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Malnutrition and handgrip strength in institutionalized and non-institutionalized 10-14 years old children

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Abstract
The children in the developing countries suffer from malnutrition. In India the people are affected mainly with malnutrition and this is found to be one of the greatest health problems facing our communities today. The present research has been structured to assess the malnutrition & handgrip strength in Institutionalized and Non-Institutionalized 10-14 years old children. The sample under study consisted of 400 children in the age group of 10-14 years. For the purpose of conducting research Hazaribag, Ramhardh and Ranchi district in Jharkhand has been selected. Descriptive research design has been adopted in the research Demographic profile, Anthropometric measurement clinical examination and Ergo graph were used for getting nutritional status of the children.
The main finding were that Institution has impact on malnutrition, Non-Institutionalized male and female children are more malnourished than Institutional male & female children have more right handgrip strength than Institutional male and female children.

Keywords: Mal-nutrition, handgrip, institutional, non-institutional children

Introduction
Childhood as a fairly long period in the life span-a time when the individual is relatively helpless and dependent on others. To children, childhood often seems endless as they wail impatiently for the magic time to come when society will regard them as "grown ups" and no longer as children.
The family has always been the most important institution in all societies because of the function it performs. It is the institution that produce new generation, socializes the young, provides care and affection, and regulates sexual behavior. It is now widely agreed that the parent's love and affection are essential for the children's proper development. Some of the early experiences leave indelible impression on the minds of children which to a great extent continue influencing the behavior of children throughout life. From the moment of birth, child requires care in order to survive. Normally, this care is given by the parents or other members of the family. The functions of a family go beyond the essential need to ensure the physical survival of its members, especially the most vulnerable member the newborn baby. A child's first experience of socialization occur in the family. The emotional bond to another human being that in necessary an infant receives from a nurturing adult supplies the foundation for later cognitive development. Even the type of behavior of parents, siblings and other members of society also influences the child's growths. Since the home is first institution therefore parent's temperaments, behavior character and mutual relations influences child's personality development.
Parents, being the primary care takers have much role to play in rearing and caring of children. Recent efforts to determine how parental qualities are important for attachment have shown that attachment does not result only from parental actions that satisfy the child's need for food, water, warmth and relief from pain. The first step in attachment is a process of bonding immediately after birth.
Food is one of the important and basic biological needs of man. Food is the foundation for good health. It is essential for life, growth and repair of human body, regulation of body mechanism, and production of energy for work.
Nutrition of people on the global level is of great concern today particularly in the developing nations.

It is noted that, " the food consumed by a large population in the developing countries of Asia, Africa, and Latin America, are based mainly on energy yielding foods and contain only small amount of protein and protein rich foods. A fair section of the population does not get enough food to eat and their diets are deficient in calories also.

The children in the developing countries suffer from malnutrition. In India the people are affected mainly with malnutrition and this is found to be one of the greatest health problems facing our communities today.

Malnutrition predisposes infection and infection to malnutrition. The malnutrition in the community in general is due to direct and indirect causes. It is a man-made situation.

In developed countries malnutrition is typically the result of disease or illness. Malnutrition can develop through malabsorption of nutrients, increased nutrient losses, increased energy expenditure, and altered utilization of nutrients.

Malnutrition is concerning in children because if affect proper growth and development. Thus, timely and accurate identification of malnutrition in children is critical. The Academy of Nutrition and Dietetics (AND) have recommended several indications to asses and identify malnutrition including growth charts, BMI for age, weight, for height, length/height for age, mid-upper arm circumstance, as well as handgrip strength (HGS).

Handgrip strength is a measurement of functional status. Measuring HGS is easy, non-invasive and inexpensive and may lead to earlier identification of malnutrition in children. HGS reacted faster to change in nutritional status compared to other anthropometric and biochemical measurements in children older than 6 years. HGS is associated with height, weight, age, and gender.

Handgrip strength is one measurement considered under functional assessment. HGS is a measurement of muscle function and is measurement using handgrip dynamometry. The thought behind HGS is that strength in the hands reflects strength elsewhere.

Review of Literature

Matos *et al.* 2007 [7] conducted a study to see if HGS could be used as a screening tool in identifying patients that are classified as being undernourished in a hospital setting. The study found that patients identified through screening as nutritionally at risk had lower HGS and therefore concluded that HGS could be useful in identifying patients at nutritional risk.

Dasgupta *et al.* 2010 conducted a study of 194 adolescent male students ages 10-19 years to determine if there was a difference between BMI and MUAC in determining nutrition status. The result of this study showed that both BMI and MUAC identify malnutrition but that MUAC is more sensitive in identifying malnutrition.

Desmukh *et al.* (2006) [3] while conducting his study on nutritional status of adolescents in rural Wardha reported that overall 53.80 percent of the adolescent were thin,44.00 percent were normal and 2.20 percent were overweight.

Deshmukh *et al.* (1979) Conducted simple anthropometric measurement and physical efficiency treats an adolescent Indian urban boys between 10-14 years and girls between 11-14 years of age.

Chatterjee and Chowdhuri (1991) assessed maximum handgrip strength and endurance of fatiguing isometric handgrip muscle contraction at 40 percent of maximum voluntary contraction of the dominant hand separately for both right and self.

Reed *et al.* (1991) measured maximum grip strength in Kilograms using a hand dynamometer on 344 unrelated boys and girls.

Shiffman (1992) conducted a study examining relationship between pretension pattern type and frequency, hand strength and performance time in functional tasks.

Gasby and Wehbe (1994) studied normal hand strength and the difference between dominant and non-dominant hands.

Desrosiers *et al.* (1995) examined the hand grip strength of 360 subjects Ellis *et al.* (2000) carried out a study on 86 children and youth enrolled at a residential school for the deaf who were matched with 86 children and youth with normal hearing (by age, sex, height, normal, weight and hand preference) from the school.

General Objective

This study is especially designed to assess the malnutrition and Handgrip strength in Institutionalized and non-institutionalized 10-14 years old children.

Specific

I. To study the malnutrition and handgrip strength in Institutionalized10-14 years old children.
II. To study the malnutrition and handgrip strength in non-Institutionalized 10-14 years old children.
III. To find the relation between malnutrition and handgrip strength in Institutionalized and non-Institutionalized 10-14 years old children.
IV. To study the demographic factors among the study.

Hypothesis

- Prevalence the malnutrition is significant among the study group.
- Malnutrition will be poorer among Institutionalized children than the non-Institutionalized children.
- Handgrip strength will be stronger in non-Institutionalized than Institutionalized children.

Research Methodology

Research Design

In order to assess the malnutrition and handgrip strength in Institutionalized and non-Institutionalized10-14 years old children of Hazaribag, and Ranchi district of Jharkhand. Descriptive research design will be adopted. For the purpose Hazaribag, and Ranchi district will be selected for conducting the study. The sample under study consisted of 400 children in the age group of 10-14 years. The sample will be collected disproportionate stratified sampling technique.

Sample Distribution
Sample 10-14 years 400 children

Study of Demographic
The socio-economic profile of the respondents will be included age, sex, caste, parental education i.e. Father's education, mother's education, occupation of father, house type, type of the family, size of the family and income of the family.

I) Tools to be used in collection of data
following methods will be used in the collection of data: I.) Anthropometric Estimation:
Anthropometric measurements included height weight and BMI of the adolescents under the study.

Parameter
Weight
Height
Waist circumference
Body fat percentage

Tools to be used
Weighing Machine
Anthropometric Scale
Measuring tape
Body fat analyzer (Skin fold Calipers, MUAC Tape)

II) Dietary Profile
- Diet Survey - 24 hours recall method / Bowl method
- Food Intake pattern-Self structured questionnaire (Food frequency)

III) Clinical Examination: The schedule will be in accordance with theICMR score card for clinical assessment.

IV) Demographic profile: Self structured pre-tested questionnaire will beused.

V) Ergograph

Inclusion criteria
- All children (both boys and girls) aged 10-14 years.
- mentally stable to provide the details required for the study.
- Co-operative children

Exclusion criteria
- Physically and mentally challenged individuals (children).
- Non-cooperative people

Statistical Analysis
Data will be analysed by using available latest version of SPSS (statistical package for social science) software. Appropriate statistical tests will be applied to find result.

Result and Discussion
Impact of institutionalization on malnutrition of children
This work was done with certain aims in which assessing impact of institutionalization on malnutrition was one of this major aims. For this two scales namely personal data sheet and BMI index were administered procured data was arranged in Table 1.

Table 1: (N, M, SD and t ratio of malnutrition of Institutionalised/Non-Institutionalised children)

S. No	Particulars	N	M	SD	t	P
1.	Institutionalised	200	21.42	2.01	3.37	.01
2.	Non-Institutionalised	200	21.05	1.75		

Considering table 1 it is observed that the N, M and SD of malnutrition of Institutionalised children are 200, 21.42, 2.01 respectively while N, M and SD of malnutrition of non-Institutional children are 200, 21.05, 1.75 respectively. The t ratio between these two groups is 3.37 which is significant on 0.01
It means Institutional children and non-Institutional children are statistically different on malnutrition. So, it can be said that Institutionalised, non institutional has impact of malnutrition.

Impact of institutionalised and non-institutionalised on malnutrition of male children

Table 2: (N,M,SD and t ratio of malnutrition of Institutionalised/Non-Institutionalised male children)

S. No	Particulars	N	M	SD	t	P
1.	Institutionalised	100	22.23	0.16	4.06	.01
2.	Non-Institutionalised	100	21.37	0.09		

Considering table 2 it is observed that the N, M, SD of malnutrition of institutionalised male children are 100 , 22.23 and 0.16 respectively while N, M, SD of malnutrition of non-Institutionalised male children are 100, 21.37 , 0.09 respectively. The t-ratio between these two groups is 4.06 which is significant on 0.01.
It means Institutionalised male children and non-institutionalised male children statistically different on malnutrition. So it can be said that institutionalised male and non-Institutionalised male has impact of malnutrition.

Impact of institutionalized and non-institutionalised on malnutrition of female children

Table 3: (N, M,SD and t ratio of malnutrition of Institutionalised/Non-Institutionalised female children)

S. No	Particulars	N	M	SD	t	P
1.	Institutionalised	100	21.59	0.21	3.57	0.01
2.	Non-Institutionalised	100	20.86	0.16		

Considering table 3 it is observed that N,M,SD of malnutrition of institutionalised
Female children are 100, 21.59 and 0.21 respectively while N,M,SD of malnutrition of non-institutionalised female children are 100,20.86,0.16 respectively. The t-ratio between these two groups is 3.57 which is significant on 0.01

Impact of institutionalised / non-institutionalised on right handgrip strength of children

Table 4: (N,M,SD and t ratio of malnutrition of Institutionalised/Non-Institutionalised children)

S. No	Particulars	N	M	SD	t	P
1.	Institutionalised	200	9.60	5.41	4.42	0.01
2.	Non-Institutionalised	200	13.72	8.07		

Pondering over above table 4 it is observed that N,M,SD of right handgrip strength of institutionalised children are 200, 9.60 and 5.41 respectively on the other hand N,M,SD of right handgrip strength of non institutionalised children are 200,13.72 and 8.07 respectively. The t-ratio between two group is 4.41 which is significant on 0.01
It means both groups are statically different on 0.01 levels. So it can be concluded that non institutionalised children have more right hand grip strength than institutionalised

Impact of institutionalised / non-institutionalised on right handgrip strength of male children

Table 5: (N,M,SD and t ratio of right handgrip strength of male Institutionalised/Non-Institutionalised children)

S. No	Particulars	N	M	SD	t	P
1.	Institutionalised	100	9.40	4.17	5.02	0.01
2.	Non-Institutionalised	100	16.83	9.91		

Pondering over above table 5 it is observed that the N,M,SD of right handgrip strength of institutionalised male children are 100, 9.40,4.17 respectively, on the other hand N,M,SD of right handgrip strength of non-institutionalised male children are 100,16.83,9.91 respectively. The t-ratio between two group is 5.02 which is significant on 0.01.
It means both group are statically different on 0.01 levels. So, it can be concluded that non-institutionalised male children have more right handgrip strength than institutionalised male children.

Impact of institutionalised / Non-institutionalised on right handgrip strength of female children

Table 6: (N,M,SD and t ratio of right handgrip strength of female Institutionalised/Non-Institutionalised children)

S. No	Particulars	N	M	SD	t	P
1	Institutionalised	100	6.17	4.54	5.52	0.01
2	Non-Institutionalised	100	10.95	7.01		

Pondering over above table 6 it is observed that the N,M,SD of right handgrip strength of institutionalised female children are 100,6.17,4.54 respectively, on the other hand N,M,SD of right handgrip strength of non-institutionalised female children are 100,10.95,7.01 respectively. The t-ratio between two groups is 5.52 which is significant on 0.01
It means both group are statically different on 0.01 levels. So it can be concluded that non-institutionalised female children have more right hand grip strength than institutionalised female children.

Impact of institutionalised / non-institutionalised on left handgrip strength of children

Table 7: (N,M,SD and t ratio of left handgrip strength of Institutionalised/Non-Institutionalised children)

S. No	Particulars	N	M	SD	t	P
1.	Institutionalised	200	12.35	5.71	5.01	0.01
2.	Non-Institutionalised	200	19.79	9.60		

Pondering over above table 7 it is observed that the N,M,SD of left handgrip strength of institutionalised children are 200,12.35,5.71 respectively, on the other hand N,M,SD of left handgrip strength of non-institutionalised children are 200,19.79,9.60 respectively. The t-ratio between two group is 5.01 which is significant on 0.01
It means both groups are statically different on 0.01 levels. So it can be concluded that non-institutionalised children have more hand grip strength than institutionalised.

Impact of institutionalised / non-institutionalised on left handgrip strength of male children

Table 8: (N, M, SD and t ratio of left handgrip strength of Institutionalised / Non-Institutionalised male children)

S. No	Particulars	N	M	SD	t	P
1.	Institutionalised	100	9.56	7.91	6.01	0.01
2.	Non-Institutionalised	100	16.08	9.73		

Considering table 8 it is observed that the N, M, SD of left handgrip strength of institutionalised male children are 100,9.56,7.91 respectively, on the other hand N, M, SD of left handgrip strength of non-institutionalised male children are 100,16.08,9.73 respectively. The t-ratio between two group is 6.01 which is significant on 0.01.
It means both group are statically different on 0.01 levels. So it can be concluded that non-institutionalised male children have more left hand grip strength than institutionalised male children.

Impact of institutionalised / non-institutionalised on left handgrip strength of female children

Table 9: (N,M,SD and t ratio of left handgrip strength of Institutionalised/Non-Institutionalised female children)

S. No	Particulars	N	M	SD	t	P
1.	Institutionalised	100	12.19	6.81	6.01	0.01
2.	Non-Institutionalised	100	23.66	9.73		

Considering table 9 it is observed that the N,M,SD of left handgrip strength of institutionalised female children are 100,12.19,6.81 respectively, on the other hand N,M,SD of left handgrip strength of non-institutionalised female children are 100,23.66,9.97 respectively. The t-ratio between two group is 6.01 which is significant on 0.01 level.
It means both group are statically different on 0.01 levels. So it can be concluded that non-institutionalised female children have more left hand grip strength than institutionalised female children.

Main Findings

- Institution has impact on malnutrition.
- Non-Institutionalized male children are more malnourished than male Institutionalized children.

- Non-Institutionalized female children are more malnourished than female Institutionalized children.
- Non-Institutionalized children have more right handgrip strength than Institutionalized children.
- Non-Institutionalized male children have more right handgrip strength than Institutionalized male children.
- Non-Institutionalized female children have more right handgrip strength than Institutionalized female children.
- Non-Institutionalized children have more left handgrip strength than Institutionalized children.
- Non-Institutionalized male children have more left handgrip strength than Institutionalized male children.
- Non-Institutionalized female children have more left handgrip strength than Institutionalized female children.
- Non-Institutionalized children have more left handgrip strength than Institutionalized children.
- Non-Institutionalized male children have more left handgrip strength than Institutionalized male children.
- Non-Institutionalized female children have more left handgrip strength than Institutionalized female children.
- Institutional has impact on general appearance.
- Non-Institutional children have more good and fair than Institutional children.
- Non-Institutional children have more normal hair than Institutional children.
- Institutional children have more normal eye than Non-Institutional children.
- Institutional and Non-Institutional both children have normal gums.
- Institutional children have more chalky and dis-colored teeth then Non-Institutional children.
- Institutional children have more angular teeth than Non-Institutional children.
- Dietary Behavior of the Institutional and Non-institutional children.
- Institutional has impact on dietary behavior.
- Non-institutional girls children have more intake pulses, green leafy vegetables, fruits fats and sugar than Institutional girls children.
- Institutional girls children have more intake cereals, roots and tubers, other vegetables than Non-institutional girl children.
- Institutional boys have more intake cereals, roots and tubers, other vegetables than Non-institutional boys children.
- Non-institutional boys children have more intake pulses, green leafy vegetables, fruits, milk, fats and sugar than Institutional boys children.

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