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Measuring the Knowledge of Rural School Children on Nutrition Education in Bihar, India

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Authors' contributions

This work was carried out in collaboration among all authors. Author VL involved in designing the study, data collection, data analysis, interpretation and drafting the article. Authors Alok Dube, Awadhesh Dixit and SK were involved in critical revision and final approval of the article version for publication. All authors read and approved the final manuscript.

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ABSTRACT

This research study investigates the knowledge regarding nutrition education among rural school children in Bihar, India. The goal of the study is to evaluate the existing level of nutrition knowledge and comprehension among kids in rural regions and to pinpoint possible areas for development in nutrition education initiatives. The rural school students were subjected to an interview schedule. A sample of rural schoolchildren from different Bihar schools, ranging in age from 8 to 12, participated in the study. The environment was taken into consideration when choosing knowledge test questions. A 53-item knowledge test was put through a relevancy check with help from extension

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specialists, and 43 items were chosen for the test. Thirty extension workers from outside the research area pretested the 53 items. Item analysis evoking difficulty index, discrimination index, and point biserial correlation were conducted based on the results of the pretesting. Items with difficulty indices between 0.3 and 0.8, discrimination indices equal or above 0.3, and substantial point biserial correlation at the 5% level of significance were chosen. Utilising the split-half method, the test's reliability was calculated and determined to be 0.70. Ultimately, 18 questions were chosen for the final knowledge test given to rural schoolchildren. This knowledge test reveals a knowledge gap about nutrition and its significance for general health and well-being among Bihar's rural schoolchildren. Most kids showed little understanding of key nutrients, food groupings, and their nutritional value. Additionally, there was a paucity of knowledge regarding the long-term effects of improper eating patterns and inadequate nutrition.

Keywords: Nutrition education; rural school children; bihar; knowledge gap; discrimination index.

1. INTRODUCTION

The importance of nutrition education among school children is not overstated, particularly in rural areas where access to adequate nutrition is often limited. The health and development of school children in the Indian state of Bihar depends on meeting their dietary needs. Currently, the world faces a triple burden of malnutrition characterized by under-nutrition (stunted growth), overweight, and micronutrient deficiencies simultaneously in an individual [1,2].

The best early childhood development initiatives integrated with family support, health, nutrition, or educational systems and services, have a longer lifespan, are of the highest quality, and are primarily focused on younger and less fortunate children. Children and families also benefit directly from them [3]. Due to a substantial chunk of its populace living in rural areas where poverty and food insecurity are common, Bihar has particular nutritional issues.

One crucial aspect related to the triple burden of malnutrition in female adolescents is their knowledge of nutrition. Research has shown that nutritional knowledge can significantly influence adolescent eating behavior, and eating behavior is a modifiable factor that directly affects nutrient intake and nutritional status (Chabi, 2022 and Oktavianto, 2023].

Unfortunately, multiple studies conducted in various countries have demonstrated that adolescent girls often possess inadequate knowledge about nutrition and health [4,5]. Addressing this knowledge gap is crucial for promoting healthier eating behaviors and improving the nutritional status of adolescent girls. Studies on the effect of health-nutrition education interventions on knowledge, eating behavior/nutrient intake, and nutritional status of female adolescents have been conducted in various countries, such as Jordan [6], Indonesia [7], Ghana [8] and Croatia [9].

Children's eating patterns in these regions frequently characterised by a lack of variety and an overreliance on basic foods, which leads to an insufficient intake of important nutrients. Such nutritional deficits have a direct effect on a student's overall academic performance, cognitive development, and physical growth. Although there have been substantial improvements, there is still more to be done to improve nutrition education among Bihar's rural schoolchildren. Implementing and maintaining nutrition programmes can be difficult due to problems with infrastructure, resources, and public awareness. Therefore, to develop focused interventions that meet their requirements, it is crucial to have a thorough grasp of the current knowledge and attitudes of rural schoolchildren regarding nutrition education.

This study intends to investigate the knowledge and preferences of rural Bihar school children towards nutrition education. This study aims to offer useful insights that can guide the creation of efficient and culturally relevant solutions by identifying the current gaps and barriers. Giving kids the information and skills, they need to choose nutritious foods is essential for enhancing their nutritional status and all-around wellbeing.

2. MATERIALS AND METHODS

Utilising the accepted methods, the nutrition education knowledge test was created. The knowledge test included questions (items) pertaining to nutrition education. A question (items) bank was established by reading

literature and consulting textbooks, leading to a thorough examination of the items with the help of subject matter experts. The questions were made to gauge the knowledge of students in rural schools. For the relevance test, a total of 43 knowledge items were created using the methodology outlined by Kumar et al. [10]. An experienced team of judges examined the item statements to assess their relevance and select those that would be included in the final examination [11]. The 43 items were delivered to a panel of 30 judges who were extension education professionals with the request that they critically assess each item's applicability in gauging the knowledge of rural schoolchildren. According to five- point scale with ratings of 5, 4, 3, and 1, highly relevant, relevant, undecided, less relevant, and not relevant, the judges were asked to respond. The scores on the rating scale for all of the judges' comments were added to determine the relevancy score for each item. For all the items, two sorts of tests—relevancy percentage and frequency were calculated from the data. The items that met the minimum requirements (Relevancy% >70, Relevancy weightage >0.70, and Mean relevancy score > 3.0) were chosen. There were 18 total items chosen.

The information gathered was in objective form and used to build the knowledge test. The only type of item was multiple choice. Thirty respondents from outside the area of data collection were given the 43 items that had been chosen. Each question on the knowledge test required the responders to indicate their answers, and the correct answers received a score of "1," while the wrong answers received a score of "0." By adding the responses to each item from each respondent, the overall knowledge score for each item was determined [12]. The difficulty index and discrimination index were computed using this information. In this study, the item difficulty index P was calculated as the proportion of respondents who correctly answered each item.

$$P = \frac{NC}{N} \times 100$$

The formula used to determine it was P = Difficulty Index, NC = Number of Correct Responses, and N = Total Number of Respondents. The final knowledge test in the current study took into consideration and included the items with P values between 30 and 80. With the use of the E1/3 approach, the discrimination power of each of the 43 items was calculated. This method separated the 30 respondents into six equal groups, each with five respondents, and sorted them in descending order of the size of the knowledge scores that were received from them. The two groups in the centre were dismissed. The 'Discrimination Index' was calculated using only four extreme groups, those with the highest and lowest scores. The formula used to determine it was as follows:

$$E1/3 = \frac{(S1 + S2) - (S5 + S6)}{N/3}$$

Where, N stands for the overall number of respondents to whom the items were given. The frequencies of accurate responses for the highest and higher scores, respectively, are S1 and S2. The frequencies of right responses for lower and lower scores, respectively, are S5 and S6, respectively. In the final knowledge test, only items with a discrimination index equal to or higher than 0.3 are chosen. The point-biserial correlation (Rp bis) is the name for a correlation between a continuous and a dichotomous variable [13]. Point biserial correlation was estimated to assess an item's internal consistency and how it related to the overall score when a dichotomized response to a particular item was obtained.

$$Rp\ bis = \frac{Mp - Mq}{Sigma} \times \sqrt{pq}$$

Where, Rp bis is the point biserial correlation, in this case. Mp is the mean of the respondents' overall scores when they correctly respond to a question. Mq is the mean of the respondents' overall scores who provided an erroneous response to a question. The standard deviation of the entire sample is called sigma. P is the percentage of respondents who correctly answer a question, while Q is the percentage of respondents who incorrectly answer a question. Statistics were used to test the calculated point biserial correlation values with n-2 degrees of freedom. The final items for the knowledge test were 18 items with a point bi serial correlation value that was significant at the 5% level of significance.

3. RESULTS AND DISCUSSION

Table 1 showed that majority of the school children (92.4%, 88.88%, 85.55%, 80.0%, 72.0% and 71.1%) had very good knowledge about different types of nutritious meal must be provided through Mid-day meal scheme, Amount

of food should eat to be a healthy person, Importance of Ghee for our body, vitamins A found in the green leafy vegetables, Percentage of Water in different type of Fruits and different type of pulses contains proteins.

Further, it can also be seen that less than 50% children did not have enough knowledge about the nutrition, 44.44% children even did not know that in every season we should drink water in more quantity. 35.55% children did not know that contaminated water causes Haiza disease. 38.88% children were not aware about the fruits which contains iron in abundant amount. 52.2% children knew about the component of the nutritious meal like Chapati, Dal, Vegetable, Milk. Similarly, Lobstein and co-workers [14] reported that education about food and nutrition can have a variety of advantages. It has been demonstrated to have favourable effects on children's micronutrient status and to help prevent obesity, though not yet on a broad scale.

Table 1. Percentage relevancy score of each statement (n=90)

S.No.	Statement	f	%
1	Which vitamin is found in green vegetables?	72	80
2	How much fruits should you eat?	80	88.88
3	Which vegetable keeps our eye-sight strong?	56	62.2
4	Which one is good source of vitamin C?	62	68.9
5	We should eat fast food (snacks)?	46	51.1
6	In which season we should drink more water?	40	44.44
7	Symptom of goiter (ghegha) syndrome is?	55	61.1
8	Ghee is good for ours?	77	85.55
9	Red colour of beetroot specially helps in the production of?	22	24.44
10	If the mid-day meal food providing in your school, then it should provide?	83	92.4
11	Which fruit contains more percentage of water?	65	72.2
12	If we are eating and drinking contaminated food and water then from which disease we may suffer?	32	35.55
13	If in the meal proteins, carbohydrates, fats and vitamins are included in requisite proportions, then it will be called as?	59	65.6
14	The right meal for children consists of?	47	52.22
15	Which is major nutrient in pulses?	64	71.1
16	What do we get by consuming carbohydrate and fat?	51	56.7
17	Iron is rich in which of the following vegetables?	35	38.88
18	Which of the following nutrient is responsible for excretion of the undigested food from the body?	27	30.0

Table 2. Difficulty and discrimination index of the knowledge items on nutrition education (Final items) (n=90)

S.no.	Items	Difficulty Index	Discrimination Index	Point Biserial Correlation (Rpbis)
1	Which vitamin is found in green vegetables? (a) Vitamin A (b) Vitamin K (c) Vitamin E (d) None of these	56.66	0.4	0.32*
2	How much fruits should you eat? (a) 1 to 2 fruits daily (b) 1 to 2 fruits once in two days (c) 1 to 2 fruits once a week (d) We should not eat fruits	66.66	0.3	0.16*
3	Which vegetable keeps our eye-sight strong?	60.00	0.4	0.46*

S.no.	Items	Difficulty Index	Discrimination Index	Point Biserial Correlation (Rpbis)
	(a) Carrot (b) Potato (c) Brinjal (d) Jack fruit			
4	Which one is good source of vitamin C? (a) Potato (b) Banana (c) Papaya (d) Anola	80.00	0.5	0.38*
5	We should eat fast food (snacks) (a) Daily (b) once in a week (c) once in a month (d) not at all	54.44	0.4	0.42*
6	In which season we should drink more water? (a) Winter (b) Summer (c) Rainy (d) All season	33.33	0.4	0.32*
7	Symptom of goiter (ghegha) syndrome is- (a) Fever (b) Swollen in neck (c) Back pain (d) Swollen in eyes	66.66	0.5	0.52*
8	Ghee is good for ours- (a) Heart (b) Eyes (c) Brain (d) All of these	80.00	0.5	0.64*
9	Red color of beetroot specially helps in the production of- (a) Protein (b) Blood (c) Fat (d) Hormones	33.33	0.4	0.32*
10	If the mid-day meal food is provided in your school, then it should provide (a) Only kheer (b) Only fruits (c) Food containing protein, vitamin, starch, carbohydrate (d) Only dal	63.33	0.4	0.48*
11	Which fruit contains more percentage of water? (a) Litchi (b) Mango (c) Papaya (d) Watermelon	50.00	0.5	46*
12	If we are eating and drinking contaminated food and water then from which disease we may suffer?	60.00	0.4	46*

S.no.	Items	Difficulty Index	Discrimination Index	Point Biserial Correlation (Rpbis)
	(a) Haiza (b) Polio (c) Chicken pox (d) All			
13	If in the meal proteins, carbohydrates, fats and vitamins are included in requisite proportions, then it will be called as_____ (a) Unbalanced diet (b) Balance diet (c) Both (d) None	62.20	0.3	0.14*
14	The right meal for children consists of- (a) Chips, noodles, coke. (b) Chapati, dal, vegetables. (c) Rice, noodles and burger. (d) Vegetable cutlets, chips	72.24	0.4	0.35*
15	Which is major nutrient in pulses? (a) Carbohydrate (b) Protein (c) Fat (d) Minerals	54.44	0.7	0.39*
16	What do we get by consuming carbohydrate and fat? (a) Energy (b) Growth (c) Protection from diseases (d) Happiness	45.55	0.6	0.42*
17	Iron is rich in which of the following vegetables? (a) Green vegetable (b) Red Color vegetable (c) Purple color vegetable (d) White color vegetable	60.00	0.4	0.46*
18	Which of the following nutrient is responsible for excretion of the undigested food from the body? (a) Carbohydrate (b) Fiber (c) Protein (d) Fat	75.55	0.5	0.58*

Table 3. Overall Knowledge Level of the Rural School Children about Nutrition (n=90)

Sl no.	Category	f	%
1	Low (<9.32)	25	27.77
2	Medium (9.32-11.85)	55	61.11
3	High (>11.85)	10	11.11

The results in Table 3 revealed that majority of the school children (61.11%) had medium level of knowledge about nutrition followed by 27.77 per cent of school children having low level of knowledge whereas 11.11 per cent children had low high level of knowledge. Similarly, Kolodinsky and co-workers [15] reported that making more wholesome decisions was always correlated with

nutritional awareness. Students who lack prior knowledge of nutrition may not be well-equipped to alter their eating pattern [16-21].

4. CONCLUSION

A knowledge test on nutrition education given to 90 rural school children in Bihar, providing insightful information on how well they understood various nutrition tenets. The results show both their nutritional knowledge's strong points and its places for development. The distribution of knowledge levels emphasises the need to concentrate on enhancing nutrition education among rural school children in Bihar. Although a sizeable percentage of participants had a medium level of knowledge, efforts should be made to close the knowledge gap for those with low levels. In order to improve the general understanding of nutrition among young kids, strengthening nutrition education programmes and interventions in schools could be extremely important. It is essential to highlight that these results may not apply to the full population as they are based on a specific sample of 90 rural schoolchildren in Bihar. However, they offer insightful analyses of the current levels of knowledge and lay the groundwork for additional study and focused interventions to improve nutrition education in this setting.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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