

# Co-Relation between Anthropometric Measurements and Daily Nutritional Intake among Children of 2-5 Years of Age

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## ABSTRACT

The study involves quantitative approach with exploratory research design with a view to develop guidelines along with objective of assessing co-relation between anthropometric measurement and daily nutritional intake of children of 2-5 years of age and to find out relationship between anthropometric measures (height, weight, BMI, MUAC) and daily nutritional intake (Calorie, Protein, Fat) with selected demographic variables. A self-structured questionnaire consisting of 3 sections was used to collect required data from sample size of 100 selected children of 2-5 years of age and their mothers/care takers. The data was collected by the researcher regarding daily nutritional intake of the children from their mother/care taker. The results revealed that there was significant relationship between anthropometric measurements and daily nutritional intake among children of 2-5 years of age in selected areas of district Patiala at 0.05 level of significance. As the children with increased intake of calorie had weight above than the standard recommended values and children with decreased intake of protein had height below than the standard recommended values. Hence it was concluded that there was significant relationship between anthropometric measurements and daily nutritional intake among children of 2-5 years of age.

**KEYWORDS:** Anthropometric measurement, Daily nutritional intake, Correlation.

## INTRODUCTION

“Success is not final, failure is not fatal: it is the courage to continue that counts.”

- Winston Churchill

Growth, considered as the increase in body size, measured as weight and height gain, is one of the main health indicators in childhood and adolescence. The growing phase is when human beings experience the greatest bio-psycho-social vulnerability<sup>1</sup>. One of the most important aspects of a well-child examination is an assessment of a child's growth<sup>2</sup>.

Long-term trends of increasing growth across generations have been observed worldwide and have been attributed to a number of factors, including improved nutrition and healthcare. Based on the assumption that children have similar growth patterns when they are raised in healthy and unconstrained environmental conditions, the World Health Organization (WHO) has introduced universal growth standards for children from birth to five years. These

standards were based on data from healthy, breastfed, well-off children born to non-smoking mothers from six countries.<sup>3</sup> Inadequate growth, i.e., not gaining sufficient height or weight, occurs when children live in a deficient environment. These environments do not provide enough food for children or lack nutrient-rich foods, are often unsanitary, causing children to get sick repeatedly, and lack access to high-quality health services. These deficient environments are shaped by underlying problems of food insecurity, limited caregiving resources, and poor environmental conditions, which are affected by economic and social conditions.

According to a World Health Organization (WHO) report, one out of ten children are obese, and this proportion is rapidly increasing worldwide.<sup>8</sup> The health and wellbeing of young children and adolescents are of paramount importance to every country as they are regarded as one of the crucial drivers of future economic and societal

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development.<sup>9</sup> The nutritional status of children under the age of five years is regarded as a proxy of the country's economic condition. Therefore, low nutritional status in children is not only a public health challenge.<sup>10</sup>

### NEED OF THE STUDY

In India, a large proportion of children suffer from varying degrees of nutritional deficiency, despite significant economic progress. According to the National Family Health Survey (NFHS-5), the prevalence of undernutrition among Indian children under five remains high, with 35.5% stunted, 19.3% wasted, and 32.1% underweight.<sup>20</sup> These figures highlight persistent disparities in child nutrition and the urgent need to evaluate dietary adequacy in different regions, including Punjab.

Furthermore, anthropometric assessments are practical tools that can be applied even in resource-limited settings. By establishing a clear correlation between anthropometric indices and dietary intake, this study may contribute to identifying early nutritional imbalances before clinical symptoms or growth faltering appear.<sup>24</sup> Early detection and timely intervention can significantly reduce the risk of long-term health complications such as stunting, anemia, and developmental delays.<sup>25</sup>

**Research Problem:** "An exploratory study to assess the correlation between anthropometric measurements and daily nutritional intake among children of 2-5 years of age in selected areas of district Patiala."

### Objectives:

- To assess the anthropometric measurements among children of 2-5 years of age from selected areas of district Patiala.
- To assess the daily nutritional intake of children of 2-5 years of age from selected areas of district Patiala.
- To assess the co-relation between anthropometric measurements and daily nutritional intake among children of 2-5 years of age from selected areas of district Patiala.
- To provide pamphlets to mother or care taker regarding the daily diet of their child according to age in selected areas of district Patiala.

### Research hypothesis:

H1: There is a significant relationship between anthropometric measurements and daily nutritional intake among children of 2-5 years of age of selected areas of district Patiala at 0.05 level of significance.

H1.1– There is significant relationship between anthropometric measurements and selected demographic variables among children of 2-5 years of

age of selected areas of district Patiala at 0.05 level of significance.

H1.2 – There is significant relationship between daily nutritional intake and selected demographic variables among children of 2-5 years of age of selected areas of district Patiala at 0.05 level of significance.

### Assumptions:

- Anthropometric measurements (height, weight, BMI and MUAC) are reliable indicators of a child's nutritional status as per WHO standards.<sup>20</sup>
- Total energy intake is the primary determinant of overall body mass. A sustained positive energy balance will lead to increase in weight and BMI for age.
- The mothers, being the primary caregivers, may have knowledge regarding the dietary requirement and are aware about the physical growth of child.

### Delimitations:

- The study was confined to children of only 2-5 years of age of selected areas of district Patiala.
- The study focuses on only three components of nutritional intake- calories, protein and fat.
- The study includes only four anthropometric measurements- height, weight, mid upper arm circumference (MUAC) and body mass index (BMI) to assess nutritional status.

## REVIEW OF LITERATURE

### Literature related to Nutrition Intake

Khadilkar et al. (2025) conducted a study in schools of Pune, Maharashtra to evaluate the impact of oral nutritional supplementation and dietary counseling among 223 undernourished Indian children aged 3–6.9 years. They reported greater intake of energy, protein, and carbohydrates in the Oral nutritional supplementation and dietary counselling group. There were no significant differences in sick days or BMI-for-age between the groups. Oral nutritional supplementation combined with dietary counselling significantly improved linear catch-up growth, nutrient intake, and key anthropometric measures in undernourished Indian children, supporting its use as an effective intervention to reduce stunting.<sup>30</sup>

A longitudinal study was conducted by Hiremath MM, Walvekar PR, and Baliga SS (2024) in Belagavi, Karnataka to determine the effect of the quality and quantity of diet on the nutritional status of under-five children. Two sub-centers were selected randomly, and a multi-stage random sample of 270 children aged 1–4 years was taken. The major findings showed that improvements in the quality and

quantity (calories, proteins) of the diet led to significant improvements in the children's nutritional status over 12 months. Specifically, weight-for-age, weight-for-height, and BMI Z-scores improved significantly, reducing the prevalence of underweight and height for age was less affected.16

### LITERATURE RELATED TO ANTHROPOMETRIC MEASUREMENT:

A study was conducted by BR Nikhita, Rai Sakshi (2025) in an Anganwadi Center of Telangana to evaluate the effects of a finger millet-based supplement on anthropometry, body composition, and dietary adequacy among moderately acute malnourished children. The sample included 60 children. The results showed that both the FMD and BMD groups showed significant improvements in weight (6.3–6.4%), height (2.4%), and MUAC (3.5–6.2%) by day 40, with sustained gains through day 160. The FMD group showed greater improvements in mineral mass, bone mineral content, and skeletal muscle mass, while the BMD group showed higher increases in protein mass and fat-free mass. Dietary recall revealed that micronutrient adequacy remained low among MAM children compared to healthy peers.39

Jaleel Abdul and Bikash Swapan (2025) conducted a cross-sectional study to investigate the prevalence, characteristics, and determinants of malnutrition among 736 children living in the urban slums of Kolkata and Siliguri. Structured interviews and anthropometric measurements were conducted. The results showed high prevalence rates of stunting (24.1%), underweight (22.3%), and wasting (15.4%). Key predictors of malnutrition included low household income and recent illness. The study concluded that child malnutrition in urban slums was influenced by multiple socioeconomic and health-related determinants.40

### METHODOLOGY

In this study, a quantitative research approach was used which refers to a systematic and empirical method of investigation that relies on numerical data, structured instruments, and statistical analysis to examine relationships among variables.” It is suitable for studies that aim to measure the extent and correlation between different variables using statistical tools.

### VARIABLES UNDER STUDY:

➤ **Demographic variable:** A demographic variable is a characteristic of a population or sample such as age, sex, education, occupation, income or residence that is used to describe, classify, and analyze groups in a research study. In this study demographic variables contained age, gender,

parental educational status, occupation, family income status, children attended Anganwadi Centre.

➤ **Independent Variable:** The independent variable is the variable that is manipulated or categorized to observe its effect on the dependent variable. In this study, the independent variables were daily nutritional intake (Calorie, Protein, Fat) of the children.

➤ **Dependent Variable:** The dependent variable is the outcome or effect that is observed and measured in response to the independent variable. In this study, the dependent variable was the anthropometric measurements (height, weight, BMI, MUAC) of the children.

### TARGET POPULATION:

The target population includes all individuals who meet the inclusion criteria for a specific study and from whom a sample can be drawn. The target population for the present study consisted of children of 2-5 years of age and their mothers / caretakers residing in the residential colonies of Bishan Nagar, Patiala, including Old Bishan Nagar, Muslim Colony, and Sundar Colony. This community predominantly belongs to a lower socioeconomic group, with limited access to education, health and nutritional resources. A total of 250 under-five children live in these areas and formed the basis for selecting the study participants. The population was chosen due to its vulnerability to nutritional deficiencies and growth-related issues observed during researcher's community field visits. Only children who fulfilled the inclusion criteria and whose parents provided informed consent were included in the study.

### SAMPLE:

For assessing the anthropometric measurements, researcher had taken the sample of 100 selected children and mothers/caretakers for assessing their daily nutritional intake.

### CONTENT VALIDITY AND RELIABILITY OF THE TOOL:

To ensure the validity, tool along with the objectives and criteria were submitted to experts. The experts were requested to judge the items for relevance, clarity, appropriateness or the content area. The modifications were done in the tool based on expert's suggestions and in consultation with guide.

The final tools were tested for reliability. Reliability was calculated using Karl Pearson Coefficient between anthropometric measurements (Height, Weight, BMI, MUAC) and daily nutritional intake (Calorie, protein, fats). The calculated reliability coefficient was 0.98 indicates a very strong positive correlation between the variables.

## DESCRIPTION OF TOOL:

The final tool included:

**SECTION A:** Socio demographic variables contained age, gender, educational status, occupation, family income status, children attending Anganwadi Centre.

**SECTION B:** It contains anthropometric measurements which include weight, height, BMI, MUAC, Standardized growth chart for anthropometric measurement.

**SECTION C:** Nutritional assessment checklist including daily intake nutritional status, standard nutrition values per day and food nutritive value chart (which includes calorie, fat and protein intake).

- **Socio-Demographic Data:** Collected basic background information such as age, gender, parental education, occupation, family income, and child attended Anganwadi center.
- **Standardized Growth Chart (WHO):** Used to record and interpret the anthropometric measurements (such as height, weight, and BMI, Mid Upper Arm Circumference). It helped compare children's measurements with internationally accepted norms for identifying undernutrition or overnutrition.
- **Nutritional Assessment Checklist:** This section gathered details about the child's daily nutritional intake and dietary habits. Used to assess daily dietary intake, including the type and frequency of meals. It included questions on food diversity, meal patterns, and intake of essential nutrients. It helped identify nutritional deficiencies or irregularities.
- **Food Nutrition Value Chart:** Provided standardized nutritional values of common food items. It assisted in calculating the actual nutrient intake (calories, proteins, fats) of each child based on their reported diet.

## ANALYSIS AND INTERPRETATION OF DATA

The demographic variables among the study subjects, 47% were in the age group of 4.1-5 years, 36% were between 3.1-4 years and minority 17% were aged 2-3 years. The sample consisted of 52% females and 48% males and shows nearly equal distribution.

Educational status of mothers indicated that 38% had primary education, 31% were illiterate, 24% had completed their secondary education and only 7% were graduates or above. In terms of occupation, most mothers were homemakers (83%), whereas 10% were business woman and 7% were having private or government jobs. For fathers, 57% were engaged in private jobs or government jobs, 34% worked as labourers, 9% were businessman. Educational attainment of fathers was relatively higher compared to mothers, with 33% having secondary education, 26% having primary education, 22% being graduates or above and 19% illiterate. Family income analysis revealed that 46% of families earned between Rs. 40,000–80,000 per month, 27% reported an income above Rs. 80,000, 22% earned between Rs.10,000–30,000, while only 5% earned less than Rs. 10,000. With respect to no. of children attended Anganwadi, 59% of children did not attend Anganwadi Centre, whereas 41% did attend.

It was concluded that the majority of children in the study were aged 4-5 years, with mothers as homemakers and fathers employed in private jobs and most families had a moderate to higher income range. Education levels varied, with a considerable proportion of mothers being illiterate compared to fathers.

Frequency of anthropometric measures of subjects, based on weight measurements, 61% of the children were classified as normal, while 24% were below normal and 15% were above the standard values according to ICMR guidelines and WHO standard values, indicating that underweight prevalence was higher than overweight among the sample. In terms of height, 45% of children were within the normal range, whereas 38% were below normal and 17% above normal, showing a considerable presence of stunting among the children. Similarly, BMI values showed that 61% of children had normal BMI, 24% were below normal, and 15% were above normal, reflecting a distribution pattern consistent with weight status. Mid-upper arm circumference (MUAC) measurements indicated that 72% of children were within the normal range, 22% were below normal, and only 6% were above normal.