



RESEARCH ARTICLE

ASSESSMENT OF ANTHROPOMETRIC STATUS AND FOOD INTAKE OF PRE-SCHOOL CHILDREN (1-3 YEARS)

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ABSTRACT

Childhood nutrition is known to have a considerable impact on children's health because the foundation for their lifetime health, strength and intellectual vitality is laid during this period. The aim of the present study is to assess the anthropometric status and food intake of pre-school children aged 1-3 years. A total of 50 subjects were studied to assess the anthropometric measurements of height, weight, mid upper arm circumference, head circumference and chest circumference for each pre-school child and diet survey methods of 24-hour recall method and food frequency questionnaire using standard procedures together with structured questionnaire. The findings showed that the mean of anthropometric measurements were found to be on par with WHO standards. The mean intake of foods was found to be significantly higher when compared to balanced diet.

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INTRODUCTION

Children are most precious resource of the country. Early childhood constitutes the most crucial period of life when foundations are laid for cognitive, social, emotional, physical, motor development and cumulative lifelong learning. The development of children is the first priority on the country's development agenda, not because they are most vulnerable, but because they are our supreme assets and also future human resources of the country. A child needs a balanced and adequate diet to supply the nutrients and energy needed for the proper growth and development. Anthropometric data for children reflect general health status, dietary adequacy and growth and development over time (McDoweliet *et al.* 2008). Anthropometrics are a set of non-invasive, quantitative body measurements used to assess growth, development and health parameters. Accurate anthropometric measurements are paramount to providers adequately assessing the health of children and in choosing appropriate treatment and interventions necessary to maintain or improve health.

With this background, the following study has been taken with the following objectives:

- To assess the nutritional status of pre-school children.
- To assess the food intake of pre-school children.

METHODOLOGY

For the collection of data, questionnaire was adapted. The study was carried out in Bangalore amongst the 50 pre-school children (N=50) of age group 1 – 3 years which were enrolled in pre-school (Makkala Mandira at smt.VHD Central Institute of Home Science and Research Centre) and their mothers in Bangalore. The questionnaire has been given to children mothers and asked them to fill the questionnaire. For assessing nutritional status, anthropometry measurements i.e., height, weight, mid upper arm circumference and head circumference were used. For assessing food intake 24-hour recall method was used.

Measurement of height: The subject should stand erect on a levelled surface, without shoes, looking straight with heels together and toes apart. The anthropometer rod should be placed behind the subject in the centre of the heels perpendicular to the ground. The investigator standing on the left side of the subject should firmly hold the chin of the subject with his/her left hand and the occiput of the subject with his right little finger to maintain the Frankfurt horizontal plane (an imaginary line joining the tragus of the ear and infra orbital margin of the eye).

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Research Design

Phase-I.

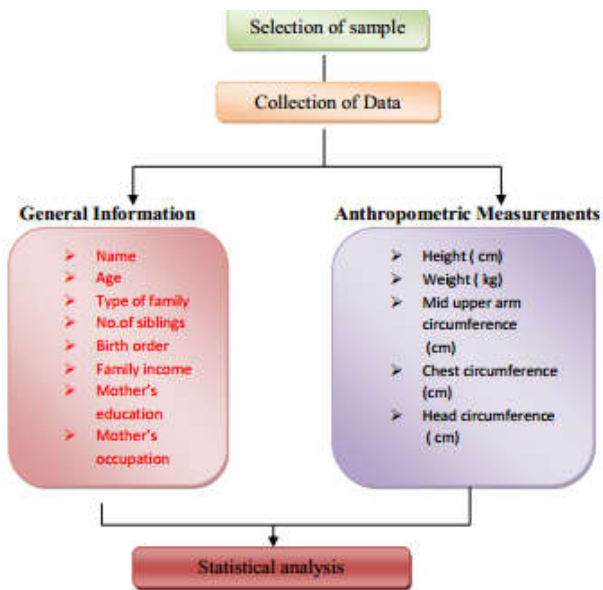


Figure 1. Assessment of anthropometric status of pre-schoolers (N=50)

Phase-II

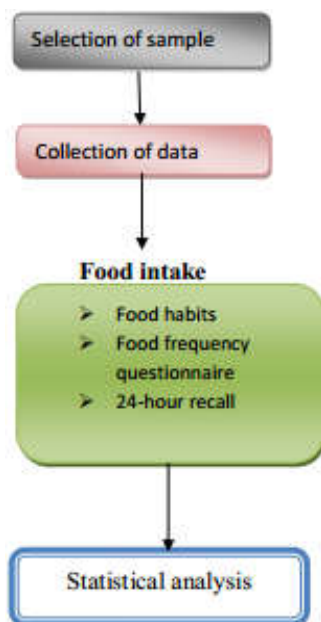


Figure 2. Assessment of food intake of pre-schoolers

The moving head piece of the anthropometer should be placed in the sagittal plane over the head of the subject applying a slight pressure to reduce the thickness of hair. The reading should be taken when the anthropometer rod is still in position. An average of three successive measurements is taken as the final measurement.

Measurement of weight: For measuring body weight, beam or lever actuated scales, with an accuracy of 50-100g, are preferred. Beam balances have been found to be reliable and are currently in extensive use in Integrated Child Development Services (ICDS) projects. Digital weighing scales are also available in India. However, it is essential that any type of weighing scale should be tested periodically for its accuracy with known standard weights.

The following precautions should be taken to measure body weight: The zero error of the weighing scale should be checked before taking the weight and corrected as and when required.

- The individual should wear minimum clothing, and be without shoes.
- The individual should not lean against or hold any support, while the weight is recorded.
- The measurements should preferably be taken under basal conditions in early mornings.

Measurement of Mid Upper Arm Circumference (MUAC):

The mid-upper arm circumference is taken on the left hand. The mid-point between the tip of the acromion of scapula and the tip of the olecranon process of the (fore arm bone) ulna, with the arm flexed at the elbow at right angle; and marked with a marker pen. Now, the arm should hang freely and the fibre glass tape is gently, but firmly placed embracing the arm without exerting too much pressure on the soft tissues. The reading is taken to the nearest millimetre, with the tape still in position. Fibre reinforced plastic tapes are preferred as tailor's cloth tape losses its accuracy with constant use because of wear and tear.

Measurement of head and chest circumference: The head and chest circumferences are measured with a flexible fibre glass tape as used for measuring arm circumference. The chest circumference is taken at the nipple level during mid inspiration. The head circumference is measured by passing the tape around the head over the supra-orbital ridges (just above eye brows) of the frontal bone in front, and the most protruding point of the occiput on the back of the head. Slight pressure should be exerted to compress the hair. Both the measurements are not very useful in routine nutrition surveys, particularly in children beyond the pre-school age. Dietary status of children in the questionnaire included food habits i.e., vegetarian or non-vegetarian, completion of lunch-box, frequency of eating from restaurants, 24-hour recall method and food frequency questionnaire.

24-hour Recall Method (Oral Questionnaire): In this recall method, dietary data is obtained from the respondent through an oral questionnaire of diet survey, using a set of "standardised cups" suited to local conditions. The steps involved are :

- The housewife or the member (respondent) of the household who invariably cooks and serves food to the family members is asked about the type of food preparations made according to meal pattern i.e., during breakfast, lunch, afternoon, teatime and dinner, during the previous 24-hours.
- An account of the raw ingredients used for each of the preparations is obtained.
- Information on the total cooked amount of each preparation is noted in terms of standardised cup(s) by weight/volume.
- The intake of each food item (preparation) by the specific individual in the family such as the pre-school child, adolescent girl, or pregnant or lactating women is also assessed by using the cups. The cups are used mainly to aid the respondent recall the quantities prepared and fed to the individual members.

Table 1. Comparison of Anthropometric Measurements with WHO standards among Pre-school Girls

Anthropometric Measurements	WHO standards	Mean (cm)	SD	Significance of t value
Height in cm	95.10	98.06	5.06	4.1369**
Weight in kg	13.90	13.66 kg	2.63	0.6453 ^{NS}
Mid Upper Arm Circumference in cm	15.60	15.96	1.66	1.5338 ^{NS}
Head circumference in cm	48.50	48.00	1.81	1.9538 ^{NS}

** Significant at 1% level NS Not significant

Table 2. Comparison of Anthropometric Measurements with WHO standards among Pre- school Boys

Anthropometric Measurements	WHO standards	Mean	SD	Significance of t value
Height in cm	96.10	97.82	5.43	2.3049*
Weight in kg	14.30	14.92	3.97	1.1043 ^{NS}
Mid Upper Arm Circumference in cm	15.70	16.60	2.92	2.1797*
Head circumference in cm	49.50	49.40	1.86	0.3802 ^{NS}

* Significant at 5% level NS Not significant

Table 3. Adequacy of Food intake of Pre-school children

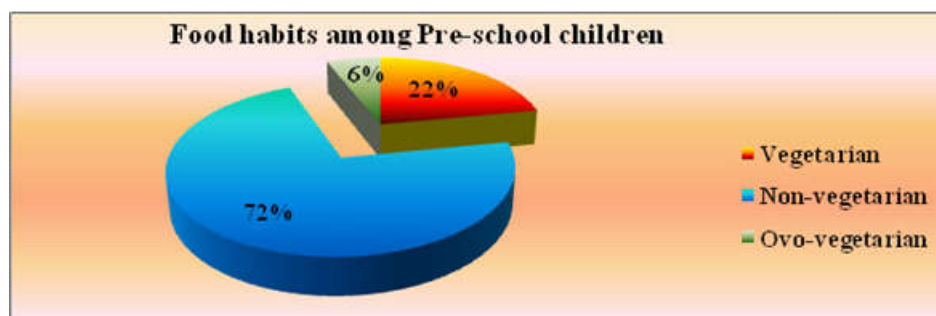
Food Groups	Balanced diet	Mean (g)	SD	Significance of t value
Cereals & Millets (g)	60	92.60	30.96	7.4456**
Pulses (g)	30	32.00	12.12	1.1668 ^{NS}
Milk and Milk products (ml)	500	267.00	104.96	15.6968**
Roots and Tubers (g)	50	34.50	20.56	5.3308**
Green Leafy Vegetables (g)	50	4.00	11.78	27.6127**
Other Vegetables (g)	50	21.50	19.28	10.4525**
Fruits (g)	100	104.00	81.34	0.3477 ^{NS}
Sugar (g)	15	18.40	6.42	3.7449**
Fats/Oils (visible) (g)	25	18.95	7.41	5.7734**

** Significant at 1% level NS Not significant

Table 4. Comparison of Nutrients with RDA among the Pre-school children

Nutrients	RDA	Mean	Difference	SD	Significance of t value
Energy (kcal)	1060	948.56	-111.44	152.23	5.1763**
Protein (g)	16.70	30.00	+13.3	6.20	15.1687**
Calcium (mg)	600	430.23	-169.77	122.51	9.7987**
Iron (mg)	9	6.32	-2.68	1.85	10.2446**
Vit-A (mcg)	3200	754.02	-2445.98	696.05	24.8481**
Vit-C (mg)	40	30.26	-9.74	38.75	1.7773 ^{NS}

** Significant at 1% level NS Not significant

**Figure 3. Food habits among pre-school children**

RESULTS AND DISCUSSION

The study to assess the anthropometric status and food intake of children was carried out in selected pre-school. The interview cum questionnaire was used to collect the data. The results revealed: The mean height of girl subjects found to be 98.06cm, which was on par with WHO standards. The similar trend was observed with mean weight (13.66kg), mean Mid Upper Arm Circumference (MUAC) (15.96cm) and mean Head Circumference (48cm) which were on par with WHO standards. The mean height of subjects was found to be 97.82 cm, which was on par with WHO standards.

The similar trend was observed with mean weight, mean Mid Upper Arm Circumference (MUAC) and mean Head Circumference which were on par with WHO standards. The similar trends were observed in the study carried out by Bishnoi et al., [2004] and the results of this were, while studying the effect of socio economic factors on anthropometric measurements of children it was observed that height and weight of children was affected by caste, income, type of house, size of family, land holding, mother's education and father's education. The above figure depicts the food habits among subjects.

Majority of the subjects were found to be non-vegetarians (72%) followed by vegetarians (22%). The above table showed that the mean intake of cereals (92.6g) was found to be significantly higher when compared to balanced diet. The mean intake of protein (32g) and fruits (104g) were found to be higher when compared to balanced diet. The mean intake of milk and milk products (267ml), roots and tubers (34.5g), green leafy vegetables (4g), other vegetables (21.5g) and fats/oils (18.95g) were found to be significantly deficit when compared to balanced diet. The mean intake of energy was found to be 948.56kcal, which was found to be significantly deficit when compared to RDA. The mean intake of calcium was found to be 430.23mg, which was found to be significantly deficit when compared to RDA. The similar trend was observed with mean intake of iron (6.32mg), vitamin – A (754.02mcg), which were significantly deficit when compared to RDA.

In contradictory to this, the mean intake of protein 30g, which was found to be significantly higher than the RDA. The study carried out by Laxmaiah *et al.* [2002] showed the similar trends and the results of this study were at the state level, the intake of macro and micronutrient rich foods such as green leafy vegetables, milk and milk products and fats and oils were lower than the RDI among preschool children. Except for protein, calcium and thiamine, the mean intake of all the nutrients was lower than the recommended level. To conclude, anthropometry is an important tool for nutritional assessment and the techniques should allow increased precision of measurement, and improved interpretation of anthropometric data. Balanced nutrition is essential for proper growth and development of children physically as well as mentally. The study showed that the anthropometric status of pre-school children were on par with WHO standards. Majority of the children were non- vegetarians. The intake of food groups i.e., cereals, pulses and fruits of pre-school children was also found to be significantly higher compared to balanced diet.

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