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BMI and Body fat percentage difference between caesarean and non-caesarean school girls

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Abstract

Background: Childhood obesity is a growing global health problem. Modern world with increasingly cheap, high calorie food, prepared foods that are high in things like salt, sugars or fat, combined with our increasingly sedentary lifestyles, increasing urbanization and changing modes of transportation, it is no wonder that obesity has rapidly increased in the last few decades, around the world. There is one question which always arise in our mind whether delivery mode can effect on children's BMI and Body Fat% ! The purpose of the study is to find out the difference in BMI and Body fat percentage level between caesarean and non-caesarean school Girls.

Materials & Method: Total number of subject selected for the study was 160, out of which 80 were Caesarean and 80 Non- Caesarean. They were doing study in class IX-X level from five difference school located at Bolpur and Kolkata, West Bengal in India. Measuring tape and Weighing machine was used for measuring standing height and body weight for calculating BMI. Dial type Skin fold Caliper was used for measuring fat% and Calculating the body fat%, Brozek et al 1963 fat percentage measurement formula & Jackson Pollock body density measurement formula was used. The collected data had calculated by using descriptive statistics and "t" test and level of significance was set on 0.05 level.

Result: There was a significance difference exist on BMI and Body Fat% level between caesarean and non-caesarean girls.

Conclusion: The finding demonstrated that caesarean born Girls has possessed higher BMI and Body Fat% level than Non- Caesarean Girls.

Keywords: Fat, Caesarean, Non- caesarean, Delivery, Skin Fold

Introduction

Human evolution is characterized by a number of morphological, developmental physiological, and behavioural changes that have taken place since the split between the last common ancestor of humans and chimpanzees. The most significant of these adaptations are bipedalism, increased brain size, lengthened ontogeny (gestation and infancy), and decreased sexual dimorphism.

Anatomically, the evolution of bipedalism has been accompanied by a large number of skeletal changes, not just to the legs and pelvis, but also to the vertebral column, feet and ankles, and skull. The femur evolved into a slightly more angular position to move the centre of gravity toward the geometric centre of the body. The most significant changes occurred in the pelvic region, where the long downward facing iliac blade was shortened and widened as a requirement for keeping the centre of gravity stable while walking; bipedal hominids have a shorter but broader, bowl-like pelvis due to this. A drawback is that the birth canal of bipedal apes is smaller than in knuckle-walking apes, though there has been a widening of it in comparison to that of australopithecine and modern humans, permitting the passage of newborns due to the increase in cranial size but this is limited to the upper portion, since further increase can hinder normal bipedal movement (Human evaluation -Wikipedia 2016)^[1]. The shortening of the pelvis and smaller birth canal evolved as a requirement for bipedalism and had significant effects on the process of human birth which is much more difficult in modern humans than in other primates. The evaluation of bipedalism has been accompanied by large number of changes and from that point of view, the birth pattern are also changed. Now a day more than a large number of birth take place by c-section. Caesarean section is a surgical procedure in which incisions are made through a woman's abdomen and uterus to deliver her

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baby Observing the difference in birth pattern the researcher want to understand whether the differences in birth pattern has any effect on BMI and Body fat percentage of human being. That may the researcher took up the study.

Methodology

In order to find out the difference in BMI and Body Fat% level between caesarean and non-caesarean school girls, the researcher randomly selected 160 school girls, out of that 80 were Caesarean and 80 Non-Caesarean. These school girls were doing study in class IX-X level from five difference school located at Bolpur and Kolkata, West Bengal, India. Measuring tape and Weighing machine was used for measuring standing height and body weight for calculating BMI and used WHO, 2008 BMI formula. Estimation of Body fat by skin fold thickness measurement, the researcher used Dial type Skinfold Caliper and measure four different standard anatomical sites around the body. This four side are Triceps, Abdomen, Supra iliac and Thigh. The right side is usually only measure (for consistency). After collecting four skin fold side measurement for the estimation of body fat% the researcher used Brozek *et al.* 1963 fat percentage measurement formula and Jackson Pollock & Word (1980)^[16] Body density measurement formula.

The formula which is used for the study is mentioned below:

WHO, 2008

$$\text{BMI} = \frac{\text{Body weight in Kilogram}}{(\text{Standing Height in meters})^2}$$

Brozek et al.1963-

$$\% \text{Fat} = 100(4.570/\text{Body Density}-4.142)$$

Jack son, Pollock & word 1980^[16]

$$\text{Body Density} = 1.096095 - 0.0006952(X) + 0.0000011(X)^2 - 0.0000714 x \text{age}$$

Where X= Sum of Triceps, Abdomen, Supra iliac and Thigh skin fold in mm x age=Age in years

The collected data were calculated by using descriptive statistics and "t" test and level of significance was set on 0.05 level.

Analysis of data

To find out the difference in BMI and Body fat% level between caesarean and non-caesarean school girls, descriptive statistics and "t" test were applied at 0.05 level of Significant and it is presented in the table.

Table 1: Mean, SD and t-value of BMI of Caesarean and Non-Caesarean Girls

Category	Mean	SD	t-value
Caesarean	22.17	4.77	2.458*
Non-Caesarean	20.56	3.39	

Table value- t 0.05 (158) = 1.97

*= Significant.

Table-1 and Figure-1 clearly revelled that, the Mean and SD of Caesarean and Non-Caesarean Girls were 22.17 ± 4.77 mm. and 20.56 ± 3.39 mm. The calculated "t-value" (2.458) is higher than Tabulated "t-value" (1.97) at 0.05 (df= 158). So according to statistics, it can be said that there was a significant difference exist on BMI between Caesarean and

Non-Caesarean Girls.

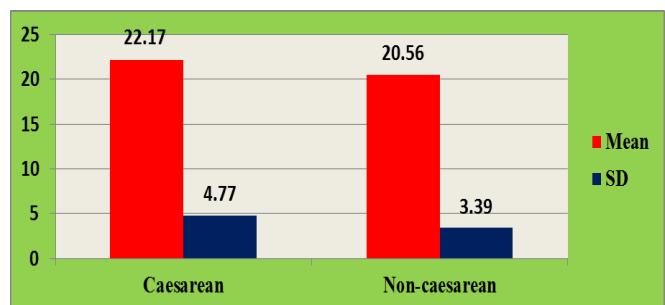


Fig 1: Graphical representation of Mean and SD of BMI of Caesarean and Non-Caesarean Girls.

Table 2: Mean, SD and t-value of Body Fat % of Caesarean and Non-Caesarean Girls.

Category	Mean	SD	t-value
Caesarean	22.33	5.11	2.703*
Non-Caesarean	20.29	4.40	

Table value- t 0.05 (158) = 1.97

*= Significant.

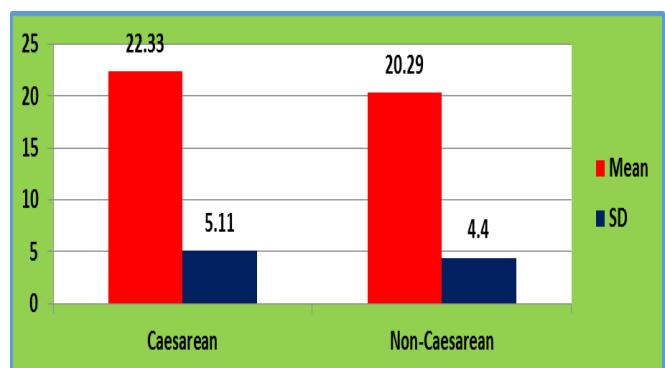


Fig 2: Graphical representation of Mean and SD of BMI of Caesarean and Non-Caesarean Girls.

Table-2 and Figure-2 shows that the Mean and SD of Caesarean Girls were 22.33 ± 5.11 . while for non-caesarean it was 20.29 ± 4.40 mm. The calculated "t-value" between caesarean and non-caesarean girls were 2.703. The calculated t-ratio was greater than the tabulated t- ratio ($2.703 > 1.97$) with respect of df (158). Hence there was a significant difference found between Caesarean and Non-Caesarean Girls in relation to their Body fat percentage.

Results and Discussion

From the result it was observed that significance difference found in selected anthropometric variables namely: Body mass index and Body fat percentage between non-caesarean and caesarean girls both at 0.05 level of significance.

From the mean comparison it was found that Caesarean posses more fat percentage than non-caesarean girls.

From this study it can be said that the Body mass index and body fat percentage of non-caesarean girls were better than caesarean girls.

The reason may be due to the different intestinal bacteria. This type of bacteria belongs mothers birth canal. When babies born by normal delivery then this type of bacteria direct transfer from mom's to baby, but c-section baby have lower levels of this bacteria. Gut bacteria is a type of bacteria. This bacteria affect the efficiency of energy extraction from nutrients and may stimulate cells to boost insulin resistance.

Inflammation, and fat deposits, the researcher write. Specifically, higher numbers of Firmicutes and lower numbers of Bacteroides colonize the guts of children born by caesarean delivery. This pattern in the gut microbiomes of obese individuals and larger number of firmicutes bacteria causes obesity [8].

The researcher accomplished with the findings and the purpose of the study which was initially conceptualized. Elisabeth Svensson *et al.* (2013) concluded that birth by caesarean section was associated with an increased risk of obesity among men. Matthew J. Hyde (2014) concluded that there is a strong association between CS and increased offspring BMI, overweight and obesity in adulthood. Denise N Mesquita *et al.* (2013) [5] concluded that subject born by caesarean section had a higher risk for increased peripheral and central adiposity during young adult age compared to those born by vaginal delivery. Rodrigo M. et al (2015) suggest that a higher probability of developing obesity among children born by Caesarean section. In newborn cohort study from U.S., Rooney *et al.* reported that the mode of delivery was associated with increased relative risk of obesity in childhood for caesarean delivery (9). A study conducted in U.K. by Blustein *et al.* with 10,219 children identified a significance association between Caesarean Section and overweight in 11 years old (10).

The Susanna Y. Huh and colleagues completed their work with 1255 mother child pairs attending 8 outpatient maternity practices in the Boston area between 1999 and 2002. They found nearly 16% children delivered by Caesarean Section became obese compared with 7.5% of those born vaginally. The present study shows the similar trend of result which the other researcher had discussed in their previous study.

Conclusions

Within the limitation of the present study the following conclusions were drawn on the basis of obtain difference exist on BMI and Body Fat percentage level of Caesarean and Non-caesarean girls. The finding demonstrated that BMI and Body fat% level of a baby who born Caesarean section have more than a baby who had born by Normal delivery.

Recommendation

On the basis of the findings of the present study, the following recommendation can be made-

- Similar study may be conducted on larger subjects with same or other variables.
- Similar study may be conducted on the basis of socio-economic condition, rural and urban areas student.
- The present study will helpful for further research in the field of Physical Education and Medical Science.

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