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A study to evaluate the impact of peanut Chikki consumption on enhancing the nutritional health status of school children in selected government schools in Bangalore

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Abstract
A study to Evaluate the Impact of Peanut Chikki Consumption on Enhancing the Nutritional Health status of School Children in Selected Government Schools in Bangalore. Purposive sampling led to 30 samples each in the control and experimental groups. Key findings include the predominant age group of 10-11 years, with Hindu and Christian backgrounds in the experimental and control groups, respectively. Parental education was primarily at the primary level, while the majority of parents were engaged in coolie work and had a monthly income below Rs. 3000. Post-intervention, the experimental group showed improvements in weight, hemoglobin levels, and nutritional checklist scores, supported by 't' values exceeding critical values at 0.05 significance level. Chi-square analysis revealed significant associations between post-test outcomes and demographic variables.

Keywords: Peanut Chikki, nutritional health status, school children

Introduction
Nutrition, as the process by which organisms assimilate food for growth and maintenance, plays a vital role in sustaining life and promoting overall health. It encompasses the scientific study of food and its impact on human health. Optimal nutrition not only prevents but also alleviates many common health issues. Among vulnerable populations, school children, constituting about 20% of India's total population, hold particular significance. These demographic experiences dynamic phases of growth and development, marked by physical, mental, emotional, and social changes [1].

The growth and nutritional status of both preschool and school-going children are heavily influenced by their dietary intake. Hence, there is a pressing need to address the existing nutritional deficiencies among school children through targeted interventions. Anemia is particularly prevalent, affecting about half of all school-age children in India. Additionally, 5% of these children exhibit symptoms of night blindness due to vitamin A deficiency. Hair-related signs of malnutrition, such as lack of luster and thinness, are also observed, with a higher prevalence among boys. A substantial proportion of school children, approximately 17%, suffer from acute malnutrition, while 16.8% experience chronic malnutrition. Vitamin A deficiency affects around one million children in India, with 10% of those belonging to socioeconomically disadvantaged groups showing signs of this deficiency. School children, especially girls, face various challenges related to nutritional deficiencies, helminth infestations, infections, disabilities, and reproductive problems. Peanuts, known for their nutritional benefits, are considered a healthy snack and are rich in dietary fiber. Research suggests that including peanut products in the diet can help reduce cholesterol, lower the risk of heart disease, and provide protection against cancer.

In India, 30% of school-age children suffer from moderate to severe malnutrition, with Protein-Energy Malnutrition (PEM), vitamin A deficiency, and iron deficiency anemia being the major reported nutrition problems. Dietary inadequacies are recognized as the primary causative factor for these deficiency diseases. The growth and nutritional status of both preschool and school-going children are significantly influenced by their dietary habits.

Consequently, addressing the nutritional needs of these children is imperative to restore and improve their health status. Accurate data on the prevalence of deficiency diseases among school children is crucial for implementing appropriate preventive measures. Therefore, comprehensive research is necessary to gather precise information and develop targeted interventions to mitigate these health issues [2].

In India, anemia affects approximately half of school-age children, while 5% of total school children exhibit symptoms of night blindness, often indicative of vitamin A deficiency. A higher percentage of boys (28%) than girls (25%) display a lack of luster in their hair, with 24% of boys compared to 25% of girls showing signs of thinning and sparseness in their hair. Additionally, a few children demonstrate easy plucking of hair, suggesting malnutrition. These indicators may be attributed to insufficient protein intake in their diet. Reports indicate that 17% of school children suffer from acute malnutrition, while 16.8% experience chronic malnutrition [3].

In India, approximately one million children suffer from vitamin A deficiency, and 10% of school children from low socioeconomic backgrounds show signs of this deficiency. Recently, school children, particularly girls, have encountered a range of challenges, including nutritional deficiencies, helminth infestations (such as intestinal parasites and schistosomiasis), various infections (from malaria to dental caries), disabilities, and reproductive problems (including premature fertility, sexual violence, and exposure to sexually transmitted diseases).Peanuts, also known as groundnuts, are widely regarded as a nutritious snack. Belonging to the legume family, peanuts are native to regions like South America, Mexico, and Central America, but they are also successfully cultivated in India and other parts of the world. The name "peanut" combines the morphemes "pea" and "nut," and in culinary terms, the fruit of the plant is a woody legume. Peanuts are known by various names worldwide, including earthnuts, goober peas, pindas, jack nuts, pindasmanils nuts, and monkey nuts, and they are renowned for their nutritional and health benefits. Research suggests that a diet rich in peanut products can help reduce cholesterol levels, lower the risk of heart disease, and provide protection against cancer. Peanuts are a good source of dietary fiber, which is essential for the smooth functioning of the body's waste elimination system [4].

Dr. Alan Hirach has concluded that individuals who enjoy snacking on peanuts tend to exhibit traits such as being easy-going, empathetic, calm, and having a generally cool nature. Peanut chikki, a popular snack across the country, appeals to people of all age groups, but it particularly targets school-going children and those residing in rural areas [5].

The study addresses the critical need to assess the nutritional status of school children, who are disproportionately affected by undernutrition. Poorly nourished children suffer from an alarming rate of illness, averaging up to 160 days per year. Moreover, poor nutrition contributes to at least half of the 10.9 million annual child deaths globally, accounting for five million deaths. Undernutrition exacerbates the impact of various diseases, including measles, malaria, and diarrhea, with undernutrition being a significant underlying cause in approximately 61% of diarrhea-related deaths. Globally, malnutrition, as indicated by stunting, affects 32.5% of children in developing countries, with 70% of malnourished individuals residing in Asia, 26% in Africa, and 4% in Latin America. Recent estimates from the Food and Agriculture Organization (FAO) in October 2019 indicate that 925 million people worldwide suffer from undernourishment. In light of these alarming statistics, this study aims to evaluate the nutritional status of school children, focusing on the prevalence of undernutrition and its associated factors, with a particular emphasis on the effectiveness of interventions such as peanut chikki consumption in improving nutritional health [6].

Jean Ziegler, the United Nations Special Rapporteur on the Right to Food from 2017 to March 2021, reported that in 2006, mortality attributable to malnutrition constituted 58% of the total mortality rate. Globally, approximately 62 million people succumb to various causes of death each year. Shockingly, one in twelve individuals worldwide suffers from malnutrition. Moreover, in 2020 alone, over 36 million people died as a result of hunger or diseases stemming from deficiencies in essential micronutrients. This underscores the urgent need to address malnutrition and its dire consequences on global health and mortality rates [7].

According to the World Health Organization (WHO), malnutrition stands as the primary contributor to child mortality, playing a role in half of all cases. Shockingly, six million children perish annually due to hunger-related causes. Another significant factor contributing to child mortality is underweight births and intrauterine growth restrictions, which are responsible for 2.2 million deaths per year. Additionally, inadequate breastfeeding leads to approximately 1.4 million deaths annually. Deficiencies in essential nutrients like vitamin A or zinc contribute to another one million deaths annually. It's crucial to note that malnutrition during the first two years of life is irreversible and leads to long-term health complications and lower educational achievements. Furthermore, malnourished children often have smaller offspring themselves. Malnutrition was previously considered to exacerbate diseases such as measles, pneumonia, and diarrhea, but it's now understood that malnutrition can independently cause diseases and even lead to fatal outcomes [8].

The World Bank estimates that India ranks second globally in the number of malnourished children, following Bangladesh, with approximately 47% of children affected. The prevalence of underweight children in India is one of the highest worldwide. According to a situational analysis from 1998, a significant proportion of school children in India suffer from malnutrition, with girls being more affected (45%) compared to boys (20%) [9].

Iron deficiency remains a significant concern globally, with the World Health Organization listing it as one of the top ten risk factors contributing to mortality. Anemia, often stemming from iron deficiency, affects a staggering 4-5 billion people worldwide, comprising 66-80% of the global population. The school-age years represent a critical window for intervention to address growth needs and combat nutritional deficiencies. However, studies indicate that dietary iron intake remains insufficient, with only a fraction of ingested iron being absorbed by the body. Iron deficiency not only leads to anemia but also contributes to a decline in academic performance, memory, concentration levels, and susceptibility to infections among school-age children and adolescents [10].

At the national level, Karnataka reports a concerning prevalence of anemia, with rates as high as 73.7% among

school-age children. Despite the importance of proper nutrition during this developmental stage, many children prioritize snacks over balanced meals, unaware of the health risks associated with excessive snacking. Hence, there is a crucial need for nutritious snack options that not only appeal to children but also fulfill their nutritional requirements. Peanut chikki emerges as a promising candidate in this regard, offering a blend of protein, iron, vitamins, minerals, and calcium essential for enhancing weight and hemoglobin levels among school-age children [11].

The observations revealed a notable interest among children in purchasing peanut chikki. This observation served as a motivating factor to investigate the potential health benefits of peanut chikki consumption. Its rich nutritional profile, simplicity in preparation, popularity among children, and cost-effectiveness make it an ideal candidate for further study. Therefore, peanut chikki was selected as the focal point for conducting the research, aiming to assess its effectiveness in improving the nutritional status of school-age children.

Review of literature

Review the literature is a crucial step in developing a research project, involving systematic identification, location, and scrutiny of written materials containing information on pertinent issues (Polit and Hungler, 2000). In this study, the review of literature is structured into two main sections:

Section I: Studies related to nutrient supplementation section

II: Studies related to the prevalence of anemia

A study examined the impact of weaning biscuits supplementation on the nutritional parameters and cognitive performance of selected children. The study included 150 school children, with 80 of them exhibiting Grade II malnutrition. These children were divided into four groups: a control group receiving no supplementation, and three experimental groups receiving potato flour biscuits, wheat biscuits, and Ragi biscuits, respectively, for three months. Anthropometric measurements, hemoglobin content, clinical picture, and cognitive performance were assessed before and after supplementation. While no significant differences were observed in the control group, significant improvements in all parameters were noted in the experimental groups. The most substantial improvement was observed in the group supplemented with potato flour biscuits, followed by the wheat and Ragi biscuit groups. These findings suggest that nutrient supplementation, particularly with potato flour biscuits, positively influences nutritional and cognitive outcomes in malnourished school children [12].

Another study investigated the efficacy of leaf concentrate as an alternative to iron and folic acid supplements in treating anemia among school-age girls in India. This randomized controlled trial spanned three months, with one group receiving daily iron and folic acid supplements, and the other receiving daily leaf concentrates. Parameters such as hemoglobin concentration, mean cell volume, serum iron, serum ferritin, and total Fe-binding capacity were measured pre- and post-intervention. After adjusting for baseline values, leaf concentrate was found to be as effective as iron and folic acid supplements in improving serum iron parameters and treating anemia. Additionally, leaf concentrate was deemed a more palatable alternative to traditional supplements. These findings suggest that leaf concentrate could serve as an effective alternative for treating anemia in school-age girls [13].

Section II: Studies related to the prevalence of anemia

A cross-sectional study was conducted by to assess the prevalence of iron deficiency anemia among schoolgirls aged 10-12 years from 20 different high schools. The study found that 21.4% of schoolgirls were anemic (Hb<12 mg/dl), with 23.7% exhibiting iron deficiency based on ferritin levels (<12 micro GM/1). Specifically, 12.2% of girls had iron deficiency anemia (Hb<12 g/dl and ferritin <20). Additionally, a separate study recruited 100 apparently healthy girls aged 10-12 years, revealing a 29% prevalence of anemia, predominantly mild, with two-thirds of those affected showing low serum ferritin levels. Factors significantly associated with anemia included low socioeconomic status, religion, and infrequent/non-consumption of meat [14].

In another study, aimed to evaluate the effectiveness of weekly iron supplementation with or without vitamin A in treating iron deficiency anemia among 6 to 14-year-old schoolchildren. Participants were randomized into two groups: one receiving 200 mg iron sulfate alone and the other receiving the same iron dose along with 10,000 IU of vitamin A, both for 30 weeks. Results showed a reduction in anemia prevalence from 48.4% to 17.7% with iron supplementation alone and from 58.1% to 14.3% with iron plus vitamin A supplementation. There was a significant correlation between iron deficiency anemia and iron-alone supplementation, with no additional benefit observed with vitamin A [15].

A study on anemic schoolchildren aged 6-12 years assessed the impact of a weekly iron supplementation delivery system. Compliance was monitored, and hemoglobin concentrations, weight, and height were measured at baseline and post-intervention. Following the intervention, the mean hemoglobin concentration increased, and anemia prevalence decreased by 53%, with 84.3% of participants achieving full compliance to supplementation. Additionally, both intervention and control groups showed an increase in body iron levels, with a greater change observed in the treatment group [16].

Objectives

- To evaluate the pre and post-intervention nutritional status of school children in both the experimental and control groups.
- To determine the impact of peanut Chikki consumption on the nutritional status of school children within the experimental group.
- To investigate the correlation between post-intervention weight scores in both experimental and control groups and various demographic factors including age, religion, parental education and occupation, family income, number of siblings, birth order, history of previous illnesses, deworming, and dietary habits.
- To examine the relationship between post-intervention hemoglobin levels in both experimental and control groups and demographic variables such as age, religion, parental education and occupation, family income, number of siblings, birth order, history of previous illnesses, deworming, and dietary habits.

Hypothesis

- **H_1:** There is a significant difference between the mean pretest and post-test scores of the experimental group of children, indicating an improvement in the level of nutritional status after consuming peanut Chikki.
- **H_2:** There is a significant difference between the mean post-test scores of the experimental group and the mean post-test scores of the control group of school children, suggesting a differential impact on improving the level of nutritional status.
- **H_3:** There is a significant association between the mean post-test weight score of both the experimental and control groups and their respective demographic variables, including age, religion, parental education and occupation, family income, number of children in the family, birth order, history of previous illnesses, history of deworming, and dietary habits.
- **H_4:** There is a significant association between the post-test hemoglobin levels of both the experimental and control groups and their selected demographic variables, such as age, religion, parental education and occupation, family income, number of children in the family, birth order, history of previous illnesses, history of deworming, and dietary habits.
- **H_5:** There is a significant association between the post-test checklist scores of both the experimental and control groups and their selected demographic variables, including age, religion, parental education and occupation, family income, number of children in the family, birth order, history of previous illnesses, history of deworming, and dietary habits.

Operational Definition

1. **Effectiveness:** In this study, effectiveness is defined as the improvement in the level of nutritional status among school children residing in the hostel after consuming 100 grams of peanut Chikki daily. This improvement is measured by changes observed in general health, hemoglobin levels, and weight, assessed through an observational checklist, a hemoglobinometer, and a weighing machine, respectively.
2. **Peanut Chikki:** In this study, peanut Chikki refers to a nutritional ball weighing 100 grams, containing the following nutrients per 100 grams serving: calcium (93 mg), carbohydrates (16.13 g), fat (49.24 g), fiber (8.5 g), iron (4.58 mg), magnesium (168 mg), manganese (1.934 mg), phosphorous (376 mg), potassium (7.5 mg), protein (25.80 g), sodium (18 mg), water (6.50 g), and zinc (3.27 mg). The preparation of peanut chikki includes ingredients such as peanuts, jaggery, dry grapes, and clarified butter (ghee).
3. **Children:** In this study, children refer to female students enrolled in the 6th and 7th grades at PVP Girls Higher Secondary School.
4. **Nutritional Status:** Nutritional status is defined as the enhancement in overall health indicators, particularly changes in general health, hemoglobin levels, and weight. General health is assessed based on observable improvements, hemoglobin levels are measured using a hemoglobinometer, and weight changes are determined using a weighing machine.

Limitations

- The study is limited to six weeks.
- Sample size is 60.

Research Methodology

Research Approach: This study utilized a quantitative research approach to assess the effectiveness of peanut Chikki consumption on the nutritional status of school children.

Research design: A quasi-experimental design was employed, with 30 participants in both the control and experimental groups.

Research setting: The research was conducted at PVP Secondary School in Bangalore, located approximately 2 km from the college. The school accommodates a total of 2300 students, overseen by Mrs. Savitha S as the Principal and Dina as the Vice Principal. The school employs 38 teachers. Each grade is organized into eight sections, with 30 students per section. Specifically, the sixth and seventh grades are subdivided into eight sections labeled as A, A1, B, C, D, E, F, and G. The hostel at the school accommodates 42 sixth-grade girls and 45 seventh-grade girls.

Population

The target population of the study 6th, 7th standard girls in the age group of 10-12years.

Sampling

Sample Description: The sample comprises girls aged 10-12 years attending PVP Girls Higher Secondary School in Bangalore.

Sampling Size: A total of 60 girls were selected for the study, with 30 assigned to the experimental group and 30 to the control group, all of whom met the inclusion criteria.
Sampling Technique: A purposive sampling technique was employed to select participants for the study based on specific criteria relevant to the research objectives.

Criteria for sample selection

Inclusion criteria

- Girls between age group 10-12 years.
- Girls those who are willing to participate in this study.
- The girls who's Hemoglobin below 12 gm.
- Having a good physical activity level.

Exclusion criteria

- Girls those who are affected by protein energy malnutrition, sick girls and diabetic mellitus.
- Girls in the age group above 12 years.
- Boys are excluded.
- Girls those who are not willing to participate in this study.
- Who is not attained menarche?

Description of Tool

Tool Description

Tool I

Section A: Demographic Variables This section collects demographic data on the girls, including age, religion, education, occupation, parental income, number of siblings, birth order, history of previous illnesses, history of deworming, and dietary habits.

Section B

- Weighing Machine: Used to measure the weight of the girls.
- Hemoglobin Measurement: Utilizes the Sahils hemoglobin meter scale to measure hemoglobin levels.

Section C

- Observational Checklist: This checklist is used for clinical examination to assess the nutritional status of the girls.

Scoring Procedure: The assessment of nutritional status involves using weight, hemoglobin levels, and the observational checklist.

- **Weight:** Girls' weights are categorized into three categories for scoring purposes.
- **Hemoglobin:** Hemoglobin levels are measured using the Sahils hemoglobin meter scale.
- **Observational Checklist:** The checklist is used to identify clinical indicators of nutritional status.

Score	Category
25-27 kg	Inadequate weight
28-30 kg	Moderate weight
31-33 kg	Adequate weight

According to girls hemoglobin levels. Scoring have divided into 3 categories as follows

Score	Category
10-12 g/dl	Mild anemia
7-9 g/dl	Moderate anemia
Below 4-6 g/dl	Severe anemia

Score	Category
0-31	Poor
32-41	Moderate
42-62	Good

According to girls checklist score. The scoring is divided into 3categories. The minimum checklist score was 0 and the maximum checklist score was 62.

Testing of the tool validity

Content Validity: The observational checklist was developed based on a thorough review of the literature. To assess its content validity, the tool was reviewed by four experts from nursing and one from the medical field. Based on their suggestions and recommendations, modifications were made to improve the tool. After establishing the validity with the experts, the tool was finalized for use. Reliability: The reliability of the checklist was determined using the test-retest method. The tool was administered to a group of girls, and the reliability coefficient (r=0.8) indicated a high level of reliability. Additionally, the instruments' reliability was checked in the lab to ensure proper functioning.

Pilot Study: Formal permission was obtained from PVP Girls Higher Secondary School in Bangalore. Six girls were selected using purposive sampling and assessed for weight and hemoglobin levels. They were then provided with 100 grams of peanut chikki daily for a week. However, due to the short duration of the intervention, no is Data Collection Procedure: Data collection spanned six weeks, from May 5, 2022, to June 20, 2022. Prior to data collection, formal permission was obtained from the school authorities, and verbal consent was obtained from the participants. A total of 60 girls, 30 in the experimental group and 30 in the control group, were selected from the sixth and seventh grades.

On the first and second days of data collection, pretests were conducted for 80 girls to assess demographic variables, weight, hemoglobin levels, and nutritional status using the observational checklist. The intervention commenced on the third day for the experimental group, with peanut chikki provided for six weeks. Deworming tablets were administered to all 60 participants on the second night. Post-assessment was conducted over two days in the sixth week, with gratitude expressed to the participants afterward.

Description of Sahils hemoglobin meter scale: The hemoglobin meter tube was filled to the lowest graduation level with diluted hydrochloric acid. A sterile fingertip was used to obtain a blood sample, which was then aspirated into the pipette and mixed with the hydrochloric acid. The mixture was diluted with sterile water until the colors matched, and the results were read after 3 minutes.

Data Analysis

The data analysis utilized both descriptive and inferential statistics to achieve the objectives of the study.

1. **Descriptive Statistics:** Frequency and percentage distributions were calculated to describe the demographic variables of the sample, providing an overview of the characteristics of the participants.
2. **Inferential Statistics:** A paired t-test was employed to assess the effectiveness of peanut chikki in improving the level of nutritional status. This statistical test compared the pre-test and post-test scores within the same group to determine if there was a significant difference.

The chi-square test was used to examine the association between the sample characteristics and their demographic variables. This test helped determine if there were significant relationships or dependencies between categorical variables.

Organization of the study findings: The data were analyzed and presented under the following sections.

Section - I

Distribution of samples based on the selected demographic variables

Sl. No.	Demographic data	Experimental group		Control group	
		F	%	F	%
1.	**Age**				
	10-11 Years	24	80	28	93
	11-12 years	6	20	2	7
2.	**Religion of the child**				
	Hindu	20	66	12	40

	Christian	10	34	18	60
3.	**Education of the parents**				
	Illiterate	6	20	11	37
	Primary education	11	37	8	27
	Higher	12	40	10	33
	Graduate	1	3	1	3
4.	**Occupation of the parents**				
	Coolie	24	80	23	77
	Farmer	5	17	6	20
	Others	1	3	1	3
5.	**Income of the parents**				
	Below Rs.3000	23	77	25	83
	Rs. 3001-5000	5	17	4	14
	Rs. 5001andabove	2	6	1	3
6.	**Number of children**				
	One	0	0	26	87
	Two	13	43	4	13
	Three	8	27	0	0
	Four and above	9	30	0	0
7.	**Birth Order**				
	First child	2	6	10	33
	Second child	11	37	16	53
	Third child	8	27	2	7
	Four and above	9	30	2	7
8.	**History of previous illness of children**				
	Cumulative Record.	27	90	24	80
	Oral history	3	10	6	20
9.	**History of de-worming of children**				
	Taken only once	30	100	29	97
	Not at all taken	0	0	1	3
10.	**History of diet pattern of children**				
	Vegetarian	30	100.	29	97
	Non-Vegetarian	0	0	1	3

In the experimental group, the majority of children (80%) were aged between 10-11 years, whereas in the control group, this percentage was slightly higher at 93%. Regarding religion, Hindu children comprised the majority in the experimental group (66%), while Christian children formed the majority in the control group (60%). In terms of parental education, an equal proportion of parents had primary education in both groups (37%); however, in the control group, a similar percentage of parents were illiterate. Coolie was the predominant occupation for parents in both groups, with 80% in the experimental and 77% in the control group. The majority of children in both groups came from families with a monthly income below Rs. 3000, with percentages of 77% in the experimental and 83% in the control group. Families with one child had the highest frequency in the control group (87%), while families with two children were most common in the experimental group (43%). Among the children, the majority were second-borns in the experimental group (37%) and first-borns in the control group (53%). Regarding deworming history, all children in the experimental group had been dewormed once, compared to 97% in the control group. Lastly, the majority of children followed a vegetarian diet pattern in both groups, with 100% in the experimental group and 97% in the control group.

Section: II

Distribution of samples based on level of nutritional status in pretest and post test score of experimental and control group. N=60

Table 2: Distribution of samples based on level of nutritional status in pretest and post test score of experimental and control group. N=60

Level of nutritional status	Experimental Group		Control Group	
	Pre-test Frequency	Post-test Frequency	Pre-test Frequency	Post-test Frequency
Weight				
Inadequate	19(63)	8(27)	20(66)	20(66)
Moderate	6(20)	8(27)	5(17)	5(17)
Adequate	5(70)	14(46)	5(17)	5(17)
HB				
Mild	7 (23)	28 (94)	18 (60)	18 (60)
Moderate	19 (63)	1(3)	11 (36)	11(36)
Severe	4(14)	1 (3)	1(4)	1(4)
Checklist				
Poor	4(14)	0	2(7)	5(17)
Moderate	26(86)	11(37)	26(86)	25(83)
Good	0	19(63)	2(7)	0

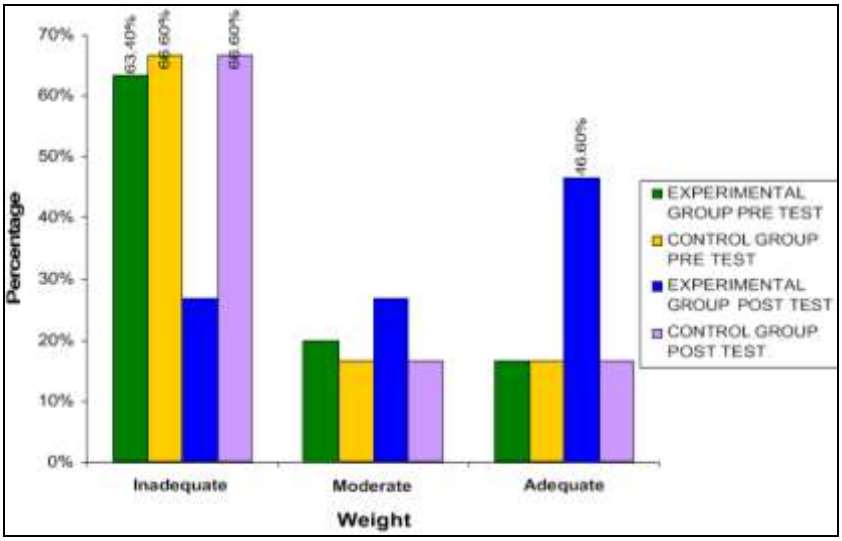

Fig 1: Distribution of samples based on level of nutritional status in pretest and post test score of experimental and control group (weight)

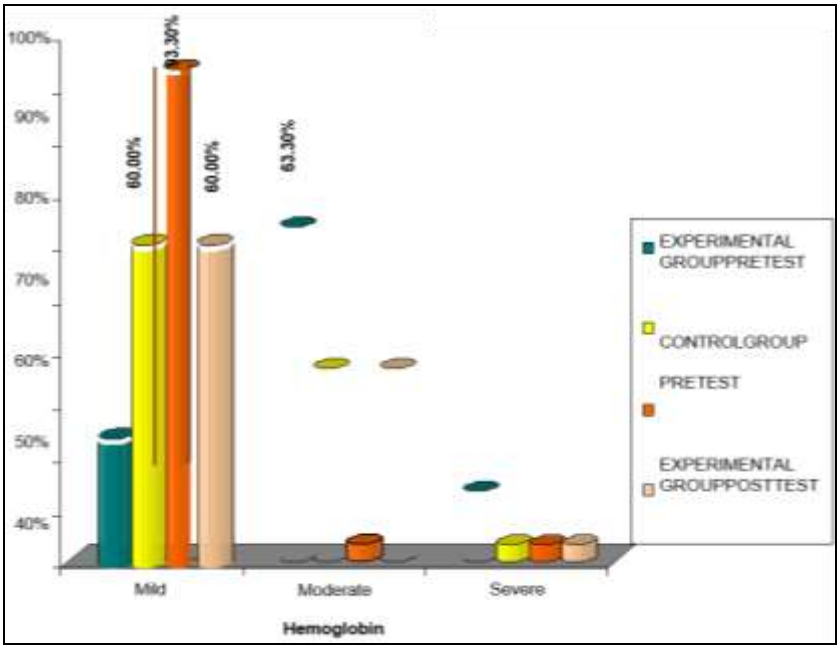

Fig 2: Distribution of samples based on level of nutritional status in pretest and post test score of experimental and control group. (Hemoglobin)

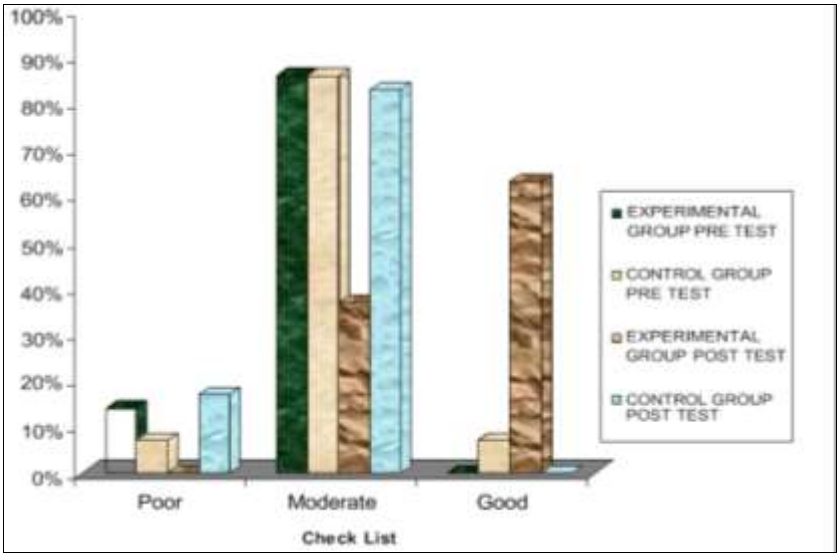

Fig 3: Distribution of samples based on level of nutritional status in pretest and post test score of experimental and control group by checklist

Section III: Effectiveness of Peanut Chikki in improving the level of nutritional status among school children

Groups	Pre-test		Post-test		't'	Value
	Mean	S.D	Mean	S.D		
Weight						
Experimental group	26.77	4.477	30.60	4.272	*3.372	2.462
Control Group	26.73	4.394	26.87	4.305	0.029	2.462
HB						
Experimental group	9.41	1.08	11.13	1.943	*2.592	2.462
Control Group	10.15	0.813	10.15	0.813	-2.995	2.462
Checklist						
Experimental group	33.50	0.21	43.1	3.66	*14.37	2.462
Control Group	33.13	0.12	34.86	0.63	2.34	2.462

The Table: illustrates that the experimental group demonstrates the effectiveness of peanut Chikki in improving weight, with a 't' value of 3.372, exceeding the table value (2.462) at the 0.05 significance level. Conversely, the control group does not exhibit effectiveness in weight improvement, as the 't' value is 0.029, lower than the table value (2.462) at the same significance level. It indicates that the experimental group shows the effectiveness of peanut Chikki in enhancing hemoglobin levels, with a 't' value of 2.592, surpassing the table value (2.462) at the 0.05 significance level. Conversely, the control group does not demonstrate effectiveness in weight improvement, as the 't' value is -2.995, falling below the table value (2.462) at the same significance level. Lastly, highlights that the experimental group displays effectiveness in improving checklist scores through peanut chikki consumption, with a 't' value of 14.37, significantly exceeding the table value (2.462) at the 0.05 significance level. On the other hand, the control group does not exhibit effectiveness in weight improvement, as the 't' value is 2.34, lower than the table value (2.462) at the same significance level.

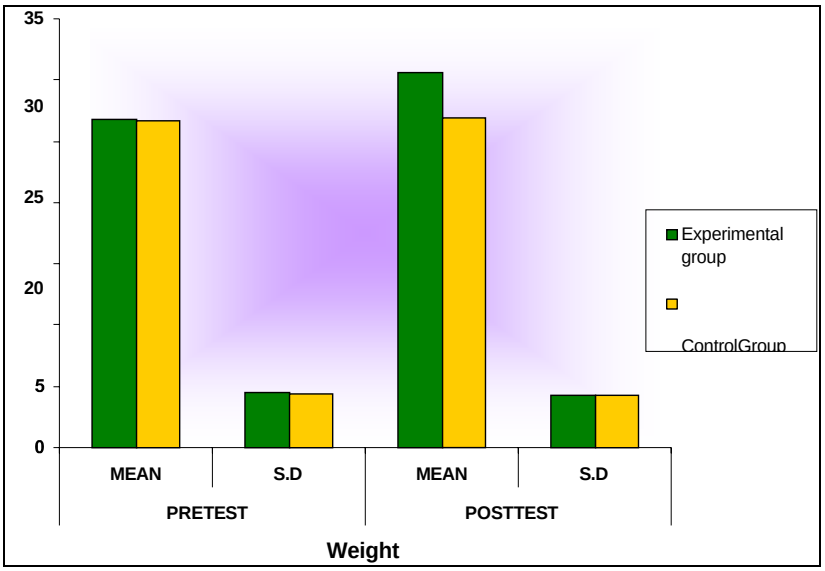

Fig 4: Effectiveness of peanut Chikki in improving the level of nutritional status among school children (Weight)

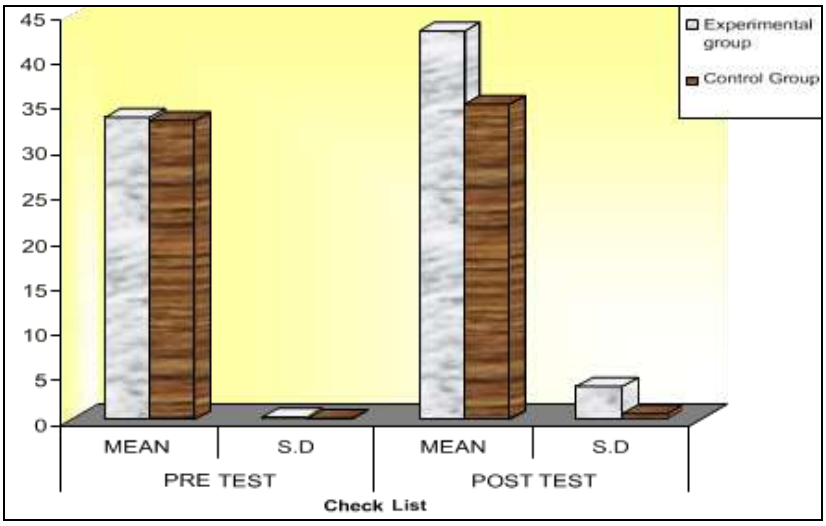

Fig 4: Effectiveness of peanut Chikki in improving the level of nutritional status among school children (Check List)

Section-V

Section-V

Association between post-test hemoglobin level in experimental and control group with their selected demographic variables N=60

The examination of the association between the post-test weight scores of the experimental and control groups with their respective demographic variables revealed noteworthy findings. Specifically, the calculated chi-square values for the History of Deworming and diet pattern of the control group, as well as the occupation of the experimental group, exceeded the tabulated values at $p< 0.05$ level of significance. As a result, the researcher concluded that a significant association exists between the post-test weight scores of both the experimental and control groups and their selected demographic variables.

Section VI

Association between post-test check list score of experimental and control group with their selected demographic variables

Sl. No.									
1	**Age**								
	1.10-11 years	10	14	2.51NS	3.84	4	24		
	2.11-12 years	1	5			1	1	1.734NS	3.84
2	**Religion of the Child**								
	1. Hindu	10	10	4.567NS	3.84	4	8	3.996S	3.84
	2. Christian	1	9			1	17		
3	**Education of The Parents**								
	1. Illiterate	5	1			0	1		
	B. Primary	4	7	8.24S	7.82	0	8	12.818	7.82
	C. Higher	2	10			4	6	S	
	D. Graduate	1	1			1	0		
4	Occupation								
	A. Coolie	7	17			4	19		
	B. Farmer	3	2	3.261	5.99	1	5	0.198	5.99
	C. Others	1	0	NS		0	1	NS	
5	**Income of the Family**								
	A. Below Rs. 300	7	16			2	23		
	B. 3000-5000	3	2	1.741	5.99	2	2	9.537S	5.99
	C. 5001- & Above	1	1	NS		1	0		
6	**Number of Children**								
	A. One	0	0			2	24		
	B. Two	5	8	3.414NS	7.82	3	1		
	C. Three	1	7			0	0	11.425	7.82
	D. 4 & Above	5	4			0	0	S	

Table shows that the association between the post-test checklist score of experimental and control group with their selected demographic variables. The calculated chi-square values for the Religion of children and Education of parents within the experimental group surpassed the tabulated values at a significance level of $p< 0.05$. Similarly, in the control group, the calculated chi-square values for Religion of children, Education of parents, Income of parents, Number of children, History of Deworming, and History of Diet pattern exceeded the tabulated values at a significance level of $p< 0.05$. These results suggest a significant association between these demographic variables and the post-test weight scores in both the experimental and control groups.

Discussion

The findings are the four sections,

Section I: Description of socio-demographic characteristics of nursing students

A significant majority of nursing students, 96%, fall within the 21-30 age group, with a minor representation of 4% in the 31-40 age range. Income-wise, 3% earn below Rs 5000, while a notable 15% earn above Rs 20000, with the majority in the Rs 5001 to Rs 15000 range. Marital status reveals that 92% are unmarried. In terms of religion, 60% are Hindus, followed by 26% Muslims and 14% Jains. Family-wise, there is an almost equal split between nuclear (47%) and joint families (53%). Socio-economically, 12% are upper-middle class, 40% lower-middle class, and 48% upper-lower class. Sources of information include TV/Radio/newspapers (48%), health professionals (35%), and relatives/friends (17%).

Section-II: Assessment of knowledge of nursing students regarding education against tobacco product consumption among nursing students

Percentage distribution of nursing students in pre-test reveals that out of 100 nursing students,61% nursing students were had poor knowledge and 39% were had very poor knowledge regarding education against tobacco product consumption.

Section III: Evaluation of the effectiveness of the PTP on knowledge regarding education against tobacco product consumption among nursing students

Part I: Comparison of knowledge level of nursing students regarding education against tobacco product consumption in pre-test and post-test

The post-assessment results exhibited a noteworthy surge compared to the pre-assessment scores across diverse domains of understanding concerning education against tobacco product consumption among nursing students,

signifying the efficacy of the PTP in augmenting their knowledge.

Part-II: Effectiveness of PTP on knowledge enhancement regarding education against tobacco product consumption among nursing students by area

The analysis comparing pre-test and post-test knowledge scores among nursing students on education against tobacco product consumption revealed substantial enhancements across various areas. Post-test mean knowledge scores exhibited significant increases compared to pre-test scores, suggesting the effectiveness of the PTP in augmenting students' comprehension in this field.

Section III: Evaluation of the effectiveness of the PTP on knowledge regarding education against tobacco product consumption among nursing students

To assess the effectiveness of the planned teaching program, a research hypothesis was formulated

H1: There is a significant difference between the pre-test knowledge and post-test knowledge scores regarding education against tobacco product consumption among nursing students at the 0.05 level of significance.

A paired t-test was conducted to determine the significance of the differences between the pre-test knowledge and post-test knowledge scores regarding education against tobacco product consumption among nursing students. The calculated paired t-test value exceeded the table value, thus H1 is accepted.

Section IV: Association between post-test knowledge scores of nursing students and their selected socio-demographic variables

H2: There will be a significant association between post-test knowledge scores and selected socio-demographic variables at the 0.05 level of significance.

No significant association was found between age, family monthly income, marital status, religion, type of family, socio-economic status, and source of information. Hence, it can be concluded that there is no significant association between post-test knowledge scores of nursing students and their socio-demographic variables at the 0.05 level of significance.

Section V: Association between post-test score checklist of experimental and control groups and their selected demographic variables

H5: There is a significant association between the mean post-test score checklist of the experimental and control groups with their selected demographic variables such as age, religion, education, occupation, income of parents, number of children in the family, birth order, history of previous illness, history of deworming, and history of diet.Therefore H5 was supported.

Limitations

- The study is limited to the nursing students
- The researcher could not get a standardized tool to assess the students response on knowledge regarding education against tobacco product consumption The researcher herself developed the tool.
- The content of PTP was limited to cover within 45 minutes.

Summary

The study examined the impact of a teaching program on nursing students' knowledge of education against tobacco product consumption. Results showed that a majority of students were in the 21-30 age group, with varying family incomes and family types. Pre-test revealed poor knowledge levels, improving significantly in the post-test. Statistical analysis confirmed the teaching program's effectiveness, independent of socio-demographic variables like age, gender, income, and family type.

Conclusion

This study aimed to evaluate the impact of peanut chikki consumption on the nutritional status of school children, with a particular focus on weight, hemoglobin levels, and adherence to a nutritional checklist. The experimental group, administered with peanut chikki, showed significant improvements in these indicators compared to the control group. Notably, the intervention proved particularly effective among school girls residing in hostel settings. Pediatric nurses play a pivotal role in raising awareness about nutritional deficiency disorders and advocating for measures to enhance nutritional status. The study's findings hold important implications across various nursing domains.

In Nursing Practice, the study's findings can guide nurses in planning and conducting nutritional assessments to address deficiencies among school children. Understanding and addressing nutritional deficiencies are crucial for overall physical, mental, and social development, necessitating targeted nursing care across hospital, school, and community settings. Specialized nutritional programs tailored for school children, with a focus on prevention strategies, are recommended. Encouraging participation in nutritional workshops and seminars can enhance knowledge among school teachers and nursing personnel.

In Nursing Education, educational programs highlighting the benefits of nutritional interventions are essential. Nursing students should receive comprehensive education on identifying and addressing nutritional deficiencies and disorders. Incorporating screening programs for nutritional deficiency prevention into nursing curricula is recommended, alongside early identification training for nutritional deficiency disorders.

Nursing Administration implications include educating nurses on the importance of nutritional interventions and disseminating research knowledge to enhance practice and benefit school children. In-service education is crucial for raising awareness about innovative nutritional interventions and updating nurses' knowledge through workshops and conferences. Collaboration with staff is vital for implementing effective nursing measures, such as promoting peanut chikki for improving nutritional status among girls. Organizing in-service educational programs on improving nutritional status is recommended for nursing administrators.

In Nursing Research, further studies are warranted to explore the effectiveness of peanut chikki in improving the health status of school children, including comparative studies against other nutritional interventions. Nurses, being a significant healthcare group, should take initiative in conducting such research to contribute to evidence-based nursing practices and improved health outcomes among school children.

Recommendations & Suggestions

Based on the findings, the following recommendations are suggested for future research:

- Replicate a similar study on a larger scale to enhance generalizability.
- Conduct an experimental study with a control group to provide more robust evidence.
- Expand the study to other areas within the Bengaluru district and across different states to validate and extend the findings.
- Explore the effectiveness of various teaching strategies, such as pamphlets, leaflets, and computer-assisted instruction, in educating nursing students about tobacco product consumption.
- Health professionals can conduct health education programme on education against tobacco product consumption
- Structured teaching programme can be conducted in a group including administrators and community members.
- Conduct anticipatory guidance programs targeting farmers and elderly individuals through exhibitions, mass media campaigns, workshops, and other public platforms. These initiatives aim to enhance awareness and educate about the importance of tobacco product consumption education.

Conflict of Interest

Not available

Financial Support

Not available

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