



# Evaluation of Body Mass Index in Cerebral Palsy Children: Pilot Study

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## **Abstract:**

Pilot study was done on 30 cerebral palsy subjects. The outcome measured used was body mass index. The result of the study was that undernourished children were more in cerebral palsy population followed by overweight and least was obese. Mean and Standard deviation were calculated for the above sample. Single sample "t test" was used to find p value.

Index terms: cerebral palsy; body mass index, weight; height;

## **Introduction:**

Cerebral palsy (CP) is the most common cause of disability in childhood. Children with cerebral palsy (CP) are known to have limitations in activity and functional abilities.<sup>1</sup>Cerebral palsy (CP) has been defined as group of disorders affecting the development of movement and posture, causing activity limitation, that are attributed to non-progressive disturbances that occurred in the developing fetal or infant brain. The motor disorders of CP are often accompanied by disturbances of sensation, cognition, communication, perception, and/or behaviour, and/or by a seizure disorder<sup>2</sup>. When compared with normal children, children with cerebral palsy (CP) have malnutrition, poor oral motor function, and insufficient function of the upper extremities, insufficient nutrition and growth retardation arising from cognitive disorders<sup>3</sup>. However, recent studies have shown that children with CP with a lower degree of involvement (hemiparetic and diparetic) and with better function have a higher rate of obesity compared to children with CP with a higher degree of involvement<sup>3</sup>. Similarly, children with a low degree of involvement have a lower rate of neuromuscular disorder arising from spasticity and decreased motor control which affects functional activities in daily life compared to children with a moderate and high degree of involvement. However, they have less energy consumption, limited participation in physical activities and sportive activities compatible with their age compared to their healthy peers. Thus, the risk of obesity is increased in these children who are more immobile compared to healthy children<sup>3</sup>.

It has been reported that obesity causes to a defect in functional disease rate and many health problems<sup>1</sup>. Obesity complicates the success of daily activities further and may affect the general health negatively by leading to limitation in participation in physical activities and insufficient self-care<sup>4</sup>. These problems in children with CP together with feeding problems may result in limitation in social participation, indifference, decreased learning ability, limitation in playing activities and decreased academic success with decreased consumption of energy which is required for participation in activities. This may considerably decrease the general well-being and quality of life of the child<sup>4</sup>. Anthropometry is one of the most basic tools for assessing nutritional status, whether over nutrition or under nutrition. A variety of methods are available to measure body fatness and body thinness<sup>5</sup>

Height- and weight-based measurements are the most practical tools for assessing nutritional status because of their simplicity and low cost. Of these methods, BMI is the one most commonly recommended and widely used for classifying overweight and obesity in adults and has also been recommended for screening overweight and obesity in adolescents and children<sup>5</sup>. Body mass index measure (BMI) Is a simple index of weight for height that is commonly used to classify underweight, overweight, and obesity. It is defined as the weight in kilograms divided by the square of the height in meters<sup>6</sup>. BMI is most commonly used clinical assessment of the body composition and is recommended index to identify overweight and obesity in children, adolescents, and adults<sup>2</sup>. The aim of the study is to find out the Body mass Index (BMI) of cerebral palsy children and to analyse different categories of weight. The purpose of the study is to evaluate and analysis the body Mass Index(BMI) in cerebral palsy children as these children have less physically activity, oro-motor issues and are suffering from nutritional deficiency . So if we get the status of these children in regard to BMI and categories of weight, we can plan different activities for improving their health, wellbeing and quality of life.

### **Methodology:**

A pilot study was done on 30 subjects of cerebral palsy children (all types). . The data was collected from Amar Jyoti research and rehabilitation centre Delhi (permission taken). Convenient sampling was used to identify the children. The variables identified for the study was BMI, height, weight. Well diagnosed children with cerebral palsy (all type) with age of 5 to 15 yrs. with or without assistive devices were identified. Whereas cerebral palsy children who require feeding via gastrostomy tube and other developmental disorders were excluded

Outcome measures: Body mass index measure (BMI)<sup>7</sup>: Is a simple index of weight for height that is commonly used to classify underweight, overweight, and obesity. It is defined as the weight in kilograms divided by the square of the height in meters. BMI is most commonly used clinical assessment of the body composition and is recommended index to identify overweight and obesity in children, adolescents, and adults

The categories that describe person's weight are:

- Underweight: BMI is below 5<sup>th</sup> percentile age, gender and height
- Healthy weight: BMI is equal to or greater than 5<sup>th</sup> percentile and less than 85<sup>th</sup> percentile for age, gender and height
- Overweight: BMI is at or above the 85<sup>th</sup> percentile but less than 95<sup>th</sup> percentile for age, gender and height
- Obese: BMI is at or above the 95<sup>th</sup> percentile for age , gender and height

### **Instrumentation:**

- Weighing machine
- Measuring tape/Inch tape
- Calculator (online)
- BMI charts
- Pen
- Marker
- Assessment forms

### **Procedure protocol:**

- Permission from the authorities of Amar Jyoti institute of Research and Rehabilitation; Delhi for conducting research was taken
- Informed consent from guardians/participants was taken.
- Height and weight of participants were measured and BMI of each child was calculated individually using BMI online calculator.
- Collected data was organized and entered into Microsoft excel for making the master chart for data analysis.
- Data was analyzed using statistical test with the help of a statistician.
- Results were formed according to data analysis of data.
- Study was concluded on the basis of the result of data analyzed.

**Data analysis:**

The data was managed on excel spread sheet and was analyzed using SPSS (statistical package for the social sciences) software, version 21. For all statistical tests, the level of significance was set at p value was calculated. All values were expressed as mean and standard deviation.

**Results:**

Total of 30 subjects participated in the study in which 23 were male and 7 female Table1;Graph1 .Descriptive analysis was done and mean of the BMI score were calculated with standard deviation as reflected in table 2and Graph2.

Table1: Distribution of gender in percentage

	Gender	Frequency	Percent
GENDER	Male	23	76.7
	Female	7	23.3

Graph1: Distribution of subjects as per gender

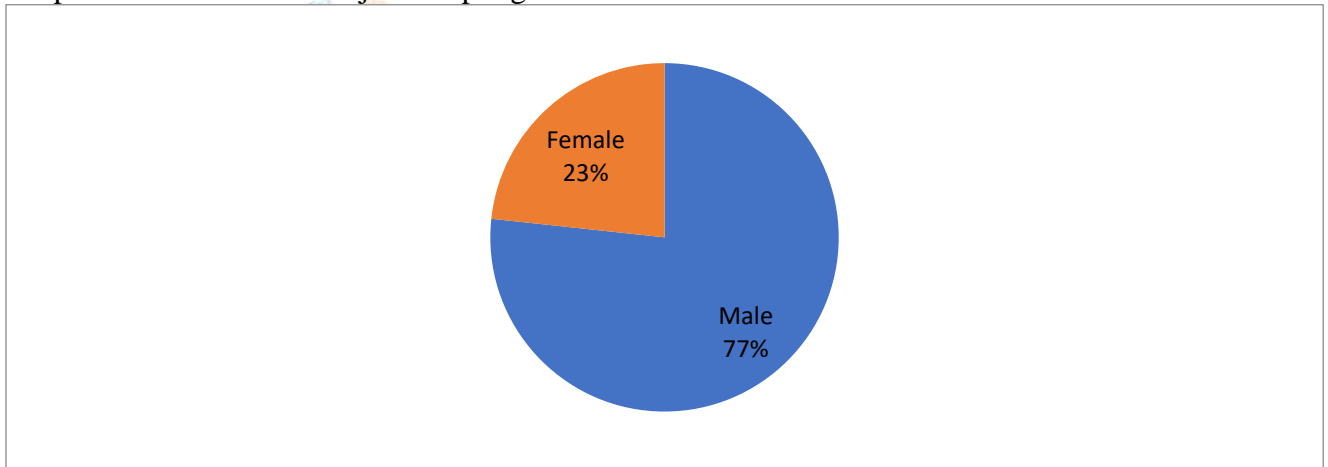
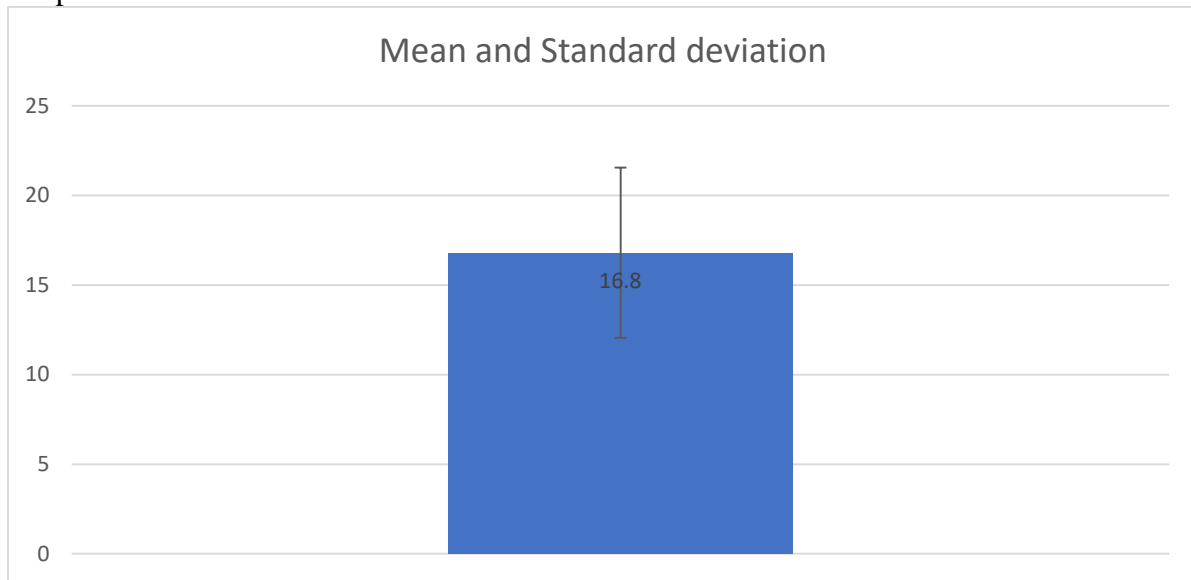


Table2: Mean and standard deviation of BMI scores

N	BMI	Mean	±S.D
30		16.80	4.75

Graph2: Mean and standard deviation

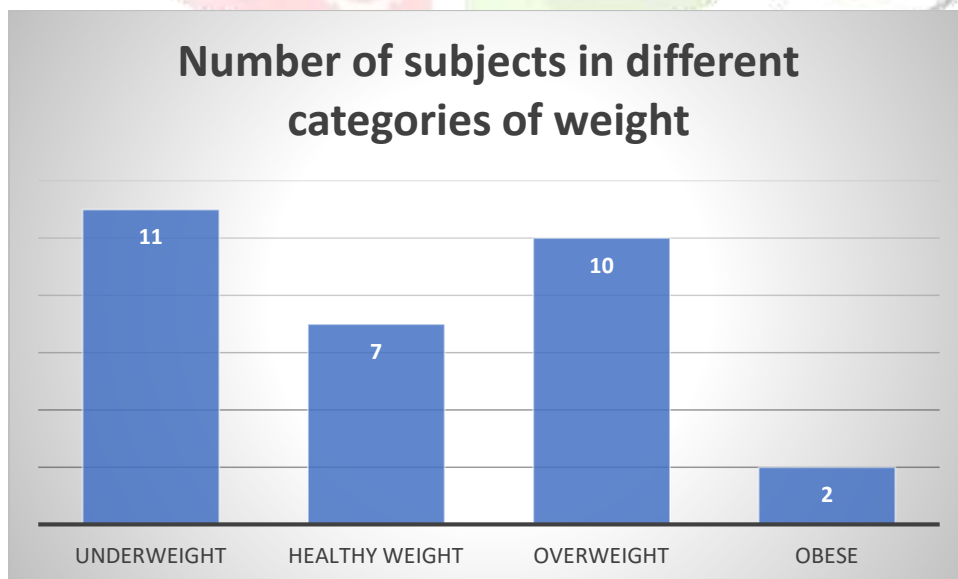


BMI was calculated for 30 subjects , it was found that underweight were 11 followed by overweight which were 10 then there were 7 healthy weight subjects and at last 2 obese subjects as illustrated in Table3 and reflected in Graph3(a, b). Mean and standard deviation of all categories of weight as per BMI was established as illustrated in Table4 and Graph4

Table3 Total number of subjects in different categories of weight

	N	Frequency	Percent
BMI STATUS	1 (Underweight)	11	37
	2 (Healthy weight)	7	33
	3 (Over weight)	10	23
	4 (Obese)	2	7

Graph 3a: Distribution of subjects in different categories of weight



Graph 3b: Distribution of subjects in percentage basis in different categories of weight

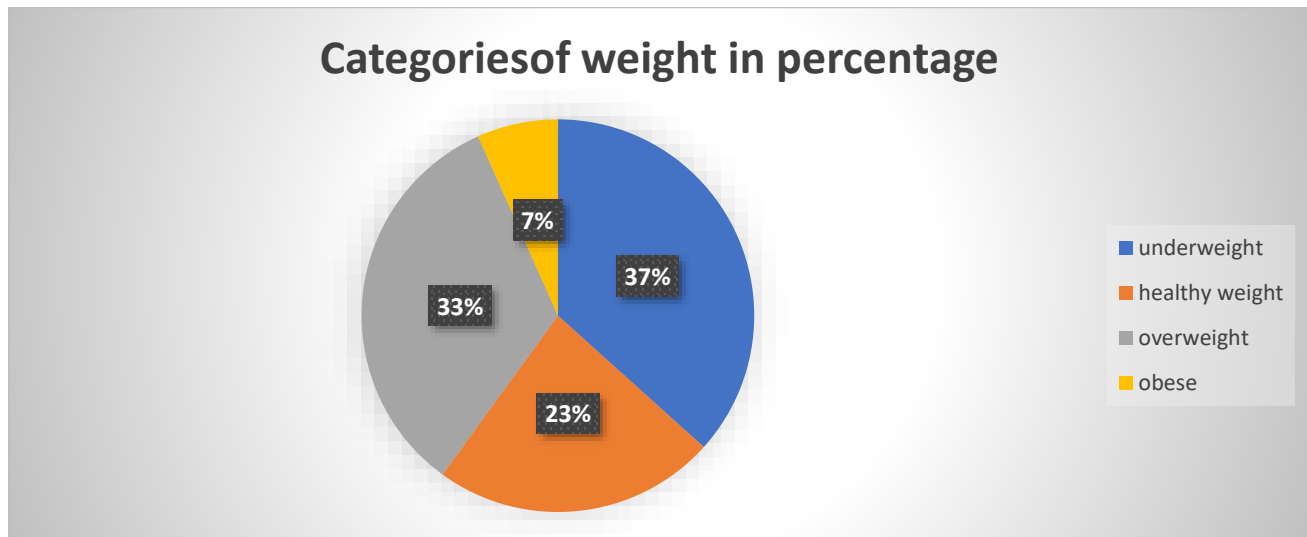
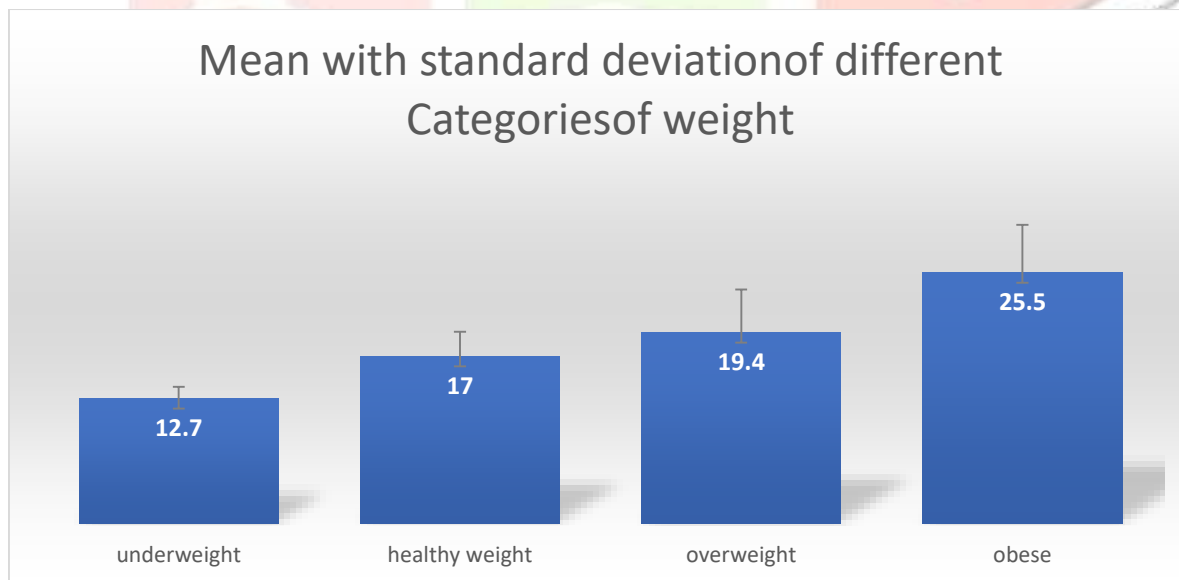


Table 4: Mean of all categories were established

Categories	Mean	Stand deviation
Underweight	12.7	1.2
Healthy weight	17	2.5
overweight	19.4	4.4
obese	25.5	4.9

Graph4: Mean and standard deviation in different categories of BMI



In this study it was found that BMI of underweight CP children is more followed by overweight and obese are the least

Single sample t test was analysed and “t test static” was 0.96. The p value was .34 and result is not significant at  $p < .05$  as sample size is too small

## ***Discussion:***

Although children with CP are often viewed as undernourished and growth impaired, a number of studies propose mechanisms that may place children with CP at a high risk of becoming overweight<sup>14</sup>. First, children with CP are often born either small for gestational age or prematurely; both of these are shown to be independently related to obesity<sup>6</sup>.

The individuals with CP encounter a unique set of medical and social issues specific to their disability that often restricts participation in physical activities<sup>6</sup>. This gives rise to conflict between undernourishment & overweight. So the aim of this study was to analyse body mass index of children with cerebral palsy and study reflected that underweight cp are more followed by overweight and least are obese.

The reason can be ambulatory children have a high rate of being under weight or at the risk of being under weight, whereas non ambulatory children tend to be overweight or at a risk of being overweight. Under nourishment because of oro-motor issues are also the reason for undernourishment. The results of the study are supported by the following studies:

Finding was supported by Hurvitz EA et al<sup>6</sup> who investigated the prevalence of overweight in clinical based population of children with cerebral palsy related to gross motor function classification using a retrospective chart review calculated BMI and recorded gross motor function classification scale. The child with a disability faces unique problems when considering issues related to physical activity. In general, individuals with disabilities who wish to increase their activity levels face problems of accessibility or improper training. It is therefore not surprising that many types of disabilities lead to a higher prevalence of overweight and obesity in individuals who have them than in their able-bodied peers.<sup>8</sup> Patrícia Ayrosa C. Lopes et al<sup>9</sup> assessed the food intake pattern and the nutritional status of children with cerebral palsy. They used a Cross-sectional study with 90 children from two to 12.8 years with cerebral palsy in the following forms: hemiplegia, diplegia, and tetraplegia. Nutritional status was assessed by weight, height, and age data. Food intake was verified by the 24-hour recall and food frequency questionnaire. The ability to chew and/or swallowing, intestinal habits, and physical activity were also evaluated and conclude that children with cerebral palsy presented inadequate dietary pattern and impaired nutritional status, with special compromise of height. Tetraplegia imposes difficulties regarding chewing/swallowing and moderate physical activity practice.

## ***Conclusion:***

30 children with cerebral palsy of age group (5-15 years) were taken in the study, body mass index measures were taken of each child. It was found that underweight cp children are found the most and then overweight, Obese were the least. That can be because of less physical activity or non-ambulatory children. Oro-motor issues can also contribute for weight disturbances. So for better treatment we have to plan goals accordingly in treatment aspects.

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