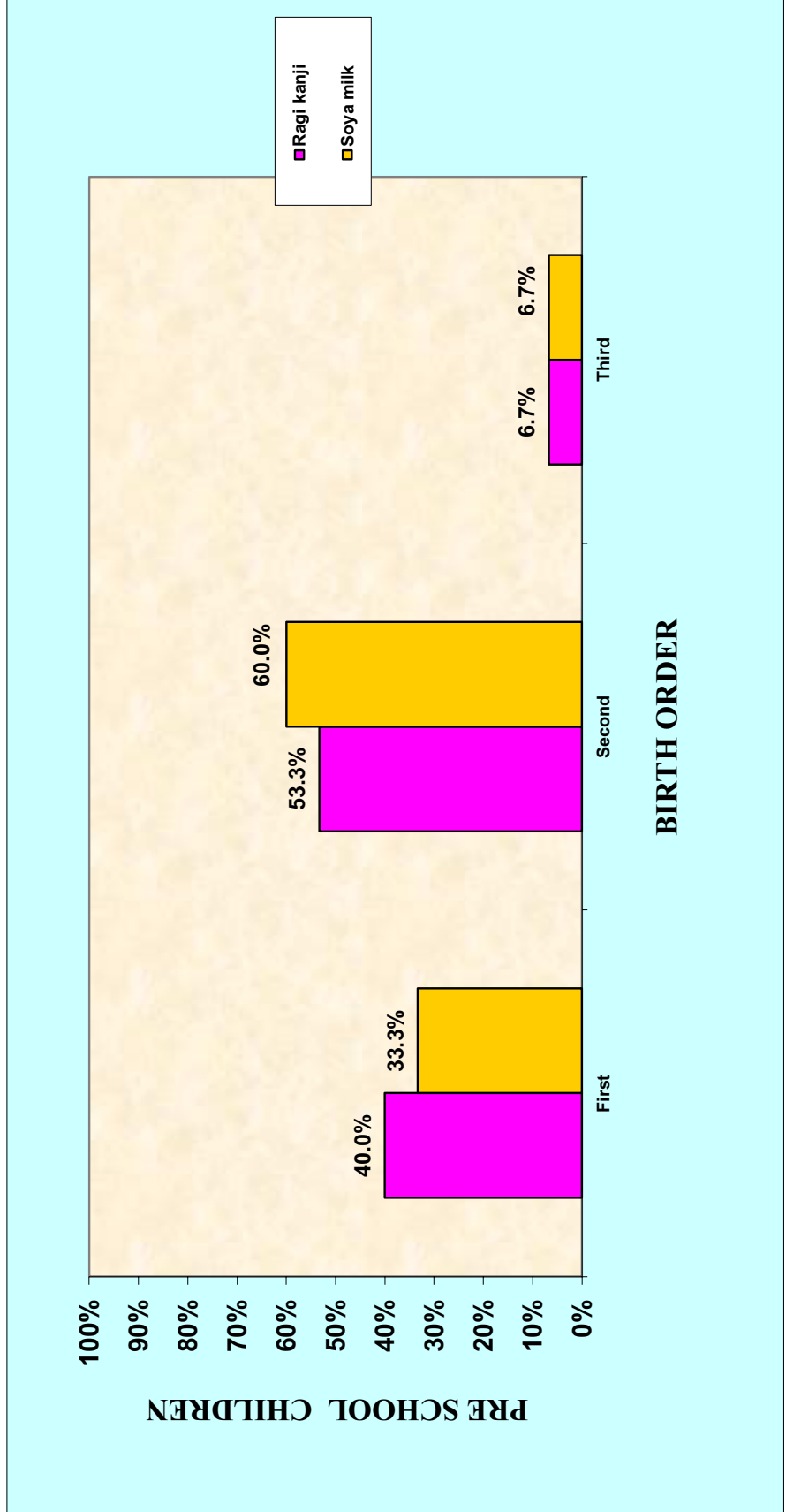


Fig 4.4: Birth order wise distribution of malnourished preschool children in both the groups

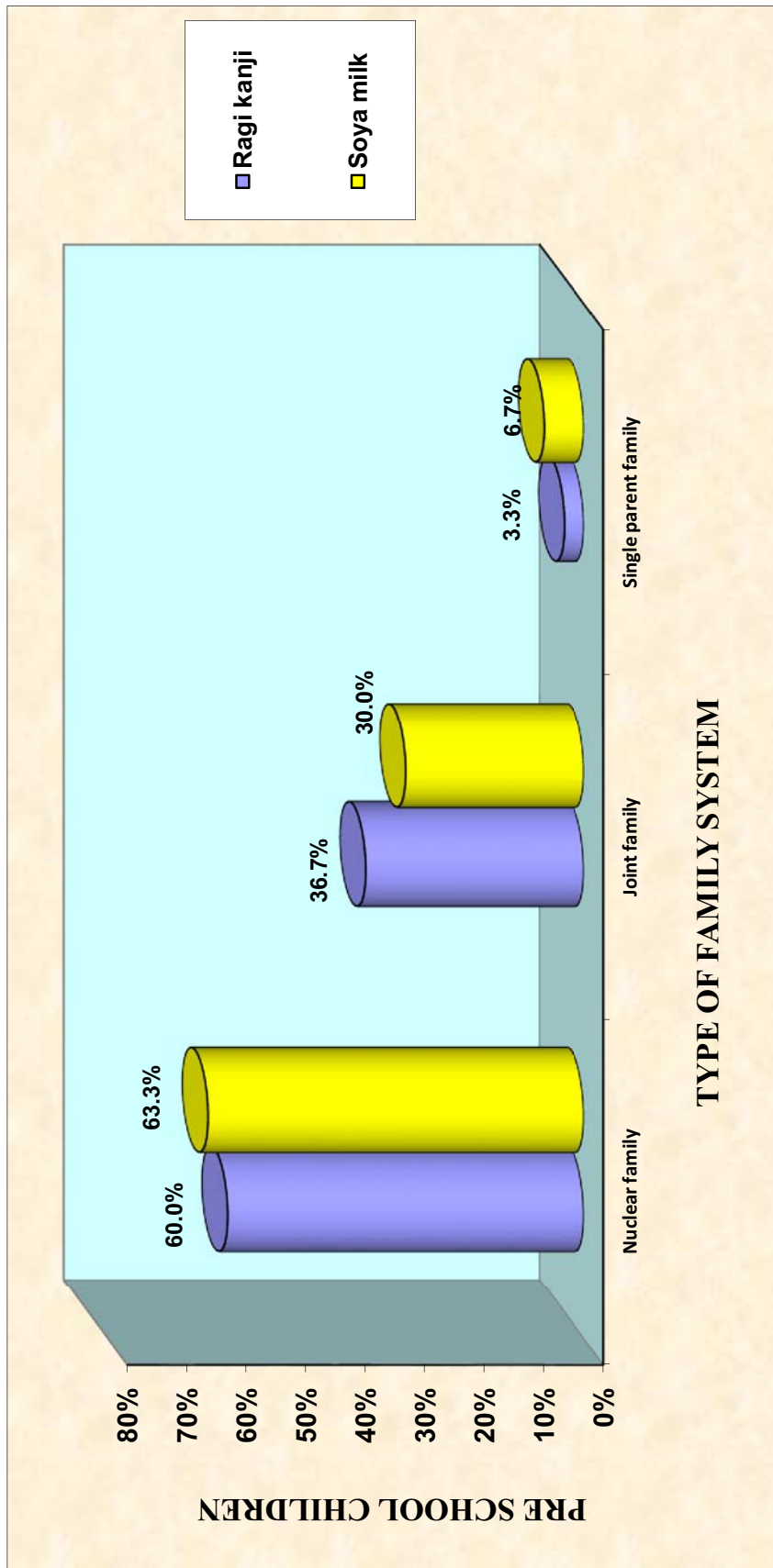


Fig 4.5: Type of family wise distribution of malnourished preschool children in both the groups

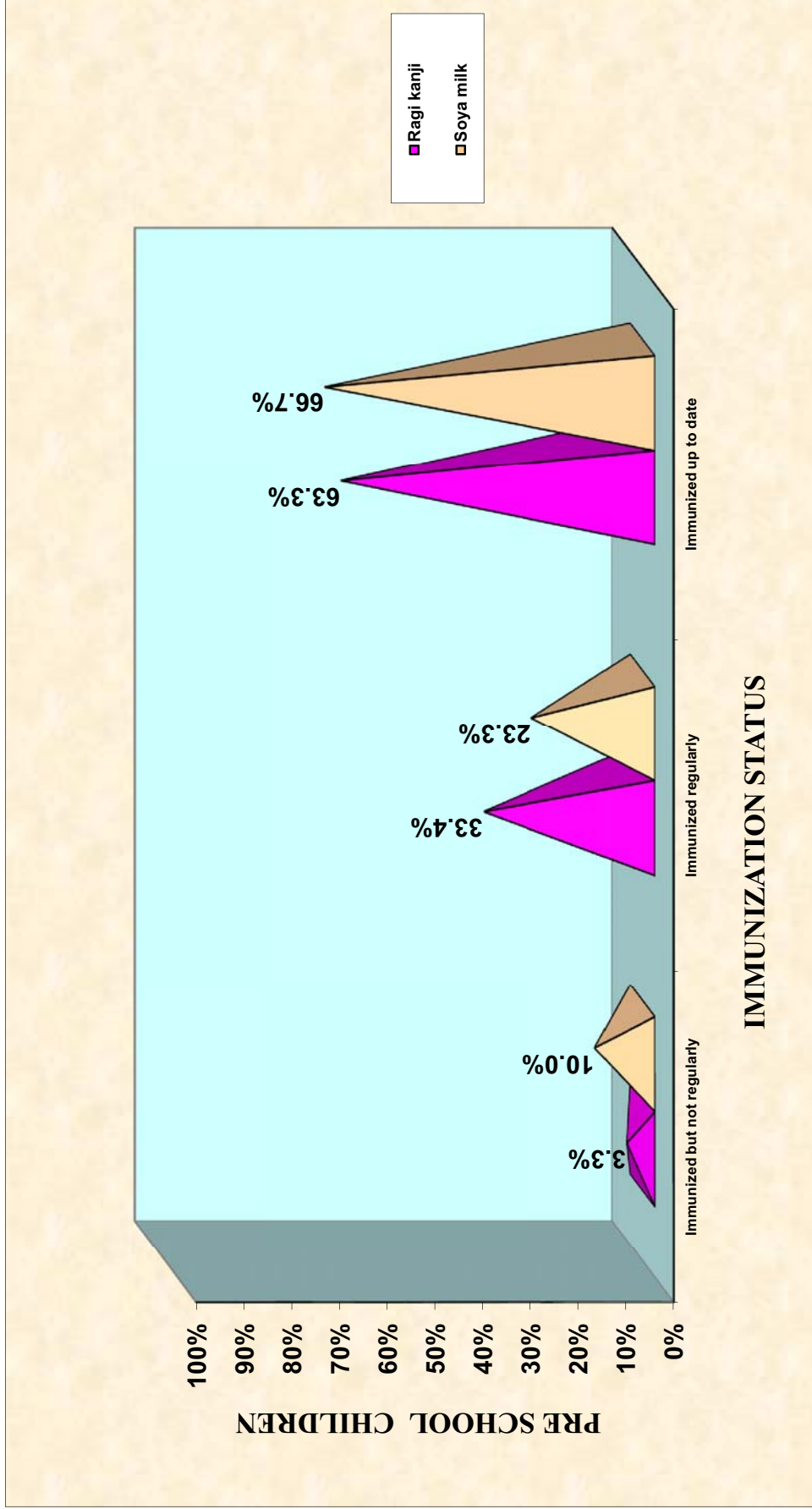


Fig 4.6: Immunization status wise distribution of malnourished preschool children in both the groups

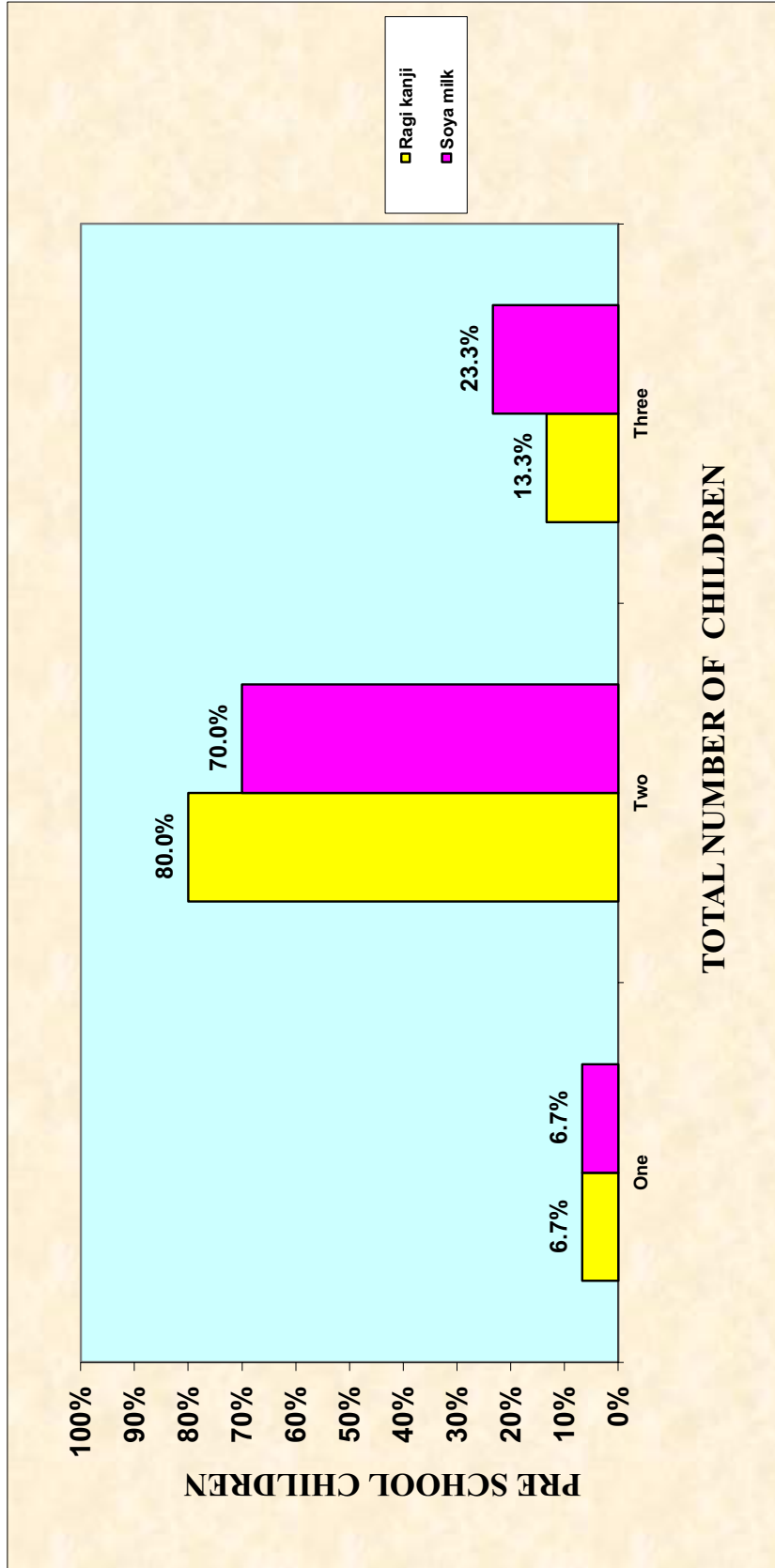


Fig 4.7: Total number of children in the family wise distribution of malnourished preschool children in both the groups

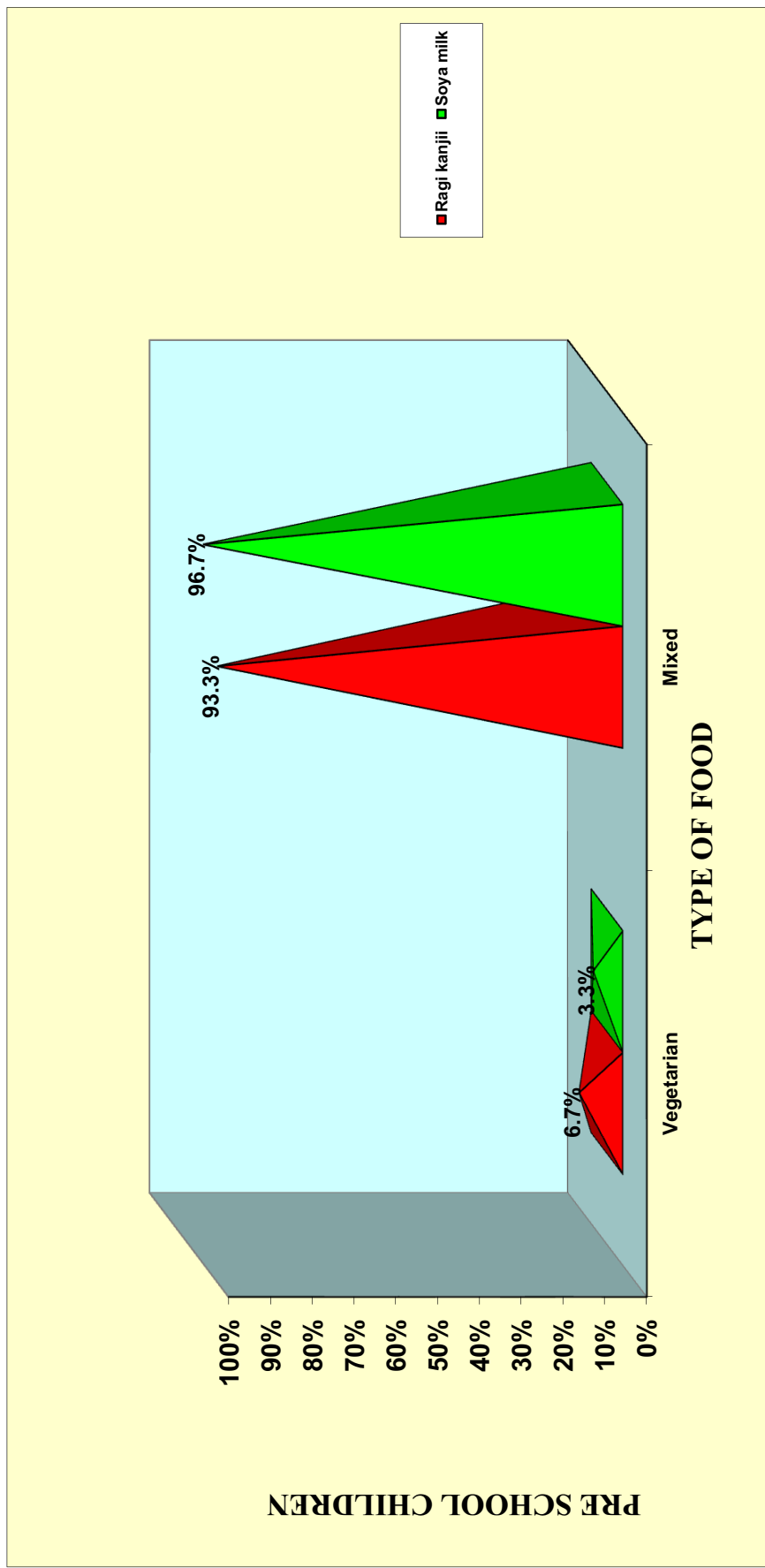


Fig 4.8: Type of food wise distribution of malnourished preschool children in both the groups

TABLE 4.2: Distribution of demographic variables of parents of malnourished pre-school children

Demographic variables		Ragi(n=30)		Soya(n=30)	
		Frequency	In %	Frequency	In %
Mother education status	Graduate or post graduate	4	13.3	5	16.7
	Intermediate or post high school diploma	4	13.3	5	16.7
	High school certificate	12	40	11	36.7
	Middle school certificate	8	26.8	7	23.3
	Primary school certificate	1	3.3	1	3.3
	No formal education	1	3.3	1	3.3
Father education status	Graduate or post graduate	5	16.7	6	20
	Intermediate or post high school diploma	7	23.3	7	23.3
	High school certificate	8	26.7	8	26.7
	Middle school certificate	8	26.7	8	26.7
	No formal education	2	6.6	1	3.3
Mother Occupation status	Skilled worker	1	3.3	2	6.7
	Semi-skilled worker	3	10	4	13.3
	Unemployed	26	86.7	24	80
Father Occupation status	Semi-Profession	3	10	4	13.3
	Clerical, Shop-owner	2	6.7	1	3.3
	Skilled worker	12	40	11	36.8
	Semi-skilled worker	9	30	10	33.3
	Unskilled worker	4	13.3	4	13.3
Monthly income	Rs.1803-5386	11	36.7	11	36.7
	Rs.5387-8988	9	30	11	36.7
	Rs.8989-13494	8	26.6	5	16.6
	> Rs.13494	2	6.7	3	10
Living area	Rural	7	23.3	9	26.7
	Urban	23	76.7	21	73.3

Table 4.2 shows:

Educational status of mother: Of the mothers of children, who were given ragi, 13.3% were graduates, 13.3% were intermediate graduates, 40% were high school certified, 26.8% were middle school certified, 3.3% were primary school certified and 3.3% did not have their formal education. Of the mothers of children who were given soya milk, 16.7% were graduates, 16.7% were intermediate graduates, 36.7% were high school certified, 23.3% were middle school certified, 3.3% were primary school certified and 3.3% did not have their formal education.

Educational status of father: Of the fathers of children, who were given ragi, 16.3% were graduates, 23.3% were intermediate graduates, 26.7% were high school certified, and 26.7% were middle school certified, 0% was primary school certified and 6.6% did not have their formal education. Of the fathers of children who were given soya milk, 20% were graduates, 23.3% were intermediate graduates, 26.7% were high school certified, 26.7% were middle school certified, 0% were primary school certified and 3.3% did not have their formal education.

Occupational status of mother: Of the mothers of children, who were given ragi kanjii, 3.3% were skilled worker, 10% were semi-skilled worker and 86.7% were unemployed. Of the mothers of children who were given soya milk, 6.7% were skilled worker, 13.3% were semi-skilled worker and 80% were unemployed.

Occupational status of father: Of the fathers of children, who were given ragi kanjii, 10% were semi-professionals, 6.7% were clerical shop owners, 40% were skilled worker, 30% were semi-skilled worker and 13.3% were unskilled worker. Of the fathers of children who were given soya milk, 13.3% were semi-professionals, 3.3% were clerical shop owners, 36.8% were skilled worker, 33.3% were semi-skilled worker and 13.3% were unskilled worker.

Monthly income: Of the children who were given ragi kanjii 36.7% of the children belong to the family with income group of 1803-5386 rupees, 30% of the children belong to the family with income group of 5387- 8988 rupees, 26.6% of the children belong to the family with income group of 8989-13494 rupees and 6.7% of the children belong to the family with income group of more than 13494 rupees. Of the children who were given soya milk 36.7% of the children belong to the family with income group of 1803-5386 rupees, 36.7 % of the children belong to the family with income group of 5387- 8988 rupees, 16.6% of the children belong to the family with income group of 8989-13494 rupees and 10% of the children belong to the family with income group of more than 13494 rupees.

Living area: About 20% of the children who were given ragi kanjii were from rural area and 76.7% of the children were from urban area. About 20% of the children who were given soya milk were from rural area and 73.3% of the children were from urban area.

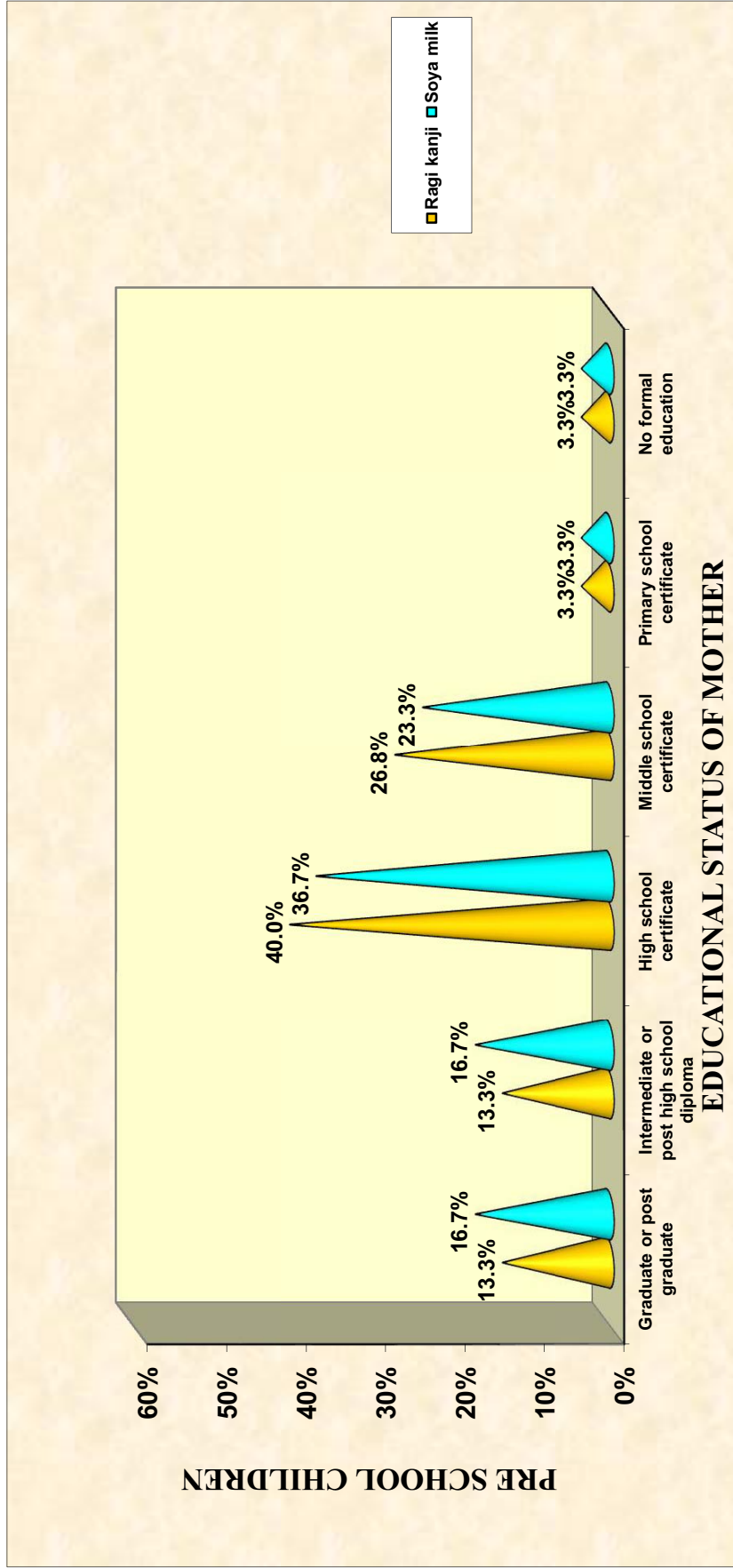


Fig 4.9: Educational status wise distribution of mothers of malnourished preschool children in both the groups

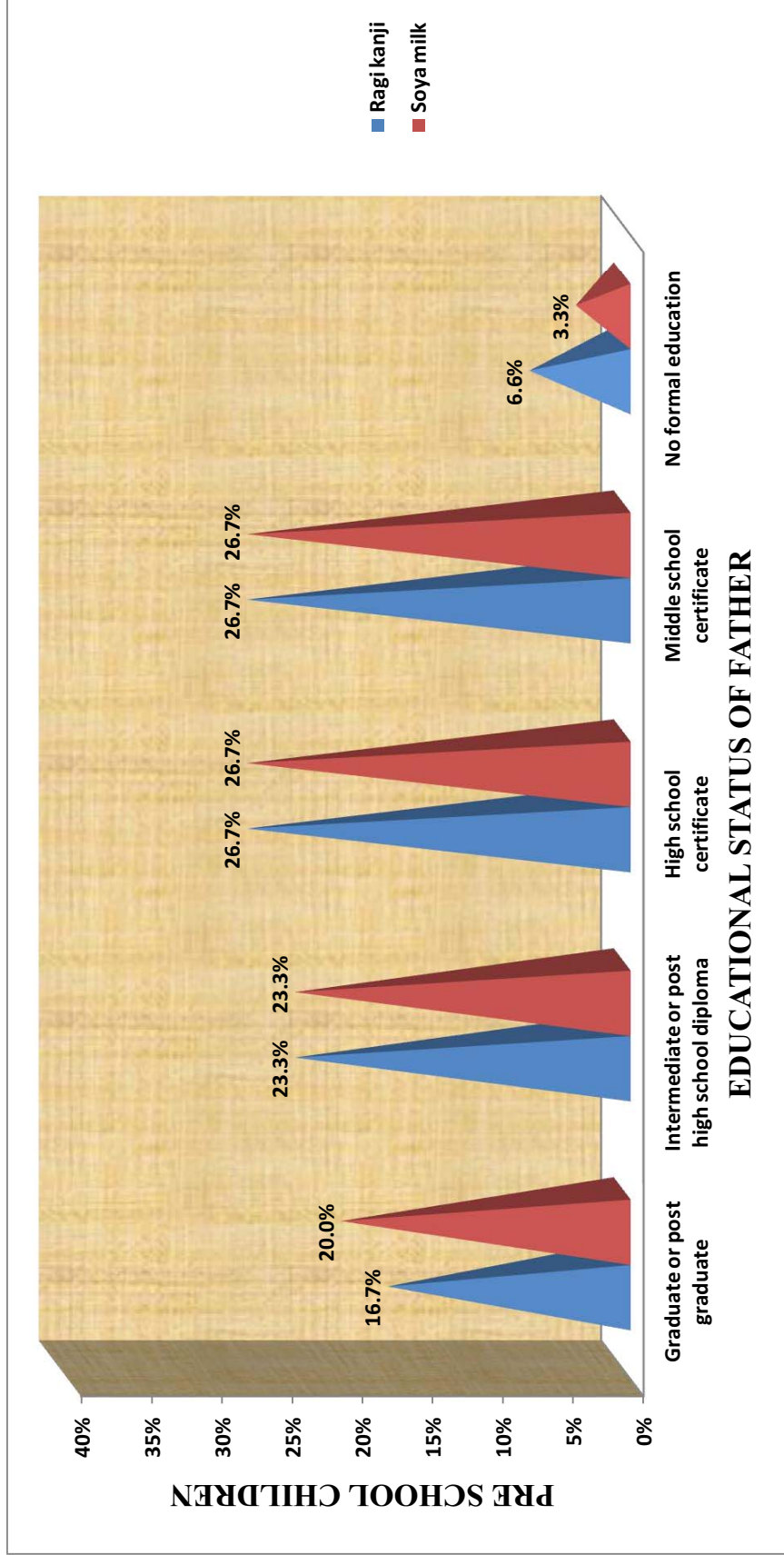


Fig 4.10: Educational status wise distribution of fathers of malnourished preschool children in both the groups

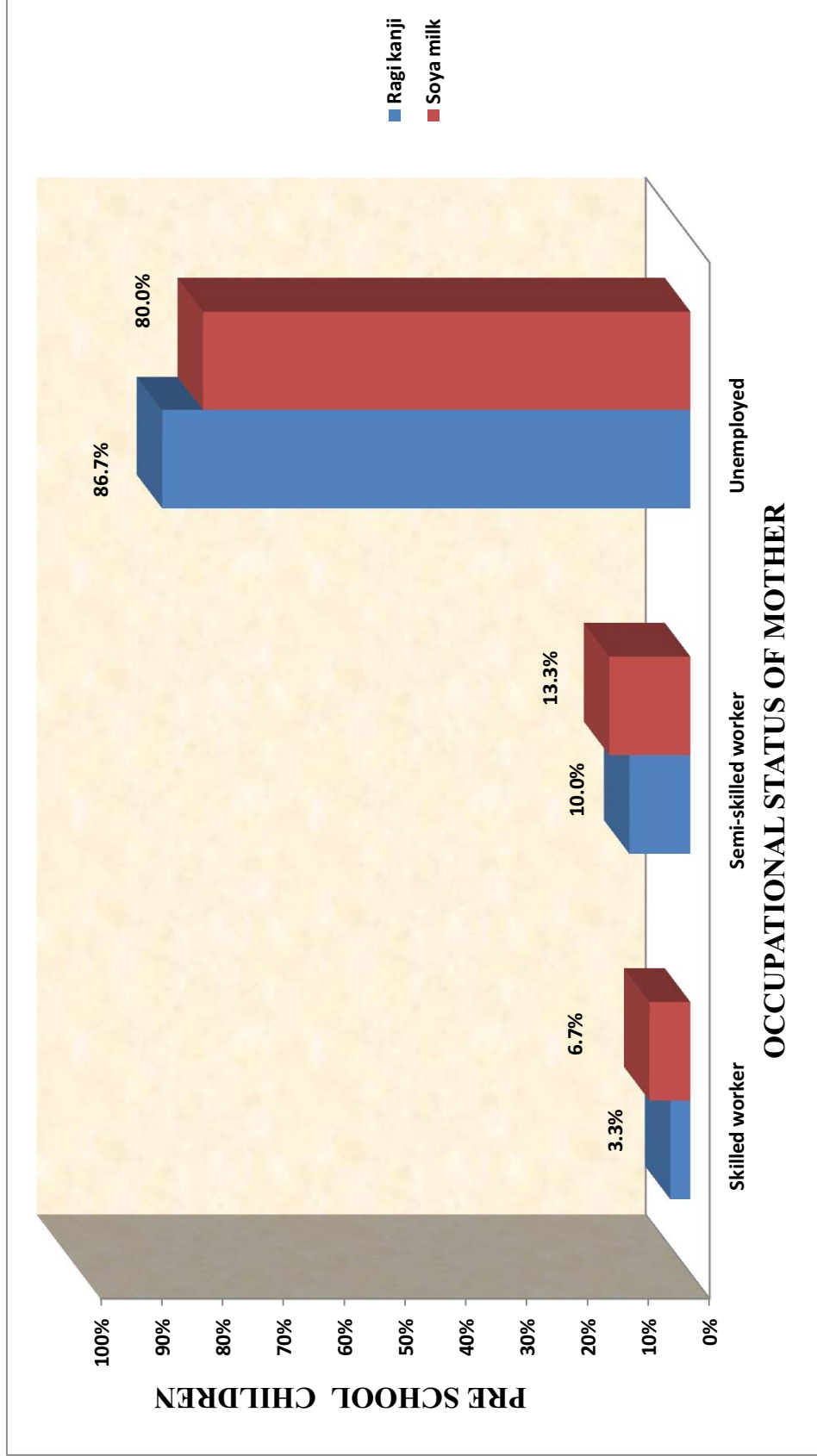


Fig 4.11: Occupational status wise distribution of mothers of malnourished preschool children in both the groups

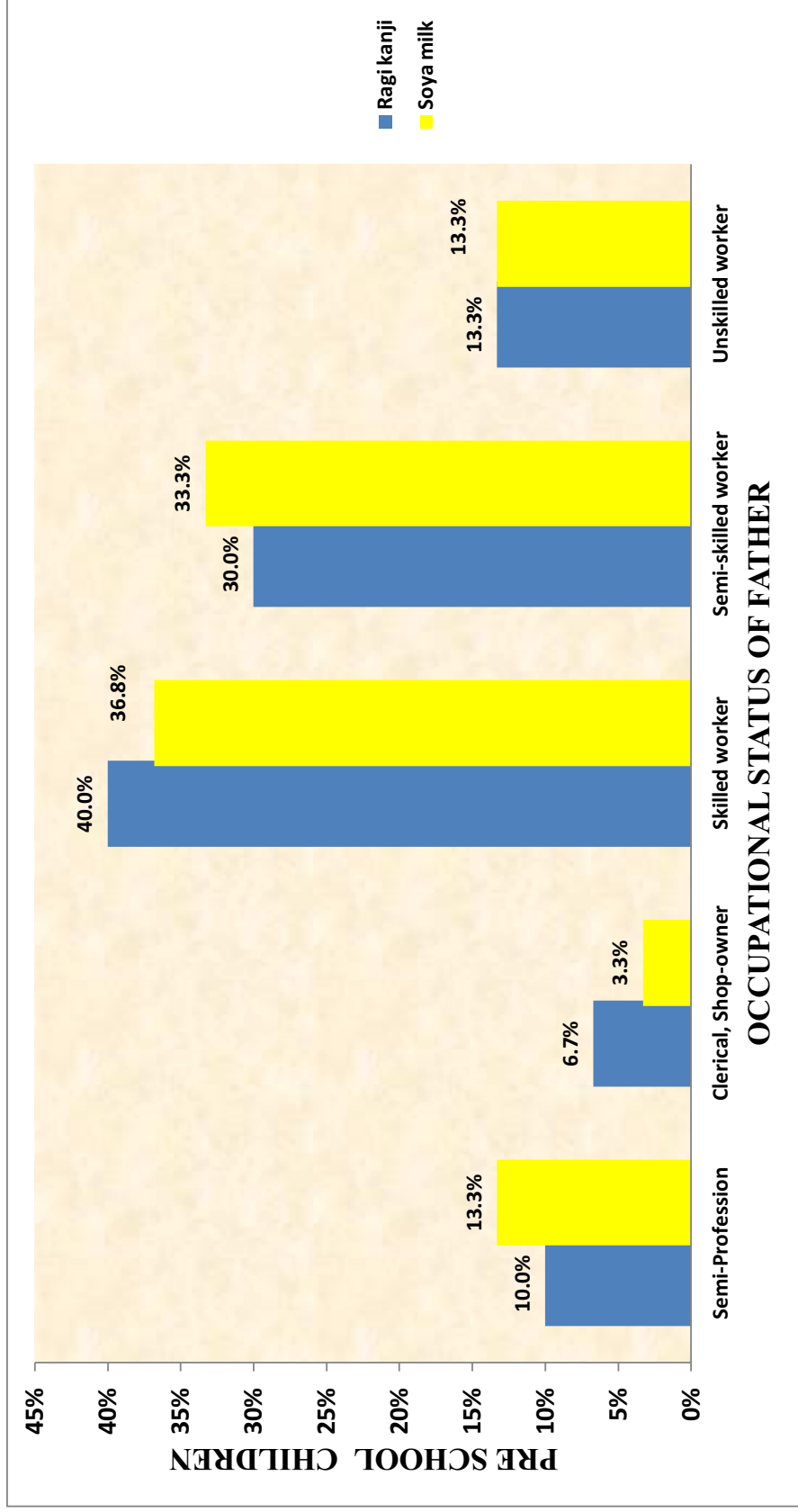


Fig 4.12: Occupational status wise distribution of fathers of malnourished preschool children in both the groups

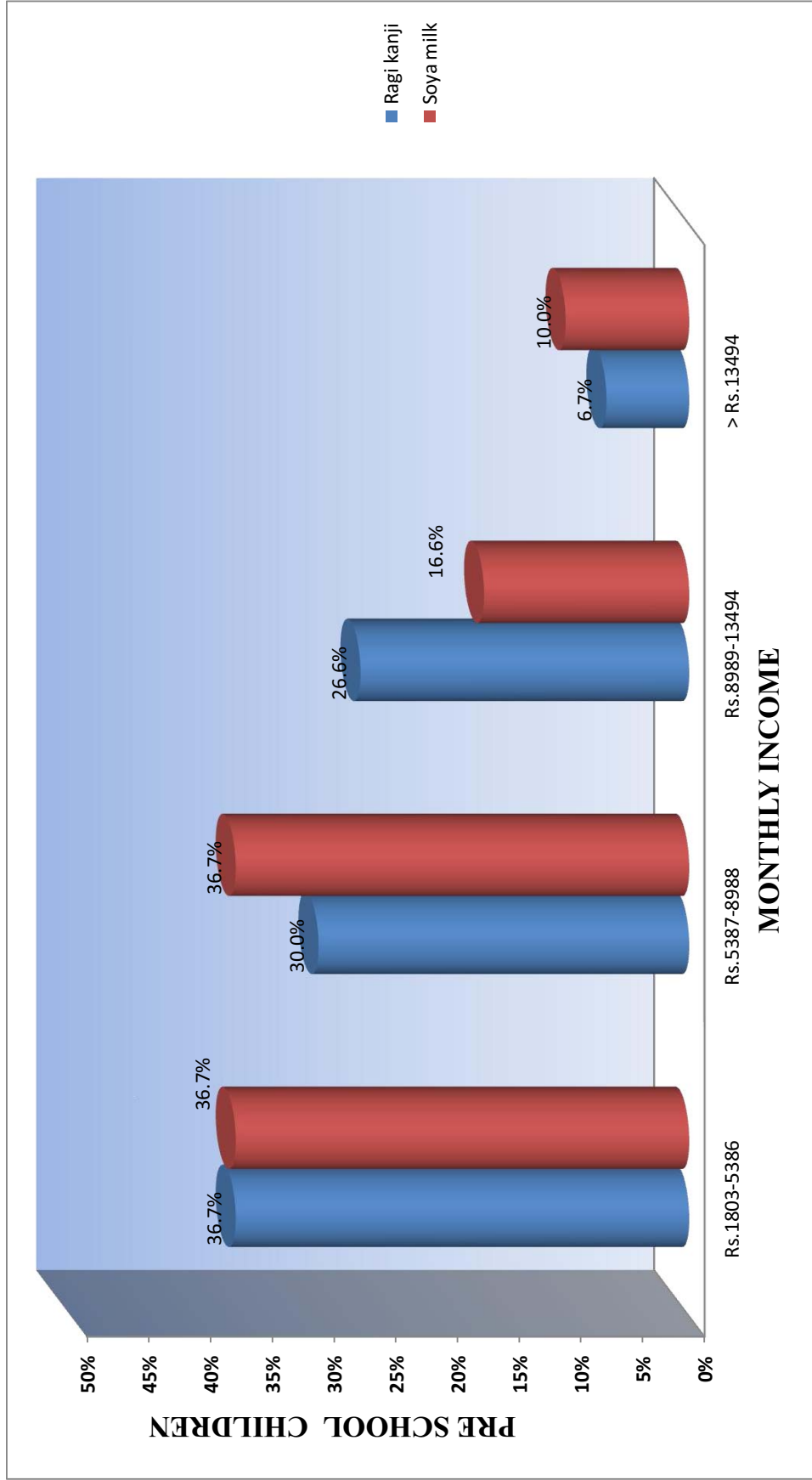


Fig 4.13: Parents monthly income wise distribution of malnourished preschool children in both the groups

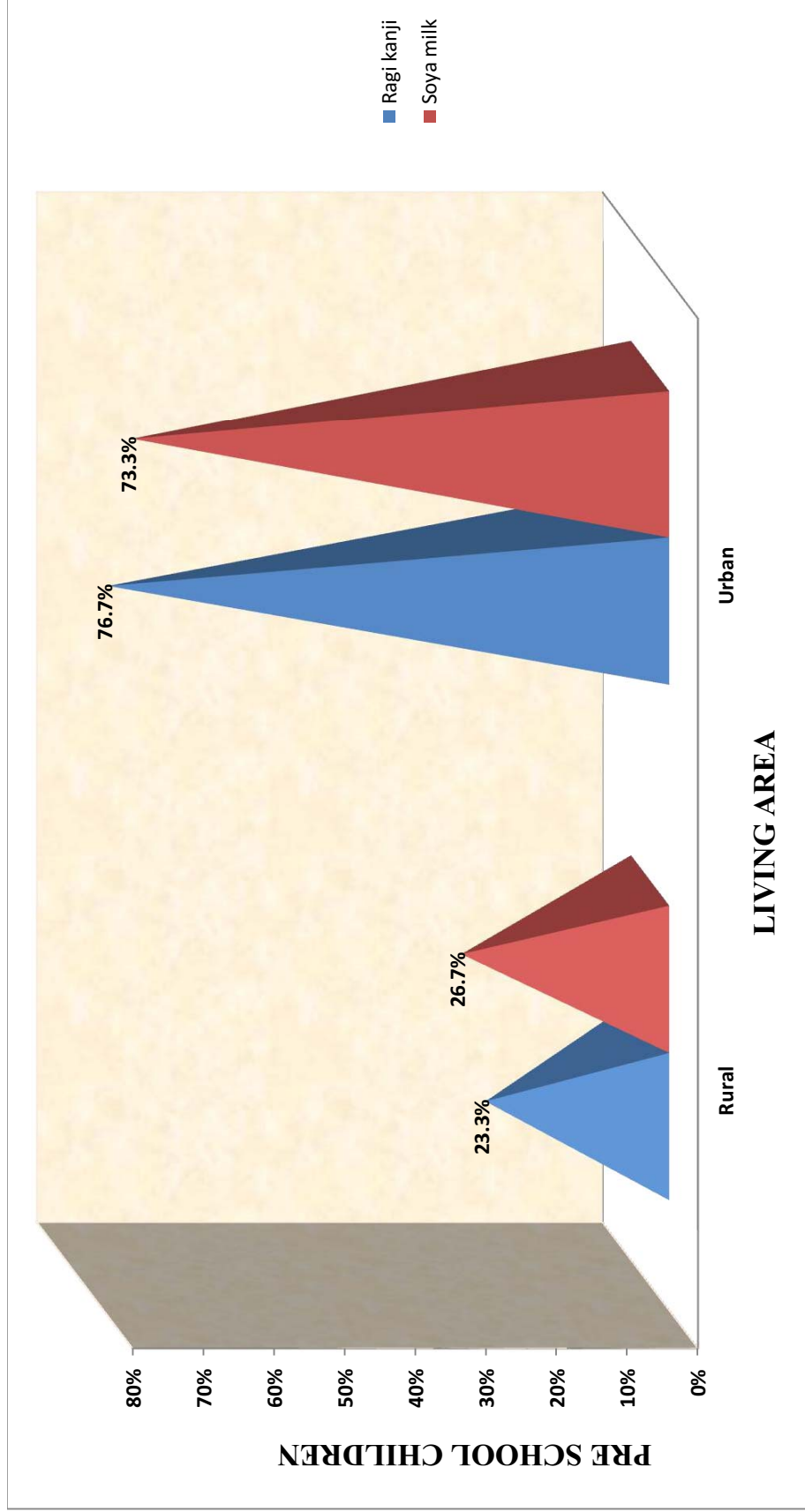


Fig 4.14: Living area wise distribution of malnourished preschool children in both the groups

SECTION B : Pre and Post-test assessment of the nutritional status of the preschool children.

TABLE 4.3: Pre-test nutritional status of pre-school children in both the groups

MEASUREMENTS		PRE TEST			
		Ragi(n=30)		Soya(n=30)	
		Frequency	In %	Frequency	%
Weight	<14 kilograms	26	86.7	25	83.4
	14-16 kilograms	3	10	4	13.3
	16-18 kilograms	1	3.3	1	3.3
Height	<90 cm	2	6.7	1	3.3
	90 -100 cm	20	66.7	18	60
	100 -110 cm	7	23.3	8	26.7
	110 -120 cm	1	3.3	3	10
Head circumference	50-55 cm	7	23.3	8	26.7
	< 50 cm	23	76.7	22	73.3
Chest circumference	< 50 cm	19	63.4	19	63.3
	50 - 52 cm	4	13.3	3	10
	52 - 54 cm	4	13.3	5	16.7
	> 54 cm	3	10	3	10
Mid arm circumference	< 11.5 cm	4	13.3	5	16.7
	11.5-13.0 cm	9	30	6	20
	13.0 -15.0 cm	17	56.7	19	63.3
Grade of malnutrition	Undernourished	8	26.6	7	23.3
	Moderate acute malnutrition	5	16.7	6	20
	Severe acute malnutrition	17	56.7	17	56.7

Table 4.3 explains the pre-test level of nutritional status of the pre-school children in both the experimental and the control group.

Based on the WHO growth charts the grade of malnutrition was assessed using the height and weight of the children.

The pre-test nutritional status assessment revealed 23.3% of the children in the experimental group were under nourished, 20% of the children were moderately acute malnourished and 56.7% of the children were severely malnourished

About 25% of the children in the control group were under nourished, 16.7% of the children were moderately acute malnourished and 56.7% of the children were severely malnourished

TABLE 4.4: Basic survey of the underlying causes of malnutrition

S.No	CONTENTS	Ragi		Soya		Proportion test
		Frequency	in %	Frequency	in %	
1	Exclusive breast feeding	20	66.7	19	63.3	Z=0.26 p=0.78
2	Breast fed for 2 years	8	26.7	9	30	Z=0.25 p=0.77
3	Have difficulty in eating	20	66.7	18	60	Z=0.52 p=0.59
4	Does child eat less than normal	26	86.7	24	80	Z=0.48 p=0.48
5	Have nausea/vomiting	15	50	12	40	Z=0.77 p=0.43
6	Need help in feeding	23	76.7	22	73.3	Z=0.26 p=0.78
7	Skips meal often	25	83.3	24	80	Z=0.26 p=0.78
8	Have constipation	11	36.7	7	23.3	Z=1.12 p=0.25
9	Have diarrhoea	2	6.7	0	0	Z=0.59 p=0.55
10	Have food allergy	1	3.3	0	0	Z=1.23 p=0.21
11	Fall sick often	22	73.3	22	73.3	Z=0.00 p=1.00
12	Do you seek medical care	28	93.3	26	86.7	Z=0.48 p=0.48
13	Does child have fatigue/weakness	12	40	8	26.7	Z=1.10 p=0.27
14	Attend regular check ups	22	73.3	27	90	Z=1.38 p=0.17
15	Is nutritious diet necessary in this age group	26	86.7	25	83.3	Z=0.26 p=0.78
16	Introduce complimentary food at 6 months of age	12	40	12	40	Z=0.00 p=1.00
17	Do you cook food according to Childs wishes	11	36.7	9	30.0	Z=0.55 p=0.58

The positive responses of the parents from the basic nutritional assessment questionnaire are as mentioned in the table above.

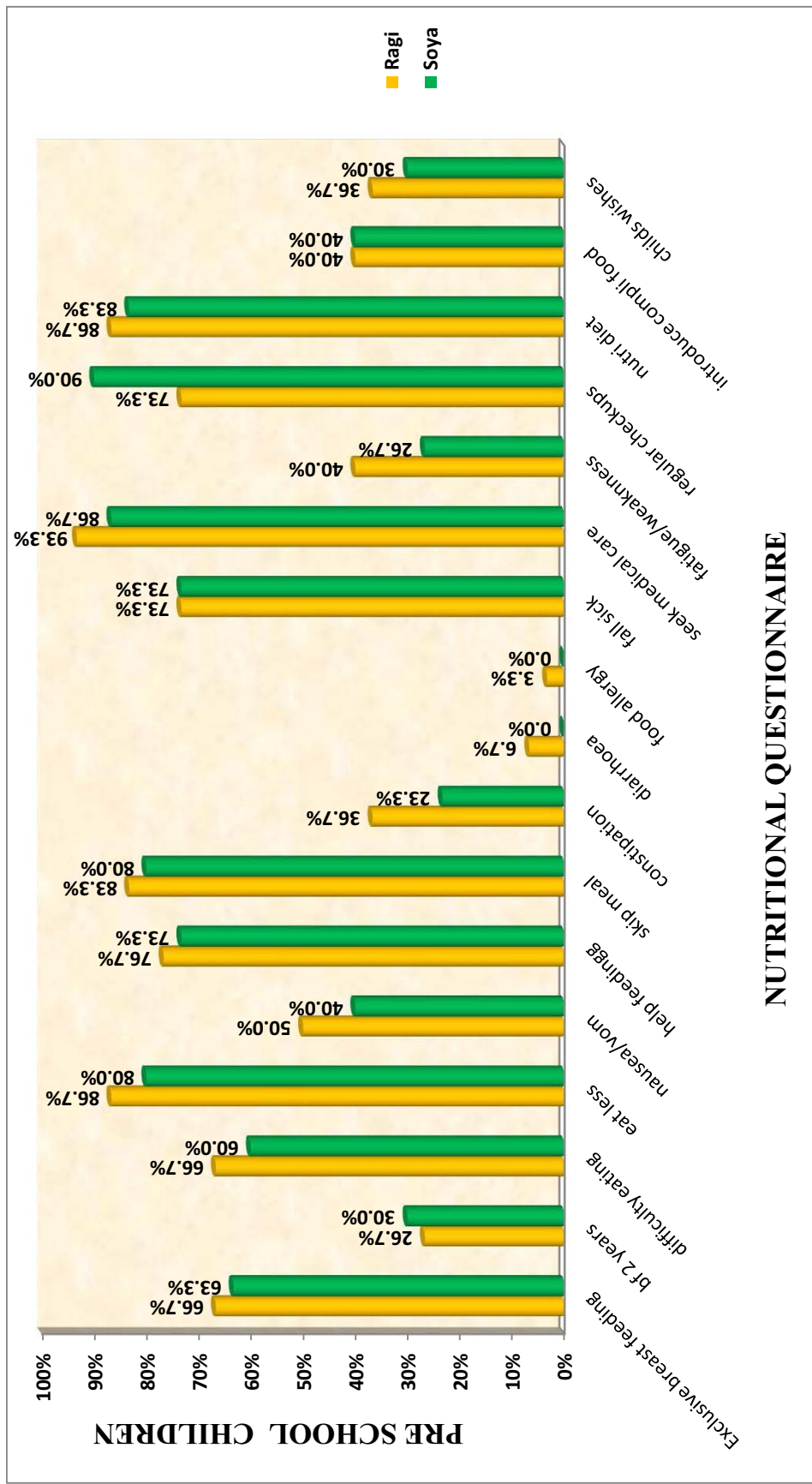


Fig 4.17: Assessment of the underlying causes of malnutrition in both the groups

TABLE 4.5: Weight gain among the experimental group of children

Weight	No. of children	% of children
80-100 grams	0	0
101-120 grams	0	0
121-140 grams	4	13.3
141-160 grams	6	20
161-180 grams	8	26.7
181-200 grams	7	23.3
201-220 grams	5	16.7
Total	30	100

The weight gain among the experimental group of children who were given soya milk is as described in the table above. Majority of the children gained weight of 161-180 grams.

TABLE 4.6: Mean weight gain among the experimental group of children

No. of children	Minimum	Maximum	Mean weight gain score	Std. Deviation
30	130	220	176.67	25.64

The mean weight gain of the children in the experimental group who were given soya milk was around 176 grams

TABLE 4.7: Weight gain among the control group of children

Weight	No. of children	% of children
80 -100 grams	11	36.7
101-110 grams	12	40
121-140 grams	6	20
141-160 grams	1	3.3
161-180 grams	0	0
181-200 grams	0	0
201-220 grams	0	0
Total	30	100

The weight gain among the control group of children who were given ragi kanjii is as described in the table above. Majority of the children gained weight of 101-110 grams.

TABLE 4.8: Mean weight gain among the control group of children

No. of children	Minimum	Maximum	Mean weight gain score	Std. Deviation
30	80	150	111.00	16.05

The mean weight gain of the children in the control group who were given ragi kanjii was around 110 grams

SECTION C: Comparing the effectiveness of the supplement among the experimental and control group.

Table 4.9: Comparison of the efficacy of ragi kanjii versus soya milk on the nutritional status of malnourished pre-school children

Group	N	Mean	Std. Deviation	Mean difference	Student independent t-test
Ragi	30	111.00	16.05	65.67	t=11.89 p=0.001*** significant
Soya	30	176.67	25.64		

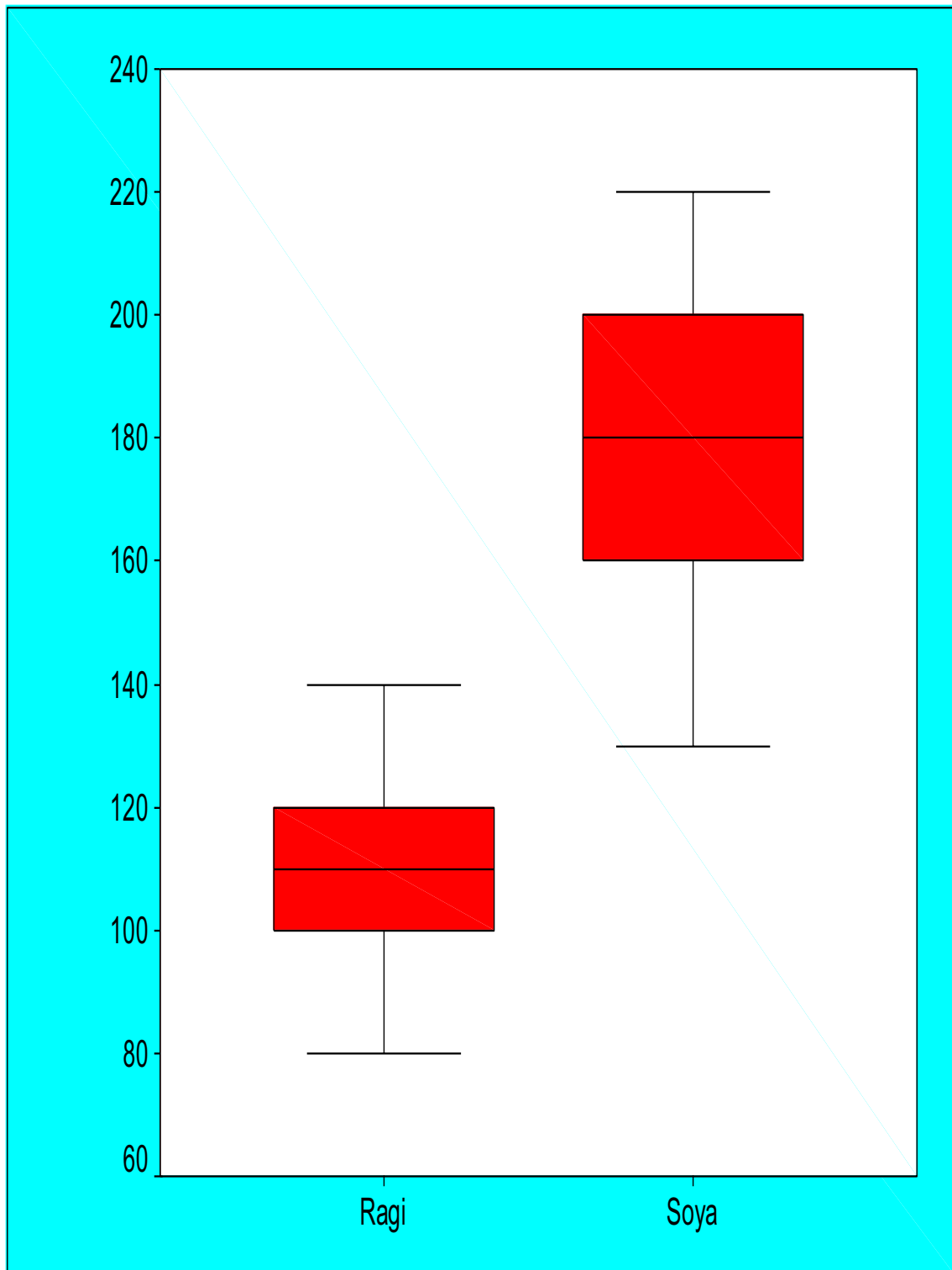
Using student independent 't' test, there was a significant improvement in weight of the children who were given soya milk when compared to ragi kanjii.

Table 4.10: Comparison of mean weight gain of malnourished pre-school children in both the groups

Group	N	Mean	Mean difference with 95% Confidence interval
Ragi	30	111.00	65.67(54.61 – 76.22)
Soya	30	176.67	

Point estimate of weight gain difference of soya milk is 65.67 gram when comparing with ragi kanjii. Likely estimate of same study conducted by other person will have 54 grams to 76 grams of weight gain difference. It was calculated using mean difference with 95% of CI.

Fig 4.18: Box plot showing the weight gain difference between the experimental and control group



SECTION D : Assessment of post-test level of nutritional status with the demographic variables.

Table 4.11: Association between level of weight gain and demographic variables (Experimental group)

Demographic variables		level of weight gain				Total	Chi square test
		Below average (<176.67 gram)		Below average (>176.67 gram)			
		Frequency	in%	Frequency	in%		
Age	3-4 years	10	71.4	4	28.6	14	$\chi^2=4.82$ $p=0.02^*$ $df=1$
	4-5 years	5	31.2	11	67.8	16	
Sex	Male	10	62.5	6	37.5	16	$\chi^2=2.14$ $p=0.14$ $df=1$
	Female	5	35.7	9	64.3	14	
Religion	Hindu	7	46.7	8	53.3	15	$\chi^2=1.85$ $p=0.39$ $df=2$
	Muslim	5	71.4	2	28.6	7	
	Christian	3	37.5	5	62.5	8	
Type of family	Nuclear family	9	47.4	10	52.6	19	$\chi^2=0.16$ $p=0.92$ $df=2$
	Joint family	5	55.6	4	44.4	9	
	Single parent family	1	50	1	50	2	
Birth order	First	4	40	6	60	10	$\chi^2=0.62$ $p=0.73$ $df=2$
	Second	10	55.6	8	44.4	18	
	Third	1	50	1	50	2	
Immunisation	Immunized but not regularly	2	66.7	1	33.3	3	$\chi^2=0.47$ $p=0.78$ $df=2$
	Immunized regularly	3	42.9	4	57.1	7	
	Immunized up to date	10	50	10	50	20	
Total children	One	0	0	2	100	2	$\chi^2=3.33$ $p=0.18$ $DF=2$
	Two	10	47.6	11	52.4	21	
	Three	5	71.4	2	28.6	7	
Type of food	Vegetarian	1	100	0	0	1	$\chi^2=1.03$ $p=0.31$ $df=1$
	Mixed	14	48.3	15	51.7	29	

* significant at $P \leq 0.05$

** highly significant at $P \leq 0.01$

*** very high significant at $P \leq 0.001$

Table 4.12: Association between level of weight gain and parents information (Experimental group)

Parents information		Level of weight gain				Total	Chi square test
		Below average (<176.67 gram)		Below average (>176.67 gram)			
		Frequency	in %	Frequency	in %		
Mother education status	Graduate or post graduate	1	20	4	80	5	$\chi^2=5.83$ $p=0.24$ $df=4$
	Intermediate or post high school diploma	4	80	1	20	5	
	High school certificate	6	54.5	5	45.5	11	
	Middle school certificate	4	57.1	3	42.9	7	
	Primary school certificate	0	0	1	100	1	
	No formal education	0	0	1	100	1	
Father education status	Graduate or post graduate	2	33.3	4	66.7	6	$\chi^2=2.31$ $p=0.67$ $df=4$
	Intermediate or post high school diploma	4	57.1	3	42.9	7	
	High school certificate	4	50	4	50.0	8	
	Middle school certificate	5	62.5	3	37.5	8	
	No formal education	0	0	1	100	1	
Mother Occupation status	Semi-skilled worker	1	25	3	75	4	$\chi^2=1.15$ $p=0.28$ $df=1$
	Unemployed	14	53.8	12	46.2	26	
Father Occupation status	Semi-Profession	3	75	1	25	4	$\chi^2=3.49p=0.47$ $df=3$
	Clerical, Shop-owner	0	0	1	100	1	
	Skilled worker	5	45.5	6	54.5	11	
	Semi-skilled worker	6	60	4	40	10	
	Unskilled worker	1	25	3	75	4	
Monthly income	Rs.1803-5386	8	72.7	3	27.3	11	$\chi^2=8.66$ $p=0.03^*$ $df=3$
	Rs.5387-8988	6	54.5	5	45.5	11	
	Rs.8989-13494	1	20	4	80	5	
	> Rs.13494	0	0	3	100	3	
Living area	Rural	1	12.5	7	87.5	8	$\chi^2=6.13p=0.01^{**}$ $df=1$
	Urban	14	63.6	8	36.4	22	

* significant at $P \leq 0.05$

** highly significant at $P \leq 0.01$

*** very high significant at $P \leq 0.001$

Table 4.13: Association between level of weight gain and nutritional assessment (Experimental group)

Variables		level of weight gain				Total	Chi square test
		Below average (<176.67 gram)		Below average (>176.67 gram)			
		Frequency	in %	Frequency	in %		
Weight	<14 kilograms	13	52	12	48	25	$\chi^2=2.04$ p=0.36 df =2
	14-16 kilograms	1	25	3	75	4	
	16-18 kilograms	1	100	0	0	1	
Height	<90 cm	1	100	0	0	1	$\chi^2=1.34$ p=0.72 df =3
	90 -100 cm	12	66.7	6	33.3	18	
	100 -110 cm	1	12.5	7	87.5	8	
	110 -120 cm	1	33.3	2	66.7	3	
Head circumference	50-55 cm	2	25	6	75	8	$\chi^2=2.72$ p=0.09 df =1
	< 50 cm	13	59.1	9	40.9	22	
Chest circumference	< 50 cm	8	42.1	11	57.9	19	$\chi^2=2.82$ p=0.41 df =3
	50 - 52 cm	0	0	3	100	3	
	52 - 54 cm	5	100	0	0	5	
	> 54 cm	2	66.7	1	33.3	3	
Mid arm circumference	< 11.5 cm	4	80	1	20	5	$\chi^2=4.51$ p=0.10 df=2
	11.5-13.0 cm	1	16.7	5	83.3	6	
	13.0 -15.0 cm	10	52.6	9	47.4	19	
Grade of malnutrition	Undernourished	5	71.4	2	28.6	7	$\chi^2=9.16$ p=0.05* df=2
	Moderate acute malnutrition	3	50	3	50	6	
	Severe acute malnutrition	7	41.2	10	58.8	17	

* significant at $P \leq 0.05$

** highly significant at $P \leq 0.01$

*** very high significant at $P \leq 0.001$

Among the children of the control group the significance of weight gain was found to be higher in children of ages between 4-5 years, children from the family of greater income and the children from rural area.

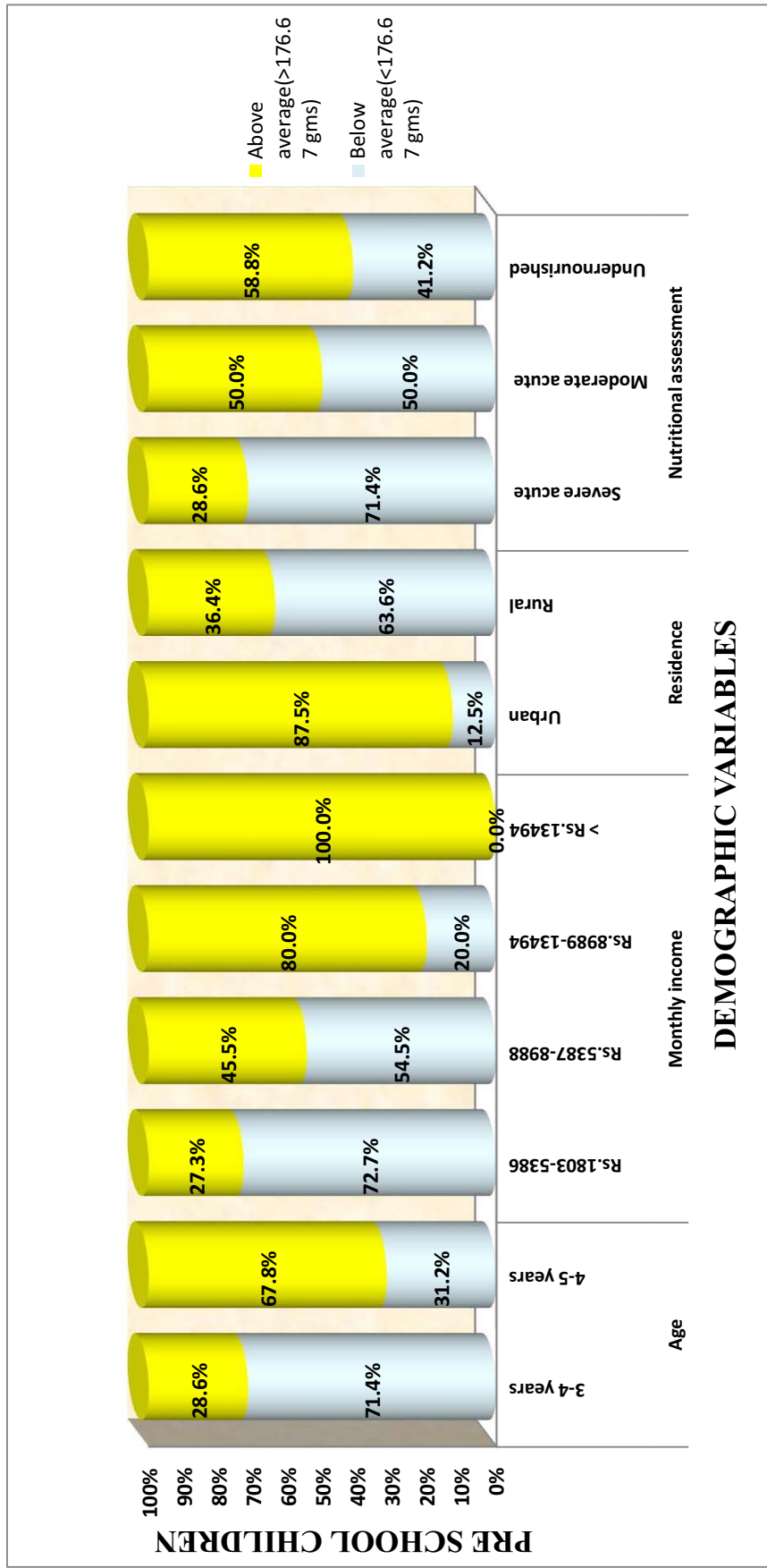


Fig 4.19: Association of the demographic variable with the level of weight gain in the experimental group

Table 4.14: Association between level of weight gain and demographic variables (Control group)

Demographic variables		level of weight gain				Total	Chi square test
		Below average (<111.0 gram)		Below average (>111.0 gram)			
		Frequency	in%	Frequency	in%		
Age	3-4 years	8	80	2	20	10	$\chi^2=5.40$ $p=0.02^*$ $df=1$
	4-5 years	7	35	13	65	20	
Sex	Male	8	44.4	10	55.6	18	$\chi^2=0.55$ $p=0.45$ $df=1$
	Female	7	58.3	5	41.7	12	
Religion	Hindu	7	43.8	9	56.3	16	$\chi^2=0.53$ $p=0.77$ $df=2$
	Muslim	4	57.1	3	42.9	7	
	Christian	4	57.1	3	42.9	7	
Type of family	Nuclear family	9	50	9	50	18	$\chi^2=1.09$ $p=0.58$ $df=2$
	Joint family	5	45.5	6	54.5	11	
	Single parent family	1	100			1	
Birth order	First	6	50	6	50	12	$\chi^2=0.00$ $p=1.00$ $df=2$
	Second	8	50	8	50	16	
	Third	1	50	1	50	2	
Immunisation	Immunized but not regularly	0	0	1	100	1	$\chi^2=3.91$ $p=0.14$ $df=2$
	Immunized regularly	3	30	7	70	10	
	Immunized up to date	12	63.2	7	36.8	19	
Total children	One	1	50	1	50	2	$\chi^2=0.00$ $p=1.00$ $df=2$
	Two	12	50	12	50	24	
	Three	2	50	2	50	4	
Type of food	Vegetarian	0	0	2	100	2	$\chi^2=2.14$ $p=0.14$ $df=1$
	Mixed	15	53.6	13	46.4	28	

* significant at $P \leq 0.05$

** highly significant at $P \leq 0.01$

*** very highly significant at $P \leq 0.001$

This shows the association between level of weight gain and demographic variables in ragi kanjii group children. Elder children had gained more weight gain than others. Statistical significance was calculated using chi square test.

Table 4.15: Association between level of weight gain and parents information (Control group)

Parents information		Level of weight gain				Total	Chi square test
		Below average (<111.0gram)		Below average (>111.0gram)			
		Frequency	in %	Frequency	in%		
Mother education status	Graduate or post graduate	2	50	2	50	4	$\chi^2=3.33$ $p=0.64$ $df=5$
	Intermediate or post high school diploma	1	25	3	75	4	
	High school certificate	7	58.3	5	41.7	12	
	Middle school certificate	4	50	4	50	8	
	Primary school certificate	0	0	1	100	1	
	No formal education	1	100	0	0	1	
Father education status	Graduate or post graduate	3	60	2	40	5	$\chi^2=0.84$ $p=0.93$ $df=4$
	Intermediate or post high school diploma	4	57.1	3	42.9	7	
	High school certificate	4	50	4	50	8	
	Middle school certificate	3	37.5	5	62.5	8	
	No formal education	1	50	1	50	2	
Mother Occupation status	Skilled worker	0	0	1	100	1	$\chi^2=1.33$ $p=0.53$ $df=2$
	Semi-skilled worker	2	66.7	1	33.3	3	
	Unemployed	13	50	13	50	26	
Father Occupation status	Semi-Profession	1	33.3	2	66.7	3	$\chi^2=1.66$ $p=0.79$ $df=4$
	Clerical, Shop-owner	1	50	1	50	2	
	Skilled worker	5	41.7	7	58.3	12	
	Semi-skilled worker	6	66.7	3	33.3	9	
	Unskilled worker	2	50	2	50	4	
Monthly income	Rs.1803-5386	9	81.8	2	18.2	11	$\chi^2=8.56$ $p=0.03^*$ $df=3$
	Rs.5387-8988	4	44.5	5	55.6	9	
	Rs.8989-13494	3	37.5	5	62.5	8	
	> Rs.13494	0	0	2	100	2	
Living area	Rural	2	28.6	5	71.4	7	$\chi^2=4.65$ $p=0.04^*$ $df=1$
	Urban	13	56.5	10	43.5	23	

* significant at $P \leq 0.05$

** highly significant at $P \leq 0.01$

*** very high significant at $P \leq 0.001$.

The association reveals Family with more income, rural children had gained more weight gain than others. Statistical significance was calculated using chi square test.

Table 4.16: Association between level of weight gain and nutritional assessment (Control group)

CONTENTS		Level of weight gain				Total	Chi square test
		Below average (<111.0 gram)		Above average (>111.0 gram)			
		Frequency	in%	Frequency	in%		
Weight	<14 kilograms	14	53.8	12	46.2	26	$\chi^2=1.48$ p=0.47 df =2
	14-16 kilograms	1	33.3	2	66.7	3	
	16-18 kilograms	0	0	1	100	1	
Height	<90 cm	1	50	1	50	2	$\chi^2=1.34$ p=0.71 df =3
	90 -100 cm	11	55	9	45	20	
	100 -110 cm	3	42.9	4	57.1	7	
	110 -120 cm	0	0	1	100	1	
Head circumference	50-55 cm	2	28.6	5	71.4	7	$\chi^2=1.66$ p=0.19 df =1
	< 50 cm	13	56.5	10	43.5	23	
Chest circumference	< 50 cm	11	57.9	8	42.1	19	$\chi^2=2.80$ p=0.42 df =3
	50 - 52 cm	1	25	3	75	4	
	52 - 54 cm	1	25	3	75	4	
	> 54 cm	2	66.7	1	33.3	3	
Mid arm circumference	< 11.5 cm	3	75	1	25	4	$\chi^2=1.17$ p=0.57 df =2
	11.5-13.0 cm	4	44.4	5	55.6	9	
	13.0 -15.0 cm	8	47.1	9	52.9	17	
Grade of malnutrition	Undernourished	1	12.5	7	87.5	8	$\chi^2=6.17$ p=0.05* df =2
	Moderate acute malnutrition	3	60	2	40	5	
	Severe acute malnutrition	11	64.7	6	35.3	17	

* significant at $P \leq 0.05$

** highly significant at $P \leq 0.01$

*** very high significant at $P \leq 0.001$.

This table shows the association between level of weight gain and demographic variables in ragi kanjii group children. Undernourished children have gained more weight gain than others. Statistical significance was calculated using chi square test.

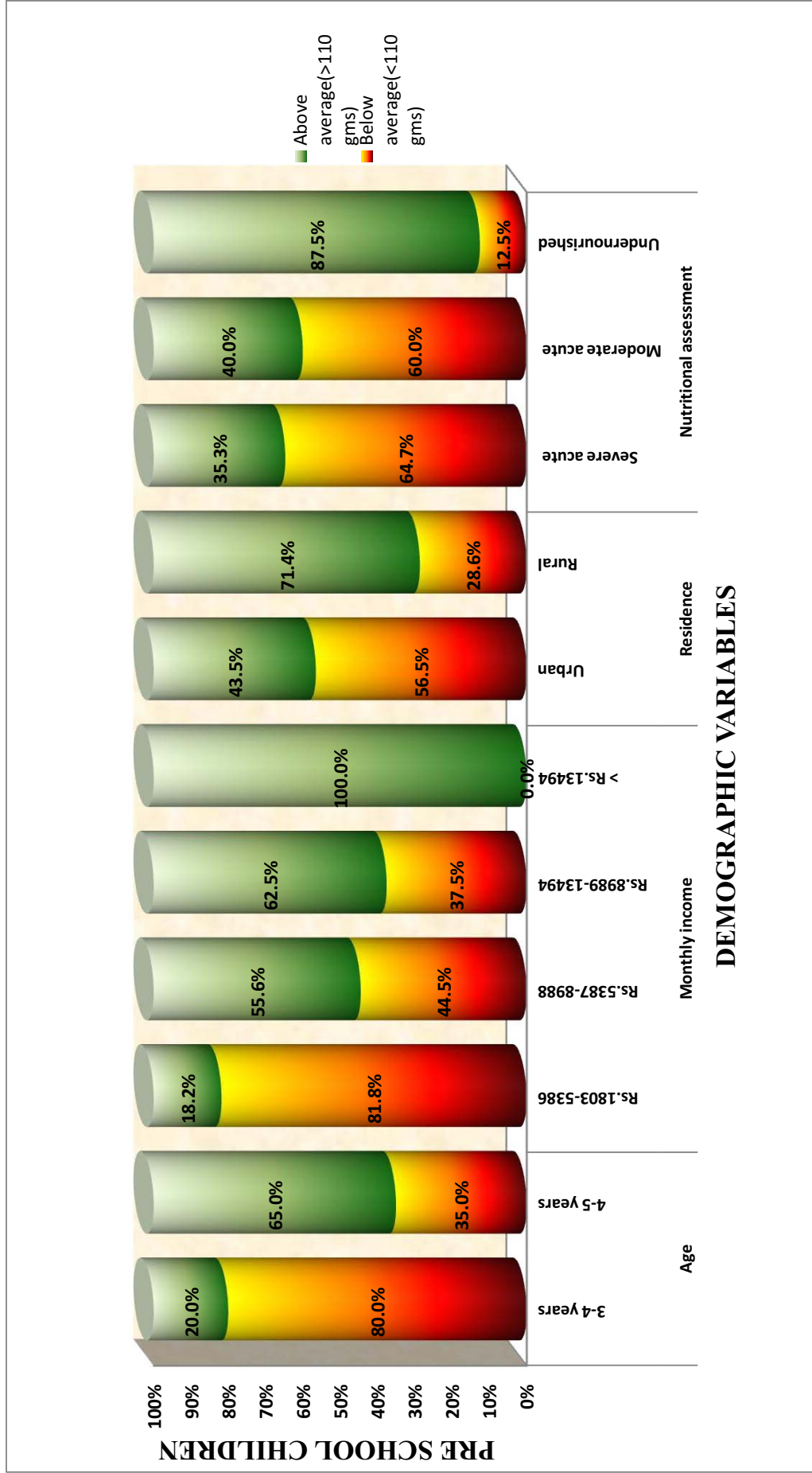


Fig 4.20: Association of the demographic variable with the level of weight gain in the control group

CHAPTER V

SUMMARY

The study was done to assess the effectiveness of ragi kanjii versus soya milk in improving the nutritional status of malnourished pre-school children at Institute of Child health and Hospital for children, Chennai.

Quasi experimental design with quantitative research approach was used. Conceptual framework adopted in the present study was modified Ludwig Von Bertalanffy General System Model. The sample size was 60 malnourished preschool children aged 3 – 5 years. The samples were selected by using convenient sampling technique.

The development of the tool was based on the objectives of the study, review of literature and the opinion from the experts. The data collection was done for a period of one month from 16.7.2015 to 17.8.2015. Parents of malnourished preschool children were interviewed by the tool. Informed consent was obtained from the parents of all the samples. The samples were divided into two groups. Pre assessment of anthropometric measurements was done for both the groups. The 30 children were given 200 ml of ragi kanjii and the remaining was given 200 ml of soya milk. The supplements were given once daily for 14 days for both the groups. 200 ml of ragi kanjii was prepared by cooking 50 grams of powdered ragi with 10 grams of jaggery in water. 200 ml of soya milk was prepared by soaking 30 grams of soya in water over night, after straining the grinded matter it was cooked with 10 grams of jaggery in water. It was distributed to the samples at free of cost and under direct supervision of investigator. Intervention was done for 14 days. The post assessment of the nutritional status was done on the 15th day for both the groups.

5.1 Major findings of the study:

With regard to the demographic variables of the children,

- Among the experimental group of children who were given soya milk the majority (53.3%) of the children were in the age group of 4-5 years. About 53.3% of the children were males, 50% of the children were Hindus. Majority (60%) of the children were born second in the family, 63.3% belong to nuclear family. About 66.7% were immunized up to date and 96.7% of the children were taking mixed diet. Majority of the parents of the children were high school certified. About 80% of the mothers of children were unemployed and 36.8% of the fathers of the children were skilled worker. Majority of the children belonged to the family with the monthly income of 1803-5386 rupees and 5387- 8988 rupees. About 73.3% of the children were from urban area.
- Among the control group of children who were given ragi kanjii, the majority (66.7%) of the children belong to the age group of 4-5 years. About 60% of the children were males, 53.4% of the children were Hindus. Majority (53.3%) were born second in the family, 60% belonged to nuclear family. About 63.3% of the children were immunized up to date and 93.3% were taking mixed diet. Majority of the parents of the children were high school certified. About 86.7% of the mothers of the children were unemployed and 40% of the fathers were skilled worker. Majority of the children belonged to the family with the monthly income of 1803-5386 rupees. About 76.7% of the children were from urban area.

THE MAJOR OBJECTIVES BROUGHT OUT THE FOLLOWING FINDING:

- In the experimental group: The pre-test nutritional status assessment revealed 23.3% of the children were under nourished, 20% of the children were moderately acute malnourished and 56.7% of the children were severely malnourished.
- In the control group: The pre-test nutritional status assessment revealed 26.6% of the children were under nourished, 16.7% of the children were moderately acute malnourished and 56.7% of the children were severely malnourished.
- The average weight gain of the children who had ragi kanjii for 14 days was around 110 grams.
- The average weight gain of the children who had soya milk for 14 days was around 176 grams.
- The differences in other anthropometric measurements were not statistically measurable so difference in weight was used to compare the effectiveness of ragi kanjii over soya milk.
- Comparing the effectiveness of ragi kanjii versus soya milk, the mean difference was found to be 65.67 and the “t” value using independent t –test was **t=11.89 at p=0.001*** significant**
- Point estimate of weight gain difference of soya milk is 65.67 gram when comparing with ragi kanjii. Likely estimate of same study conducted by other person will have 54 grams to 76 grams of weight gain difference. It was calculated using mean difference with 95% of CI.

- The association of the effectiveness of soya milk with the selected demographic variables in the experimental group was found 67.8% more effective for the age 4-5 years and 28.6% more effective for the age 3-4years. Fifty nine per cent more effective in under nourished child, 50% more effective in moderately acute malnutrition and 28.6% more effective in severe acute malnutrition. About 88% more effective in children from rural area.

- The association of the effectiveness of ragi kanjii with the selected demographic variables in the control group were found 60% more effective for the age 4-5 years and 20% more effective for the age 3-4years. 87.5% more effective in under nourished child, 40% more effective in moderately acute malnutrition and 35.3% more effective in severe acute malnutrition. 71.4% more effective in children from rural area and 43.5% more effective in children from urban area.

CHAPTER VI

DISCUSSION

Malnutrition is the worldwide emerging disease that is rocking our Nation. With increasing urbanization, malnutrition and its complications are becoming major health problems in our country. In particular, malnutrition is a major cause of illness everywhere with some cases remains unnoticed. There is good evidence that a decreasing awareness and screening is partly responsible for this rising incidence of malnutrition and possibly early identification and appropriate treatment may help in preventing morbidity and mortality.

Objectives:

- To evaluate the efficacy of ragi kanjii on the nutritional status of the malnourished pre-school children
- To evaluate the efficacy of soya milk on the nutritional status of the malnourished pre-school children
- To compare the efficacy of ragi kanjii versus soya milk on the nutritional status of malnourished pre-school children
- To associate efficacy of ragi kanjii and soya milk on nutritional status with the selected demographic variables.

The sample consists of 60 malnourished preschool children, 30 in the experimental group and 30 in the control group. Children in the experimental group were given soya milk and the children in the control group were given ragi kanjii for a period of 14 days. Most of the children were in the age group of 4-5 years. Most of the children were male in both the experimental and control group. About 50% of the children in

both the groups were Hindus. Sixty per cent in the experimental and 53% in the control were born second in the family.

Majority of children in the experimental and control group belonged to nuclear family. About 65 % in the experimental and 60% control group were immunized. Ninety six per cent of children in the experimental and 90% of children in the control group were vegetarians. About 36% of mothers of children in the experimental group and 40% of mothers of children in the control group were high school certificate education holders.

About 40% of fathers of preschool children in the experimental and 33% of fathers of preschool children in the control group were skilled workers. Most of the children from the experimental and control group were from the urban area.

DISCUSSION BASED ON THE OBJECTIVES:

Objective 1: To evaluate the efficacy of ragi kanjii on the nutritional status of the malnourished pre-school children

30 samples who were administered ragi kanjii for 14 days showed an average increase in weight of 110 grams. The rise in height and other anthropometric measurements were very minimal and hence were not used to calculate the post experimental status.

The basic survey on the nutritional status of the malnourished children showed that the lack of exclusive breast feeding remained an important cause in malnutrition of the preschool aged children.

Thus this proves that initial breast feeding would definitely play a major role in the nutritional status of the children. Lack in knowledge and improper screening is the reason for the morbidity and mortality of children under five years of age.

These findings are similar to the cross sectional study conducted by **Thanaa. A. Elkholyet et.al., (2012)** to assess the nutritional status of preschool children. The study revealed that lacks of breast feeding and improper nutritional guidance are the main reason for the malnutrition among preschool children.

Objective 2: To evaluate the efficacy of soya milk on the nutritional status of the malnourished pre-school children

30 samples who were administered soya milk for 14 days showed an average increase in weight of 176 grams. The rise in height and other anthropometric measurements were very minimal and hence were not used to calculate the post experimental status.

The basic survey on the nutritional status of the malnourished children showed that the lack of exclusive breast feeding remained and important cause in malnutrition of the preschool aged children.

Thus this proves that initial breast feeding would definitely play a major role in the nutritional status of the children. Lack in knowledge and improper screening is the reason for the morbidity and mortality of children under five years of age.

This finding is consistent with the community-based feeding study conducted by **Villanueva et al (2015)** among 939 preschool children with malnutrition residing in 18 villages. The study revealed a tremendous increase in growth of children given soya milk for a period of 2 months.

Objective 3: To compare the efficacy of ragi kanjii versus soya milk on the nutritional status of malnourished pre-school children.

Point estimate of weight gain difference of soya milk is 65.67 gram when comparing with ragi kanjii. Likely estimate of same study

conducted by other person will have 54 grams to 76 grams of weight gain difference. It was calculated using mean difference with 95% of CI.

The mean weight gain in children given soya milk was high when compared to ragi kanjii. Thus supplementation with soya milk would prove highly beneficial and would definitely prevent morbidity and mortality in under five children, as the death in under five is not mainly due to the affected disease but due to the underlying malnutrition status.

The malnutrition in the preschool period is basically due to inappropriate weaning of children at the appropriate age which should be managed by appropriate health education and counselling of parents at the time of the child's birth.

These findings are similar with the study conducted by **Hopkins et.al., (2011)** a nutritional experimental study on wheat flour, maize, rice, sorghum, ragi millet and soya products was done. Study revealed soya products can be introduced to supplement animal protein. This can serve to increase the total protein available to target populations. Nutritional studies have demonstrated that mixtures of soya protein and meat or soya protein and fish are of a biological quality similar to that of meat or fish protein when fed alone. Soya products also can be used in mixed protein systems with vegetable proteins to complement amino acids. Many studies with human subjects have demonstrated the utility of soya products in a variety of soya-cereal foods that can serve as the major source of protein for infants and children.

Objective 4: To associate the efficacy of ragi kanjii and soya milk on nutritional status with selected demographic variables

The weight gain in children given soya milk was found to be good in elder children than in younger children. On the income basis the parents with higher income had the ability to care their child more than

the parents with lesser income. The children from rural area showed a higher response as the need is considerably high. The undernourished children showed best response when compared to severe acute malnourished child.

From this finding it may be concluded that the effectiveness of soya milk was found to be greater than ragi kanjii and it would be implemented as the weaning food as practised in United Kingdom so that a healthier Nation can be developed.

This is in consistent with the study conducted by **Christian Troubé (2012)** who found 3.5 and 5 million children under five die every year. So wide use of plumpy soy and other soya related products in United Kingdom have proved beneficial in fighting against malnutrition.

The weight gain in children given ragi kanjii was found to be good in elder children than younger children. On the income basis the parents with higher income had the ability to care their child more than the parents with lesser income. The children from rural area showed a higher response as the need is considerably high. The undernourished children showed best response when compared to severe acute malnourished child.

These findings are supported by the study conducted by **Ganguly et.al., (2015)**. Total study subjects age group 0-5 years were 516 who were selected randomly. Total malnutrition cases were 394 with a prevalence of 76.36%. Here malnutrition was more common in males than females. Malnutrition was more prevalent in 1-5 age group children and was found statistically significant. High percentage of malnutrition was found in under five rural male children. Generally percentage of malnutrition increases, as age increases among under five rural children

Hypotheses:

H₁: There will be an improvement in nutritional status of preschool children receiving soya milk than children receiving ragi kanjii.

The average weight gain of the children who had ragi kanjii for 14 days was around 110 grams. The average weight gain of the children who had soya milk for 14 days was around 176 grams. Comparing the effectiveness of ragi kanjii versus soya milk, the mean difference was found to be 65.67 and the **t** value using independent t –test was **t=11.89 p=0.001*** significant**. Point estimate of weight gain difference of soya milk is 65.67 gram when comparing with ragi kanjii. Likely estimate of same study conducted by other person will have 54 grams to 76 grams of weight gain difference. It was calculated using mean difference with 95% of CI.

H₂: There will be an association between the selected demographic variables and the nutritional status of children receiving ragi kanjii and soya milk.

By using chi square test, there was significant association of weight gain with the selected demographic variables like age of the child, family income and the living area of the child.

Thus the hypotheses were statistically proved.

CHAPTER VII

CONCLUSION, RECOMMENDATION

7.1 Nursing implications:

Nursing service:

- ▶ The nurse can develop the skill in providing necessary education to the parents of malnourished children so that further morbidity and mortality can be reduced.
- ▶ The nurse has to develop knowledge regarding malnourishment in children, their incidence and treatment without side effects and cost effective manner.
- ▶ The result of the study will help the nurse to enlighten their knowledge in various home therapies concerned with the management of malnourishment.
- ▶ The nursing supervisors can provide in-service educations to nursing personnel to update their knowledge about the results of the study as a means of good healthy practices.

Nursing administration:

- Nurses as administrators can influence the quality of nursing care in the community, they can also co-ordinate and discuss about the effectiveness of soya milk and their other dietary products which maintains the health.
- Nurse administrators can encourage the staffs to conduct various programmes to the various nursing and health personnel related to the home management of other morbid disorder resulting from malnourished status which can be easily managed by the people in the community.

Nursing education:

- ❖ The nurse educator can create awareness to the students about the home management and the treatment options which are available as unnoticed and with cost effective, easily available and accessible manner for malnourishment
- ❖ The nurse educator can include the nutritional health tips and diet therapy aspects in the clinical teaching programme, which can be adopted by the students and the nursing personnel.

Nursing research:

- ❖ Nurses and nursing students should undertake more research activities in easily available and acceptable food products in improving the health rather than treating after they end up in a severe morbid form.
- ❖ Nurses can assist researchers of other disciplines in the maintenance and improvement of new modalities in the management of the malnutrition in preschool children.
- ❖ Develop network for new directions in research and collaboration with other Health care professionals for the effective management of the malnutrition in preschool children.
- ❖ This study can be effectively utilized by the emerging researchers for their reference purposes

7.2 Limitations:

- Prolonged effects of the supplements could not be measured
- Some samples hesitated to accept the taste of soya milk and refused to take on daily, so these samples were excluded from the study.

7.3 Recommendations for further study:

- A longitudinal study can be done using Post-test after one month, six months and one year to see effectiveness of both the supplements and monitoring the change in all anthropometric indices
- Similar study can be replicated on a larger sample.
- Similar study can be conducted in other underserved population areas where the people do not seek any treatment facilities due to distance factors and remain unnoticed of their disease

Conclusion:

The present study was done to assess the effectiveness of ragi kanjii versus soya milk in improving the nutritional status of malnourished pre-school children at Institute of child health and hospital for Children, Chennai. The administration of the health supplements revealed a significant effectiveness in nutritional status of children who were given soya milk when compared to ragi kanjii. This was proved by the mean difference of 65.67 and the t value using independent t –test was $t=11.89$ $p=0.001$ ***significant.

Malnourishment in preschool children is a National as well as Worldwide problem. It affects the growth and development of the children which in turn affects their future. Hence soya milk supplementation may be encouraged among parents of preschool children to improve the nutritional status of their children

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**INSTITUTIONAL ETHICS COMMITTEE
MADRAS MEDICAL COLLEGE, CHENNAI-3**

EC Reg No. ECR/270/Inst./TN/2013
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CERTIFICATE OF APPROVAL

rs. REMYA.M.R.
Sc. (Nursing),
College of Nursing,
Madras Medical College,
Chennai - 600 003.

Dear Mrs. REMYA.M.R,

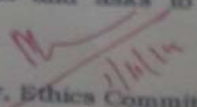
The Institutional Ethics Committee has considered your request and approved your study titled **A STUDY TO ASSESS THE EFFECTIVENESS OF RAGI KANUBI VERSUS SALK IN IMPROVING THE NUTRITIONAL STATUS OF MALNOURISHED PRE-SCHOOL CHILDREN AT INSTITUTE OF CHILD HEALTH AND HOSPITAL FOR CHILDREN, EGMORE. No.28102014.**

The following members of Ethics Committee were present in the meeting held on 21.10.2014 conducted at Madras Medical College, Chennai-3.

- | | |
|--|----------------------|
| 1. Dr.C.Rajendran, M.D., | : Chairperson |
| 2. Dr.R.Vimala, M.D., Dean, MMC, Ch-3 | : Deputy Chairperson |
| 3. Prof.R.Kalaiselvi, M.D., Vice-Principal, MMC, Ch-3 | : Member Secretary |
| 4. Prof.R.Nandhini, M.D., Inst.of Pharmacology, MMC | : Member |
| 5. Prof.K.Ramadevi, Director i/c, Inst.of Biochemistry, MMC | : Member |
| 6. Prof.Saraswathy, M.D., Director, Pathology, MMC, Ch-3 | : Member |
| 7. Prof.S.G.Sivachidambaram, M.D., Director i/c,
Inst.of Internal Medicine, MMC | : Member |
| 8. Dr.Raghumani, M.S., Professor of Surgery, MMC | : Member |
| 9. Thiru S.Rameshkumar, Administrative Officer | : Lay Person |
| 10. Thiru S.Govindasamy, B.A., B.L., | : Lawyer |
| 11. Tmt.Arnold Saulina, M.A., MSW., | : Social Scientist |

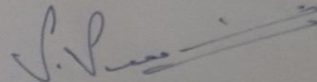
We approve the proposal to be conducted in its presented form.

The Institutional Ethics Committee expects to be informed about the progress of the study and SAE occurring in the course of the study, any change in the protocol and patients information/informed consent and asks to provide a copy of the final report.


Member Secretary, Ethics Committee

CERTIFICATE FOR CONTENT VALIDITY

This is to certify that a tool prepared by Ms. M.R. Remya, studying M.Sc. Nursing II year, College of Nursing, Madras Medical College, undertaking a Research study on "A STUDY TO ASSESS THE EFFECTIVENESS OF RAGI KANJII VERSUS SOYAMILK IN IMPROVING THE NUTRITIONAL STATUS OF MALNOURISHED PRE-SCHOOL CHILDREN AT INSTITUTE OF CHILD HEALTH AND HOSPITAL FOR CHILDREN, EGMORE" has been validated by me and is found to be valid up to date and she can proceed with this tool to conduct the main study.

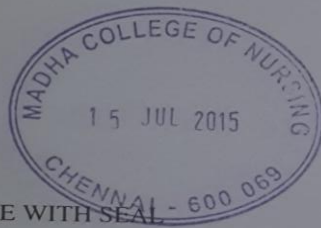


SIGNATURE WITH SEAL

Name : Dr. P. PRINJVASAN
Designation : MEDICAL REGISTRAR
Date : INSTITUTE OF CHILD HEALTH AND
Place : HOSPITAL FOR CHILDREN
EGMORE, CHENNAI - 600 008

CERTIFICATE FOR CONTENT VALIDITY

This is to certify that a tool prepared by Ms. M.R. REMYA, studying M.Sc. Nursing, II year College of Nursing, Madras Medical College, undertaking a Research study on "A STUDY TO ASSESS THE EFFECTIVENESS OF RAGI KANJII VERSUS SOYAMILK IN IMPROVING THE NUTRITIONAL STATUS OF MALNOURISHED PRE-SCHOOL CHILDREN AT INSTITUTE OF CHILD HEALTH AND HOSPITAL FOR CHILDREN, EGMORE" has been validated by me and is found to be valid up to date and she can proceed with this tool to conduct the main study.



Mahiba J.
SIGNATURE WITH SEAL

Name : MRS. MAHIBA JANICE J
Designation : LECTURER.
Date : 15.07.15
Place : Chennai - 69.

CERTIFICATE FOR CONTENT VALIDITY

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SIGNATURE WITH SEAL

சென்னை சுகாதார அமைச்சு
DEPT OF CLINICAL NUTRITION
I.C.H. & H.C. குழந்தைகள் நல மருத்துவமனை
ஆம் தேய்ப் பகுதி Out Patient Dep
சென்னை-600 002

Name : M. Vellankanni
Designation : m. social worker
Date : 11/8/2015
Place : Chennai - 8 - Egmore

From

Ms.M.R.Remya,
M.Sc(Nursing) II year,
College of Nursing,
Madras Medical College,
Chennai-600003.

To

The Director,
Institute of Child Health and Hospital for Children,
Egmore,
Chennai -600008

Through Proper Channel,

Respected Sir/Madam,

Sub: Requesting Permission to conduct a nursing research study-regarding

I, **Ms.M.R.Remya**, studying M.Sc.Nursing II year ,College of Nursing, Ma
Medical College, request you to kindly grant me permission to conduct study for th
proposed topic " **A STUDY TO ASSESS THE EFFECTIVENESS OF RAGI K
VERSUS SOYAMILK IN IMPROVING THE NUTRITIONAL STATUS OF
MALNOURISHED PRE-SCHOOL CHILDREN AT INSTITUTE OF CHILD
HEALTH AND HOSPITAL FOR CHILDREN,EGMORE** in partial fulfillment
the degree of Master of Science in Nursing.

I assure you that it will not interfere with routine activities of the study settings.

Thanking you,

Date:01-07-2015

Place:Chennai

Yours Obedient

M. R. Remya
(M.R.REMYA)

Forwarded,

Permit to do
Study

Per
12/7/15
Director and Superintenden,
Institute of Child Health and
Hospital for Children
Egmore Chennai - 600 008

**“A study to assess the effectiveness of ragi kanjii versus
soyamilk in improving the nutritional status of malnourished
pre-school children at Institute of Child health and Hospital for
children, Chennai”**

SECTION A

Sample No:

Date:

CHILD PROFILE

1. AGE OF THE CHILD

a) 3-4 years

b) 4-5 years

2. SEX OF THE CHILD

a) Male

b) Female

3. RELIGION

a) Hindu

b) Muslim

c) Christian

d) Others

4. TYPE OF FAMILY

a) Nuclear family

b) Joint family

c) Single parent family

d) Extended family

5. BIRTH ORDER OF THE CHILD

a) 1

b) 2

c) 3

d) >3

6. IMMUNIZATION STATUS

- a) Not immunized
- b) Immunized but not regularly
- c) Immunized regularly
- d) Immunized up to date

7. TOTAL NUMBER OF LIVE CHILDREN IN THE FAMILY

- a) 1
- b) 2
- c) 3
- d) >4

8. TYPE OF FOOD:

- a) Vegetarian
- b) Non- Vegetarian
- c) Mixed

PARENT PROFILE

1. EDUCATIONAL STATUS OF MOTHER

- a) Profession or Honours
- b) Graduate or post graduate
- c) Intermediate or post high school diploma
- d) High school certificate
- e) Middle school certificate
- f) Primary school certificate
- g) No formal education

2. EDUCATIONAL STATUS OF FATHER

- a) Profession or Honours
- b) Graduate or post graduate
- c) Intermediate or post high school diploma
- d) High school certificate
- e) Middle school certificate
- f) Primary school certificate
-

g) No formal education

3. OCCUPATIONAL STATUS OF MOTHER

- a) Profession
- b) Semi-Profession
- c) Clerical, Shop-owner
- d) Skilled worker
- e) Semi-skilled worker
- f) Unskilled worker
- g) Unemployed

4. OCCUPATIONAL STATUS OF FATHER

- a) Profession
- b) Semi-Profession
- c) Clerical, Shop-owner
- d) Skilled worker
- e) Semi-skilled worker
- f) Unskilled worker
- g) Unemployed

5. MONTHLY INCOME

- a) <1802 rupees
- b) 1803–5386 rupees
- c) 5387–8988 rupees
- d) 8989–13494 rupees
- e) \geq 13494 rupees

6. LIVING AREA:

- a) Rural
- b) Urban

SECTION - B

1. Weight

a) <14 kilograms

b) 14-16 kilograms

c) 16-18 kilograms

d) 18-20 kilograms

2. Height

a) <90 centimetres

b) 90-100 centimetres

c) 100-110 centimetres

d) 110-120 centimetres

3. Head circumference

a) <50 centimetres

b) 50-55 centimetres

c) 55-60 centimetres

d) >60 centimetres

4. Chest circumference

a) <50 centimetres

b) 50-52 centimetres

c) 52-54 centimetres

d) >54 centimetres

5. Mid arm circumference

a) <11.5 centimetres

b) 11.5-13 centimetres

c) 13-15 centimetres

d) >15 centimetres

6. Grade of malnutrition

a) Undernourished

b) Moderate acute malnutrition

c) Severe acute malnutrition

d) Severe acute malnutrition with complications

Questionnaire for assessing the nutritional status:

Answer Yes or No:

1. Have you exclusively breast fed the child for six months?

a) Yes

b) No

2. Have you breast fed your child till 2 years of age?

a) Yes

b) No

3. Does the child experience difficulty in eating?

a) Yes

b) No

4. Does the child eat less than normal?

a) Yes

b) No

5. Does the child experience nausea / vomiting?

a) Yes

b) No

6. Does the child require help in feeding?

a) Yes

b) No

7. Does the child skip meal occasionally?

a) Yes

b) No

8. Does the child have constipation?

a) Yes

b) No

9. Does the child have diarrhoea?

a) Yes

b) No

10. Does the child suffer from any food allergy?

a) Yes

b) No

11. Does the child fall sick often in a year?

a) Yes

b) No

12. Do you seek medical care immediately if the child falls sick?

a) Yes

b) No

13. Have you noticed fatigue or weakness in your child?

a) Yes

b) No

14. Do you take your child for regular health check-ups?

a) Yes

b) No

15. Is it necessary to provide a nutritious diet during this age group?

a) Yes

b) No

16. Did you introduce complimentary feeding at age of six months?

a) Yes

b) No

17. Do you prepare dishes according to the wishes of the child?

a) Yes

b) No

பகுதி-அ

குழந்தைவடிவுருவம்

1. குழந்தை வயது

a) 3-4 வருடம்

b) 4-5 வருடம்

2. குழந்தை இனம்

a) ஆண்

b) பெண்

3. மதம்

a) இந்து

b) முஸ்லிம்

c) கிறிஸ்டியன்

d) மற்றவர்கள்

4. குடும்பம் வகைகள்

a) தனிக்குடும்பம்

b) கூட்டுக்குடும்பம்

c) தனி பெற்றோர் குடும்பம்

d) பெரிய குடும்பம்

5. பிறப்பு வரிசை குழந்தை

a) 1

b) 2

c) 3

d) >3

6. தடுப்பூசி நிலை

a) தடுப்பூசி அளிக்கப்படவில்லை

b) தடுப்பூசி அளிக்கப்பட்டது ஆனால்
தொடர்ச்சியாக அளிக்கப்படவில்லை

c) தொடர்ச்சியாக அளிக்கப்படவில்லை

d) தடுப்பூசி இந்நாள் வரை அளிக்கப்பட்டது.

7. குடும்பத்தில் வாழும் குழந்தைகள்

a) 1

b) 2

c) 3

d) >4

8. உணவு வகைகள்

a) சைவம்

b) அசைவம்

c) இரண்டும்

பெற்றோர் சுயவிவரம்

1. அம்மாவின் படிப்புசான்று

- a) தொழில் உத்தியோகம்
- b) பட்டம் பெற்றவர்
- c) தொழில் நுட்பம்சார்ந்தக்கல்வி
- d) உயர்நிலைக்கல்வி சான்றிதழ்
- e) இடைநிலைக்கல்வி சான்றிதழ்
- f) தொடக்கல்வி சான்றிதழ்
- g) படிக்காதவர்கள்

2. தந்தை கல்வி நிலை

- a) தொழில் உத்தியோகம்
- b) பட்டம் பெற்றவர்
- c) தொழில் நுட்பம்சார்ந்தக்கல்வி
- d) உயர்நிலைக்கல்வி சான்றிதழ்
- e) இடைநிலைக்கல்வி சான்றிதழ்
- f) தொடக்கல்வி சான்றிதழ்
- g) படிக்காதவர்கள்

3. தாயின் பதவி நிலை

- a) தொழில் உத்தியோகம்
- b) பகுதி நேர தொழில் உத்தியோகம்
- c) குமாஸ்தா, கடைஉரிமையாளர்
- d) திறமை வாய்ந்த வேலையாட்கள்

e) பகுதி நேர திறமை வாய்ந்த வேலையாட்கள்

f) திறமை இல்லாத வேலையாட்கள்

g) வேலையின்மை

4. தந்தை பதவி நிலை

h) தொழில் உத்தியோகம்

i) பகுதி நேர தொழில் உத்தியோகம்

j) குமாஸ்தா, கடைஉரிமையாளர்

k) திறமை வாய்ந்த வேலையாட்கள்

l) பகுதி நேர திறமை வாய்ந்த வேலையாட்கள்

m) திறமை இல்லாத வேலையாட்கள்

a) வேலையின்மை

5.மாத வருமானம்

a) <1802 ரூபாய்

b) 1802-5386 ரூபாய்

c) 5387-8988 ரூபாய்

d) 8989-13494 ரூபாய்

e) \geq 13494 ரூபாய்

6.வாழும் பகுதி

a) கிராமம்

b) நகரம்

பகுதி-ஆ

1.எடை

- a) <14 கிலோகிராம்
- b) 14-16 கிலோகிராம்
- c) 16-18 கிலோகிராம்
- d) 18-20 கிலோகிராம்

2. உயரம்

- a) <90 அங்குலம்
- b) 90-100 அங்குலம்
- c) 100-110 அங்குலம்
- d) 110-120 அங்குலம்

3. தலை சுற்றளவு

- a) <50 அங்குலம்
- b) 50-55 அங்குலம்
- c) 55-60 அங்குலம்
- d) >60 அங்குலம்

4.மார்பு சுற்றளவு

- a) <50 அங்குலம்
b) 50-52 அங்குலம்
c) 52-54 அங்குலம்
d) >54 அங்குலம்

5.கை மையப்பகுதி சுற்றளவு

- a) <11.5 அங்குலம்
b) 11.5-13 அங்குலம்
c) 13-15 அங்குலம்
d) >15 அங்குலம்

6. ஊட்டச்சத்து நிலை

- a) குறைவான உணவு
b) மிதமான சத்து உணவு
c) கடுமையான சத்துகுறைபாடுகள்
d) மிகக்கடுமையான சத்துகுறைபடிர்கான
விளைவுகள்

பின்

1.நிங்கள் தனிப்பட்ட முறையில் குழந்தைக்கு ஆறு மாதம் தாய் பால் கொடுத்தீர்களா?

a) ஆம்

b) இல்லை

2. நிங்கள் இரண்டு வருடம் வரை தாய் பால் கொடுத்தீர்களா?

a) ஆம்

b) இல்லை

3. குழந்தை உணவு உட்கொள்ள சிரமபடுகிறதா?

a) ஆம்

b) இல்லை

4. குழந்தை சாதாரண அளவு உணவுவிட குறைவாக உண்ணுகிறதா?

a) ஆம்

b) இல்லை

5. குழந்தைக்கு குமட்டல் / வாந்தி எடுத்த அனுபவம் உள்ளதா?

a) ஆம்

b) இல்லை

6. குழந்தை உணவு உட்கொள்ளும்பொழுது மற்றவர்களின் உதவி தேவைப்படுகிறதா?

a) ஆம்

b) இல்லை

7. குழந்தை எப்பொழுதாவது உணவைதவிர்கிறதா?

a) ஆம்

b) இல்லை

8. குழந்தைக்கு மலைச்சிக்கல் உள்ளதா?

a) ஆம்

b) இல்லை

9. குழந்தைக்கு வயிற்றுப்போய்க்கு உள்ளதா?

a) ஆம்

b) இல்லை

10. குழந்தைக்கு உணவு ஒவ்வாமை உள்ளதா?

a) ஆம்

b) இல்லை

11. குழந்தைக்கு அடிக்கடி நோய் வருகிறதா?

a) ஆம்

b) இல்லை

12. குழந்தைக்கு நோய்வாய்ப்பட்டால் மருத்துவரிடம் அழைத்து செல்வார்களா?

a) ஆம்

b) இல்லை

13. உங்கள் குழந்தை பலவினமாகவும் சோர்வாகவும் உள்ளதா?

a) ஆம்

b) இல்லை

14. நிங்கள் உங்கள் குழந்தைக்கு வழக்கமான உடல் பரிசோதனை செய்கிறீர்களா?

a) ஆம்

b) இல்லை

15. ஆரோய்க்கியா உணவு இந்த வயதில் அவிசயமானதா?

a) ஆம்

b) இல்லை

16. குழந்தைக்கு ஆறு மாதம் முதல் இணை உணவு ஆரம்பிக்கப்பட்டதா?

a) ஆம்

b) இல்லை

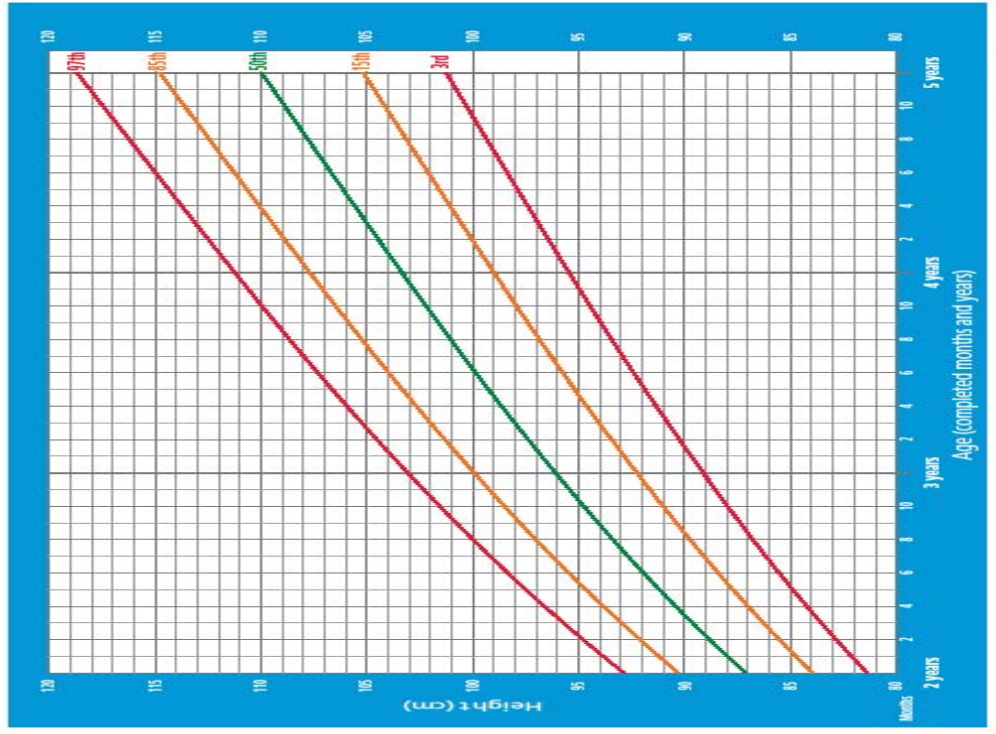
17. நிங்கள் குழந்தையின் விருப்பத்திற்கு எற்ப உணவு தயார் செய்வீர்களா?

a) ஆம்

b) இல்லை

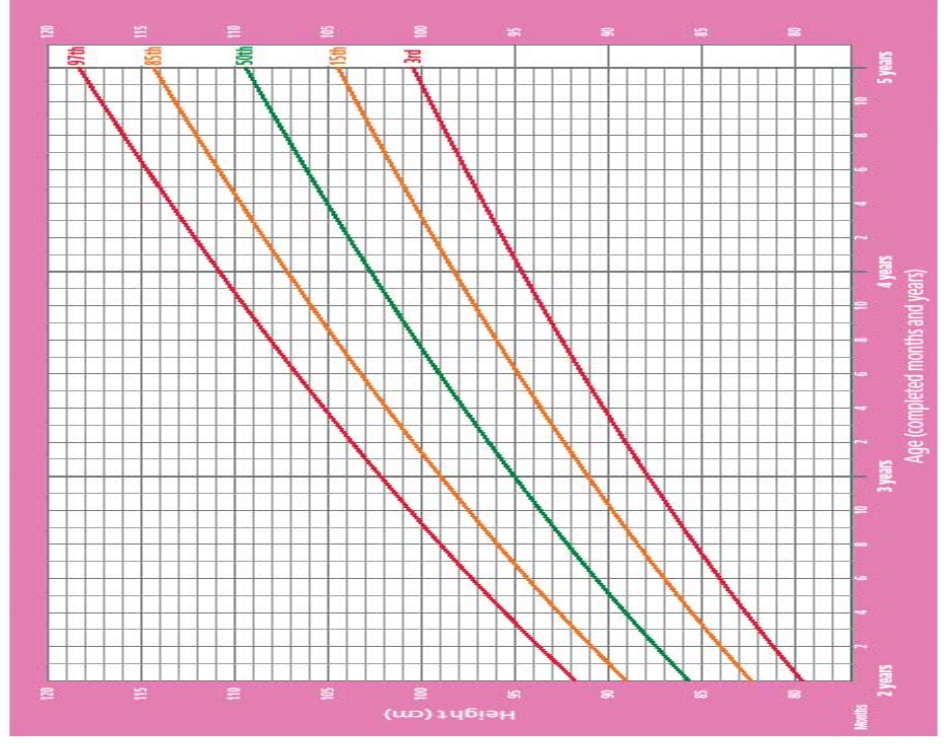
Height-for-age BOYS

2 to 5 years (percentiles)



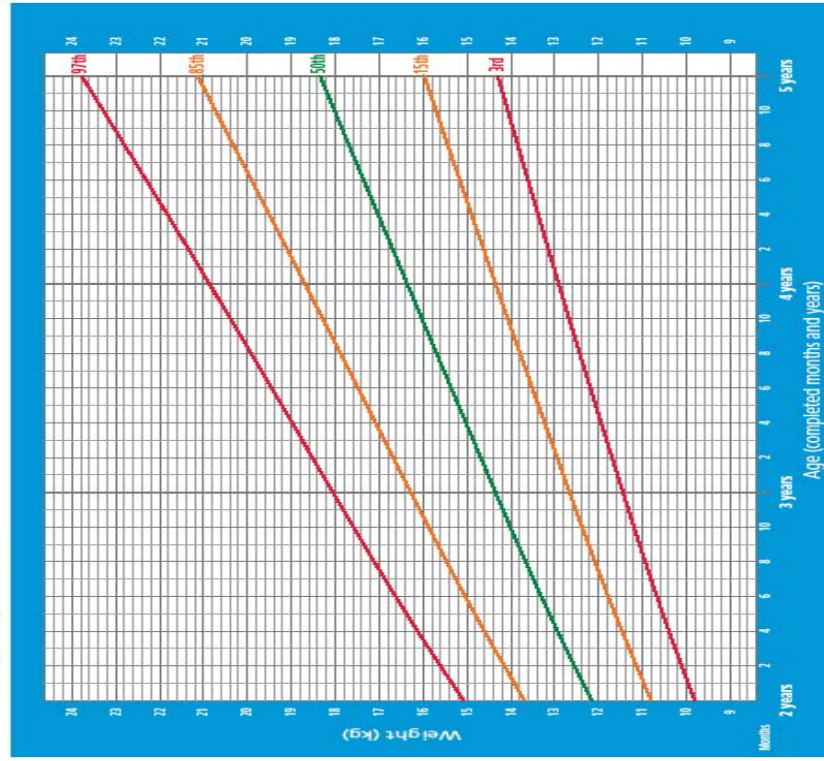
Height-for-age GIRLS

2 to 5 years (percentiles)



Weight-for-age BOYS

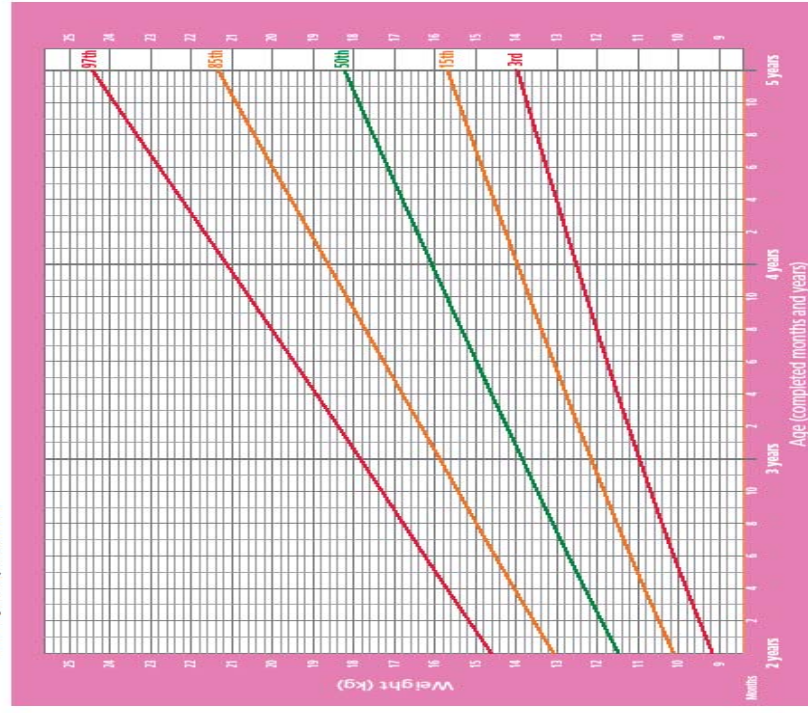
2 to 5 years (percentiles)



WHO Child Growth Standards

Weight-for-age GIRLS

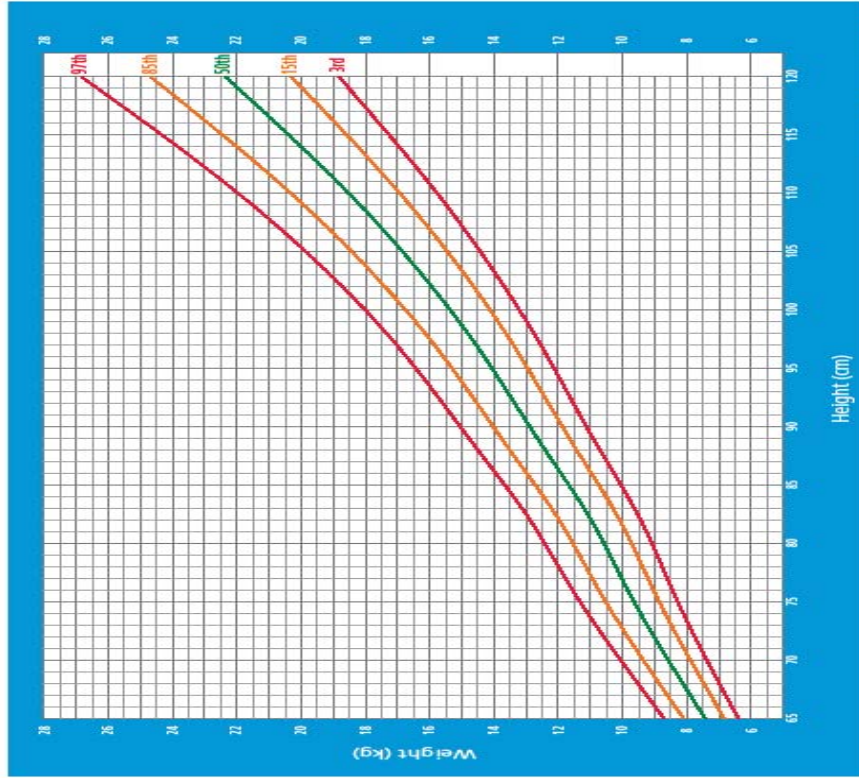
2 to 5 years (percentiles)



WHO Child Growth Standards

Weight-for-height BOYS

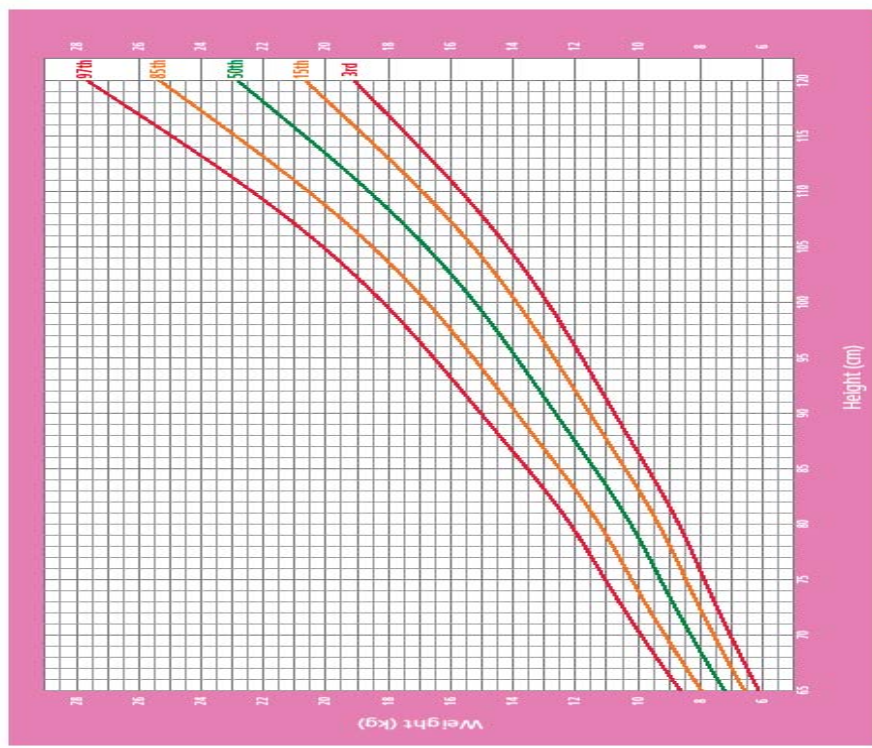
2 to 5 years (percentiles)



WHO Child Growth Standards

Weight-for-height GIRLS

2 to 5 years (percentiles)



WHO Child Growth Standards

PREPARATION OF SUPPLEMENTS

PREPARATION OF RAGI KANJII:

Ragi washed and dried under the shade. Powdered and then used for the study. 200 ml of ragi kanjii was prepared by cooking 50 grams of powdered ragi with 10 grams of jaggery in water. It was distributed to the samples at free of cost and under direct supervision of investigator.



Intervention was done for 14 days.

PREPARATION OF SOYA MILK:

200 ml of soya milk was prepared by soaking 30 grams of soya in water over night, after straining the grinded matter it was cooked with 10 grams of jaggery in water. It was distributed to the samples at free of cost and under direct supervision of investigator. Intervention was done for 14 days.



INFORMATION TO PARTICIPANTS

Title: EFFECTIVENESS OF IMPROVEMENT IN NUTRITIONAL STATUS OF MALNOURISHED CHILDREN EITHER BY RAGI KANJII OR SOYA MILK

Investigator:

Name of parent/care taker:

This study is conducted in Institute of child health, Egmore, Chennai-03. You (parent/care taker) are invited to take part in this study. The information in this document is meant to help you decide whether or not to take part. Please feel free to ask if you have queries or concerns

What is the purpose of the study:

Malnutrition among under five children is one of the major health problems affecting India. The growing body of evidence shows promptly treating the malnutrition prevents further complications in childhood there by preserving the family and the nation's future. In this study we want to test the effectiveness of ragi kanjii and the soya milk in improving the nutritional status of the children. We have obtained permission from the institutional ethics committee.

The study design:

All the children in the study will be divided into two groups. Your child will be assigned to either of the groups. One group will be given ragi kanjii and the other will receive soya milk.

Study procedure:

The study involves evaluation of the nutritional status of the children before initiation of the study and child will be evaluated the same way after the cessation of the study. You will be asked to feed the child with 120 ml of either of one supplement once daily for a period of 14 days. Kindly report any adverse effects immediately. You will be asked to report child absence which will enable correct assessment of the study results.

Possible effects to your child: Taking the prepared food daily ensures adequate nutrition required for the child and you can also continue the usual food regimen you were already giving your child. There by preventing severity of malnutrition.

Possible effects to other people:

The results of the research may provide benefits to the society and the health care team for creating further advancements in preventing ill effects of malnutrition.

Confidentiality of the information obtained from you:

You have the right to confidentiality regarding the privacy of your child medical information. By signing this document you will be allowing the research team investigators, other team personnel, sponsors, institution ethics committee and any person or agency required by law like health controller general of India to view your child's data. If required the information from this study will be published in scientific journals or presented at scientific meetings which will not reveal your child's personal identity.

How will your decision to not to participate in study affect your child:

Your decision on your child for not to participating in this research will not affect your child's medical care or your relationship with the investigator or the institution. Your child will be taken care and will not loose any benefits to which you are entitled.

Can you decide to stop your child from not participating in the study once you start:

The participation in this research is purely voluntary and you have the right to withdraw your child from this study at any time during the course of the study without giving any reason. However it is advisable that you talk to the research team prior to stopping the food material / discontinuing the food regimen. The results of the study will be informed to you at the end of the study.

**Signature of investigator with date
with date**

Signature of the child's parent/care taker

INFORMED CONSENT FORM

Title: Effectiveness of improvement in nutritional status of malnourished children either by ragi kanjji or soya milk

Name off the parent/care taker:

Name of the investigator:

I parent/care taker of _____ have read the information in this form (or it has been read to me). I was free to ask questions and they have been answered. As am the _____ of the child I hereby give my consent to include my child as the participant in this study.

1. I have read and understood the consent form and the information provided to me.
2. I have had the consent document explained to me about my child
3. I have been explained about the nature of the study on my child
4. I have been explained about my rights and responsibilities by the investigator on my child.
5. I am aware of the fact that I can take my child out of the study at any time without having to give any reason and this will not affect my child's future treatment in the hospital.
6. I hereby give permission to the investigator to release the information obtained on my child's study to other team personnel, sponsors, institution ethics committee and any person or agency required by law like health controller general of India, IEC. I understand that they are publicly presented.
7. I understand my child's identity will be kept confidential when the study is publicly presented. I have had my questions answered to my satisfaction.
8. I have decided to involve my child as a participant of the research study.

I am aware that if I have any questions during this study, I should contact the investigator. By signing this consent form I attest that the information given in this document about the research on my child has been clearly explained to me and understood by me. I will be given a copy of this consent document.

Name and signature /thumb impression of the parent/care taker with date

ஆராய்ச்சி தகவல் தாள்

ஆராய்ச்சி தலைப்பு : கேழ்வரகு கஞ்சி அல்லது சோயா பால்
கொடுப்பதினால்

மாற்றம்

ஏற்படும் குழந்தைகளின் ஊட்டச்சத்து நிலை

பற்றிய ஆய்வு.

ஆய்வாளர் பெயர் : ரெம்யா. ம.ரெ.
பங்கேற்பாளர் பெயர் :
தேதி :
வயது/பால் :

இந்த ஆய்வு அரசு குழந்தைகள் மருத்துவமனையில் நடைபெற உள்ளது. உங்கள் குழந்தை இந்த ஆய்வில் பங்கேற்க நான் விரும்புகிறேன். இதிலுள்ள தகவலின் அடிப்படையில் இந்த ஆய்வில் பங்கேற்பதா அல்லது வேண்டாமா என்று நீங்கள் முடிவு செய்து கொள்ளலாம். உங்கள் சந்தேகங்களை எங்களிடம் கேட்டு நிவர்த்தி செய்து கொள்ளலாம்.

இந்த ஆய்வின் நோக்கம்:

இந்தியாவில் ஊட்டச்சத்து குறைபாட்டினால் அதிகளவில் குழந்தைகள் பாதிக்கப்பட்டுள்ளனர். தற்பொழுதைய நிலையிலிருந்து குழந்தைகளின் ஆரோக்கிய நிலையை முன்னேற்று வதற்காகவும், ஊட்டச்சத்து நிலை 1, 2 ல் உள்ள குழந்தைகளை நிலை 4ற்கு தள்ளப்படாமலிருக்கவும் இந்த ஆய்வு பயன்படுகிறது என்பதை அறியலாம். இந்த ஆய்விற்கு எத்திக்கல் கமிட்டி சம்மதம் பெற்றிருக்கிறேன்.

ஆய்வின் செயல்முறை:

இந்த ஆய்வில் கலந்து கொள்பவர்களை A மற்றும் B என்று இரு குழுக்களாக பிரிக்கப்படுவார்கள். A குழுவில் இருப்பவர்களுக்கு கேழ்வரகு கஞ்சியும் B குழுவில் இருப்பவர்களுக்கு சோயா பாலும் கொடுக்கப்படும்.

இந்த ஆய்வில் முதல் மற்றும் இ வார முடிவில் மனித இனநூல் மற்றும் இரத்த அணு பரிசோதனை செய்யப்படும். அதற்காக எடுக்கப்படும் இரத்த அளவு 2மி.லி. இந்த ஆய்வின் போது ஏதேனும் பக்கவிளைவுகள் ஏற்பட்டால் உடனடியாக எங்களிடம் தெரிவிக்க வேண்டும்

இதனால் ஆய்வாளருக்கான பயன்:

இந்தியாவில் ஊட்டச்சத்து குறைபாட்டினால் அதிகளவில் குழந்தைகள் பாதிக்கப்பட்டுள்ளனர். தற்பொழுதைய நிலையிலிருந்து குழந்தைகளின் ஆரோக்கிய நிலையை முன்னேற்று வதற்காகவும், ஊட்டச்சத்து நிலை 1, 2 ல் உள்ள குழந்தைகளை நிலை 4ற்கு தள்ளப்படாமலிருக்கவும் இந்த ஆய்வு பயன்படுகிறது

இதனால் பங்கேற் பாளருக்கான பயன்:

இந்த ஆராய்ச்சியில் பங்கேற்பதினால்

குழந்தைகளின் ஊட்டச்சத்து நிலை மாற்றம் ஏற்படும்.

ஆராய்ச்சியில் பங்கேற்கவில்லை என்றாலும், உங்களின் சராசரி வாழ்கை முறை, மருத்துவரின் ஆலோசனை மற்றும் சிகிச்சை முறையில் எந்த வித மாற்றமும் ஏற்படாது என்பதை தெரிவிக்கிறேன்.

இந்த ஆராய்ச்சியில் பங்கேற்க விருப்பம் இல்லை என்றால் உங்களின் முழுமனதுடன் நீங்கள் இந்த ஆராய்ச்சியில் இருந்து விலகி கொள்ளலாம் என்பதை தெரிவிக்கிறேன்.

இந்த ஆராய்ச்சியில் உங்களின் மருத்துவதகவல்களை பாதுகாப்பாக வைத்து கொள்கிறேன் என்பதை தெரிவிக்கிறேன்.

இந்த ஆராய்ச்சியின் தகவல்களை வெளியிடும் போது, உங்களை பற்றிய அடையாளங்கள் வெளிவராது என்பதை உறுதி கூறுகிறேன்.

மருத்துவ சிகிச்சையின் தகவல்கள் குறித்த விவரங்கள்:

உங்கள் குழந்தையின் மருத்துவ சிகிச்சை குறித்த தகவல்கள் ரகசியமாக பாதுகாக்கப்படும். இந்த தகவல் தாளில் கையெழுத்திடுவதின் மூலம் உங்கள் குழந்தை பற்றிய குறிப்புகளோ, எடுத்து கொண்ட சிகிச்சை முறையை பற்றியோ ஆய்வாளரோ இனஸ்டிடியூசன் எத்திக்கல் கமிட்டியை சார்ந்தவர்களோ தேவைப்படட்டால் அறிந்து கொள்ளலாம் என்று சம்மதிக்கிறீர்கள். முடிவுகளை அல்லது கருத்துக்களை வெளியிடும் போதோ அல்லது ஆய்வின் போதோ தங்களது குழந்தையின் பெயரையோ அல்லது அடையாளங்களையோ வெளியிடமாட்டேன் என்பதையும் தெரிவித்துக் கொள்கிறேன்.

இந்த ஆய்வில் பங்கேற்காவிட்டாலும் உங்கள் குழந்தை வழக்கமான தொடர்ந்து பெறலாம்.

இந்த ஆய்வில் பங்கேற்பது தங்களது விருப்பத்தின் பேரில் தான் இருக்கிறது. மேலும் உங்கள் குழந்தை எந்நேரமும் இந்த ஆய்விலிருந்து பின் வாங்கலாம் என்பதையும் தெரிவித்துக் கொள்கிறேன்.

இந்த சிறப்பு சிகிச்சையின் முடிவுகளை ஆய்வின் போதோ அல்லது ஆய்வின் முடிவின் போதோ தங்களுக்கு அறிவிப்போம் என்பதையும் தெரிவித்துக் கொள்கிறேன்.

ஆய்வாளர் கையொப்பம்

பங்கேற்கும் குழந்தையின்

பெற்றோரின் கையொப்பம்

தேதி

தேதி

ஆராய்ச்சி ஒப்புதல் கடிதம்

ஆராய்ச்சி தலைப்பு : கேழ்வரகு கஞ்சி அல்லது சோயா பால்
கொடுப்பதினால்

நிலை மாற்றம் ஏற்படும் குழந்தைகளின் ஊட்டச்சத்து
பற்றிய ஆய்வு.

ஆய்வாளர் பெயர் : ரெம்யா. ம.ரெ.

பங்கேற்பாளர் பெயர் :

தேதி :

வயது/பால் :

- ஆய்வாளர் மேற்கொள்ளும் ஆராய்ச்சியில் எனது குழந்தை பங்கேற்க யாருடைய கட்டாயமுமின்றி முழுமனதுடனும் சுயநினைவுடனும் சம்மதிக்கிறேன்.
- ஆய்வாளர் மேற்கொள்ளபோகும் பரிசோதனைகளை மிக தெளிவாக விளக்கிக்கூறினார்.
- எனக்கு விருப்பமில்லாத பட்சத்தில் ஆராய்ச்சியிலிருந்து எந்நேரமும் எனது குழந்தை விலகலாம் என்பதையும் ஆய்வாளர் மூலம் அறிந்து கொண்டேன்.
- இந்த ஆராய்ச்சி ஒப்புதல் கடிதத்தில் உள்ள விவரங்களை நன்கு புரிந்து கொண்டேன். எனது உரிமைகள் மற்றும் கடமைகள் ஆராய்ச்சியாளர் மூலம் விளக்கப்பட்டது.
- நான் ஆராய்ச்சியாளருடன் ஒத்துழைக்க சம்மதிக்கிறேன். எனது குழந்தைக்கு ஏதேனும் உடல்நலகுறைவு ஏற்பட்டால் ஆராய்ச்சியாளரிடம் தெரிவிப்பேன்.
- எனது குழந்தை வேறு எந்த ஆராய்ச்சியிலும் தற்சமயம் இடம்பெறவில்லை என்பதை தெரிவித்துக்கொள்கிறேன்.
- இந்த ஆராய்ச்சியின் தகவல்களை வெளியிட சம்மதிக்கிறேன். அப்படி வெளியிடும்போது எனது குழந்தையின் அடையாளம் வெளிவராது என்பதை அறிவேன்.
- எனக்கு இந்த ஒப்புதல் கடிதத்தின் நகல் கொடுக்கப்பட்டது.

ஆய்வாளர் கையொப்பம்
பெற்றோரின்

தேதி:

பங்கேற்கும் குழந்தையின்

கையொப்பம்

தேதி:

CONTROL GROUP OF MALNOURISHED PRE SCHOOL CHILDREN

Samples	Age	Sex	Religion	Family	birth order	immuni	total child	food type
1	b	b	a	a	b	d	b	c
2	b	a	a	a	b	d	b	c
3	a	a	b	a	b	d	b	c
4	a	a	a	b	a	d	b	a
5	b	b	c	a	b	d	b	c
6	a	a	a	a	a	d	b	c
7	b	a	a	b	b	c	b	c
8	b	b	c	b	c	c	c	c
9	a	b	a	b	a	d	b	c
10	b	b	a	b	a	c	b	c
11	b	a	c	b	a	d	a	c
12	a	a	a	b	b	c	c	c
13	b	a	a	a	b	d	b	c
14	a	b	a	a	b	c	b	c
15	a	b	b	a	a	c	b	a
16	b	a	b	c	b	d	b	c
17	b	a	a	a	b	b	b	c
18	b	b	a	a	a	d	a	c
19	b	b	c	a	b	c	b	c
20	b	b	c	b	a	d	b	c
21	a	a	b	a	b	c	b	c
22	b	b	b	a	a	d	b	c
23	b	a	a	a	b	c	b	c
24	b	b	a	b	a	d	b	c
25	b	a	b	b	c	c	c	c
26	b	a	a	a	b	d	b	c
27	b	a	c	a	b	d	c	c
28	b	a	b	a	a	d	b	c
29	b	a	a	a	a	d	b	c
30	b	a	c	b	b	d	b	c

Control group

Sample no	edn mother	edn father	occ mother	occ father	month income	living area	weight	height	HC	CC	MAC	GRADE
1	b	d	g	e	c	b	a	b	d	a	c	a
2	c	b	g	e	d	a	a	c	d	a	a	c
3	d	e	g	d	c	b	a	b	d	c	b	c
4	c	d	g	c	b	b	a	b	d	a	a	c
5	d	d	g	d	b	b	a	c	d	a	c	c
6	d	g	g	f	d	b	a	b	d	a	b	c
7	e	e	g	e	b	a	a	b	c	a	c	c
8	g	g	e	e	b	a	a	b	c	a	a	c
9	d	c	g	d	c	b	a	b	d	a	c	b
10	d	d	g	d	d	b	b	b	d	a	c	a
11	b	b	g	b	d	b	a	b	d	a	c	a
12	d	e	g	e	b	a	a	b	d	b	c	b
13	e	e	g	e	c	b	a	a	d	b	c	a
14	e	e	g	d	d	b	a	b	d	a	b	c
15	c	c	d	f	b	b	a	b	d	b	c	c
16	e	e	e	f	c	b	a	c	d	a	c	c
17	d	d	e	d	c	b	a	c	c	c	c	c
18	d	c	g	d	c	b	a	c	d	b	c	c
19	e	c	g	d	c	a	a	b	c	c	b	c
20	e	e	g	d	b	b	a	b	d	a	b	b
21	b	b	g	b	c	b	a	a	d	a	c	c
22	e	e	g	d	b	a	b	c	d	a	b	c
23	e	d	g	e	c	b	a	b	d	a	c	b
24	d	c	g	f	d	b	b	b	d	d	c	a
25	c	c	g	d	b	a	b	c	c	d	c	b
26	b	b	g	b	d	b	a	b	c	c	b	a
27	d	d	g	e	c	b	a	b	c	d	b	c
28	e	d	g	d	d	b	a	b	d	a	a	c
29	d	c	g	c	b	b	a	b	d	a	b	a
30	d	b	g	e	b	b	a	b	d	a	c	a

Control group

Sam	exclusive	bf 2	difficulty	eat	nausea	help	skip	constip	diarr	food	fall	seek	fatigue/we	regular	nutri	introduce	childs
ple	breast	years	eating	less	/vom	feedg	meal	ation	hoea	allergy	sick	medical	aknness	checkups	diet	compli	wishes
no	feeding											care				Food	
1	A	b	a	a	a	a	a	b	b	b	a	a	a	a	a	a	a
2	B	a	a	a	b	a	a	b	b	b	b	a	b	a	a	b	b
3	A	b	a	a	b	a	b	a	b	b	a	a	a	a	a	b	b
4	A	b	a	a	a	a	a	a	b	b	a	a	b	a	a	b	b
5	A	a	a	a	a	b	a	b	b	b	a	a	b	a	a	a	a
6	A	b	b	a	b	b	a	b	b	b	a	a	b	a	a	a	a
7	A	b	a	a	a	a	a	b	b	b	a	a	a	a	a	a	a
8	A	a	a	a	a	a	a	b	b	b	a	b	a	b	a	b	b
9	A	b	b	a	b	a	b	b	b	b	b	a	b	b	b	b	a
10	A	b	a	a	a	a	a	a	b	b	b	a	b	a	a	b	b
11	A	b	a	a	b	a	a	a	b	b	b	a	b	a	a	b	b
12	A	b	b	b	b	b	b	b	b	b	b	a	b	a	a	a	a
13	B	b	a	b	b	b	a	a	b	b	a	a	a	a	a	b	b
14	A	a	a	a	a	a	a	b	b	b	a	a	b	a	a	a	a
15	B	b	a	a	a	a	a	a	b	b	a	a	a	a	a	b	b
16	B	a	a	a	b	a	a	b	b	b	b	a	b	a	a	b	b
17	A	b	b	b	b	a	a	b	b	b	a	a	b	b	b	a	b
18	B	b	a	a	a	a	a	b	b	b	b	a	b	a	a	b	a
19	B	b	a	a	a	a	a	a	b	b	a	a	a	b	b	b	b
20	A	a	a	a	a	a	a	b	b	b	a	a	b	a	a	a	b
21	A	a	a	a	a	a	a	b	b	b	a	a	a	a	a	a	b
22	B	b	b	a	b	a	b	b	b	b	a	a	b	a	a	b	b
23	B	b	a	a	b	b	a	a	b	b	b	a	b	a	b	b	b
24	A	a	b	b	b	b	a	b	b	b	a	a	b	a	a	b	a
25	A	a	a	a	b	a	b	b	b	b	a	b	a	a	a	b	b
26	B	b	b	a	b	a	a	a	b	b	a	a	a	a	a	b	b
27	A	b	a	a	a	a	a	b	b	b	a	a	a	a	a	a	b
28	A	b	a	a	a	a	a	b	b	b	a	a	b	a	a	a	a
29	A	b	b	b	b	b	a	a	b	b	a	a	a	a	a	a	a
30	B	b	b	a	a	a	a	a	b	b	a	a	b	a	a	b	b

EXPERIMENTAL GROUP OF PRESCHOOL MALNOURISHED CHILDREN

samples	age	sex	religion	family	birth order	immu	total child	food type
1	b	b	a	a	b	c	b	c
2	b	a	c	b	b	d	b	c
3	a	a	b	b	b	d	b	c
4	a	a	c	c	a	d	a	c
5	a	a	c	a	a	d	b	c
6	a	a	a	b	b	d	c	c
7	a	a	a	a	a	d	c	c
8	b	a	a	a	b	d	b	c
9	b	b	c	b	c	d	b	c
10	a	a	a	a	b	d	b	c
11	b	a	a	a	b	c	c	c
12	b	b	c	a	a	c	a	c
13	b	b	c	b	b	b	b	c
14	a	a	c	a	b	d	b	c
15	b	b	a	a	b	d	b	c
16	b	a	a	a	b	d	c	c
17	a	a	b	c	b	d	b	c
18	a	a	b	b	b	d	b	c
19	b	b	a	a	b	c	b	c
20	a	a	c	b	b	d	b	c
21	a	a	a	b	c	d	c	c
22	a	b	a	a	b	b	b	c
23	b	b	b	b	a	d	b	c
24	a	a	a	a	a	d	b	c
25	b	b	a	a	a	c	c	c
26	b	b	b	a	a	c	c	c
27	a	b	a	a	b	c	b	c
28	a	b	b	a	a	b	b	c
29	a	b	b	a	b	d	b	c
30	b	b	a	a	a	d	b	c

Experimental group

Sample	edn mother	edn father	occ mother	occ father	month income	living area	weight	height	HC	CC	M AC	GR ADE
1	f	d	g	d	b	a	b	c	c	b	c	b
2	b	b	g	c	e	a	a	c	d	b	c	c
3	b	d	g	e	c	b	a	b	d	a	c	c
4	c	b	e	d	b	b	a	b	d	a	b	c
5	d	e	g	e	c	b	a	a	d	a	a	c
6	c	d	g	b	b	b	a	b	c	a	c	c
7	d	d	g	b	c	b	a	b	d	a	c	c
8	e	g	g	e	c	a	b	c	c	d	c	a
9	d	c	g	f	b	b	a	c	c	b	c	c
10	d	d	g	b	d	b	a	b	c	c	c	a
11	e	b	g	d	e	a	c	c	d	c	c	a
12	b	e	e	e	b	b	b	d	d	a	c	c
13	c	e	e	e	b	b	b	d	d	a	b	c
14	b	e	e	e	b	a	a	b	d	a	c	c
15	d	c	g	f	b	b	a	d	c	a	b	c
16	e	e	g	d	c	a	a	b	d	c	c	a
17	d	e	g	e	e	a	a	b	d	c	c	a
18	d	b	g	d	b	a	a	b	d	a	c	c
19	e	e	g	d	b	b	a	c	c	a	c	b
20	c	d	g	e	d	b	a	b	d	a	c	c
21	e	c	g	b	c	b	a	b	d	d	c	c
22	e	c	g	f	c	b	a	b	c	a	b	c
23	d	d	g	d	d	b	a	c	d	a	a	c
24	b	c	g	f	c	b	a	b	d	d	c	c
25	g	b	g	d	d	b	a	c	d	a	b	b
26	e	c	g	d	d	b	a	b	d	a	c	a
27	d	c	g	d	c	b	a	b	d	c	a	b
28	d	d	g	e	c	b	a	b	d	a	a	b
29	c	e	g	e	b	b	a	b	d	a	a	b
30	d	b	g	d	c	b	a	b	d	a	b	a

Samples	Experimental group																	
	exclusive breast feeding	18-24 months	difficulty eating	eat less	nausea/vom	help feedg	skip meal	constipation	diarrhoea	food allergy	fall sick	seek medical care	fatigue/weakness	regular checkups	nutri diet	introduce food	compliance	children's wishes
1	B	a	a	a	b	b	b	b	b	b	a	a	b	a	a	b		b
2	A	a	a	b	a	a	a	b	b	b	a	a	b	a	a	a		a
3	A	b	a	a	a	b	b	b	b	b	a	a	a	a	a	a		b
4	A	a	a	a	a	a	b	b	b	b	a	a	b	a	a	a		a
5	A	a	b	a	a	b	a	b	b	b	a	a	a	a	b	a		b
6	B	b	a	b	b	a	a	b	b	b	a	a	b	a	a	b		a
7	B	a	b	a	b	a	b	b	b	b	a	a	a	b	b	b		b
8	A	b	a	a	a	a	b	b	b	b	a	a	a	a	a	b		b
9	B	b	b	a	b	a	b	a	b	b	b	b	a	a	a	b		a
10	A	b	a	b	b	a	b	b	b	b	a	a	b	a	a	b		a
11	A	b	a	a	b	a	a	b	b	b	b	a	b	b	b	b		a
12	A	b	a	b	b	a	b	b	b	b	b	a	b	a	b	b		b
13	A	b	a	a	a	a	b	b	b	b	a	a	a	a	b	b		b
14	A	a	b	a	a	a	a	b	b	b	a	a	a	a	a	a		b
15	A	a	a	a	b	a	a	b	b	b	a	b	b	a	b	a		b
16	A	b	a	a	a	b	b	b	b	b	a	a	b	a	b	b		b
17	A	b	a	a	b	a	b	b	b	b	a	a	b	a	a	b		b
18	A	b	b	b	b	a	b	b	b	b	a	a	a	a	b	b		b
19	A	b	a	a	a	a	a	b	b	b	a	a	a	a	b	b		a
20	B	a	a	a	a	a	a	b	b	b	a	a	a	a	b	b		a
21	A	b	a	b	b	a	b	b	b	b	a	a	a	a	a	a		a
22	A	b	b	a	a	a	a	b	b	b	a	a	b	a	b	b		b
23	A	b	a	a	a	a	b	b	b	b	a	a	b	a	a	a		b
24	B	b	b	a	b	a	b	a	b	b	a	b	b	a	b	b		a
25	B	b	a	a	b	a	a	b	b	b	a	a	b	a	b	b		a
26	A	a	a	a	b	a	b	b	b	b	a	a	b	a	a	b		a
27	B	b	a	a	b	a	b	b	b	b	b	a	b	b	b	b		b
28	A	b	b	a	b	a	b	b	b	b	a	b	b	a	a	b		a
29	B	b	b	a	b	a	b	b	b	b	b	a	b	a	b	b		b
30	B	b	a	a	a	a	b	b	b	b	a	a	b	a	a	b		a

Ragi Wt Gain

1 100 gms
2 90 gms
3 80gms
4 110 gms
5 100gms
6 130gms
7 110gms
8 100gms
9 90gms
10 100gms
11 110gms
12 140gms
13 130gms
14 110gms
15 100gms
16 90gms
17 80gms
18 100gms
19 110gms
20 100gms
21 100gms
22 130gms
23 10gms
24 100gms
25 130gms
26 120gms
27 110gms
28 110gms
29 100gms
30 110gms

Soya Wt Gain

1 210gms
2 200gms
3 210gms
4 190gms
5 180gms
6 170gms
7 200gms
8 210gms
9 220gms
10 190gms
11 210gms
12 220gms
13 210gms
14 190gms
15 180gms
16 170gms
17 170gms
18 160gms
19 200gms
20 150gms
21 170gms
22 180gms
23 180gms
24 150gms
25 200gms
26 190gms
27 180gms
28 190gms
29 180gms
30 180gms

CERTIFICATE OF ENGLISH EDITING
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This is to certify that the dissertation work "A Study To Assess The Effectiveness of Ragi Kanjii Versus Soyamilk in Improving The Nutritional Status of Malnourished Pre-School Children At Institute Of Child Health And Hospital for Children, Egmore" done by Mrs.M.R.Remya , II year MSc (N) student of College Of Nursing , Madras Medical College , Chennai -03 is edited for English language appropriateness by Mrs. POORNIMA, M.A., B.Ed., M.Phil.

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