Impact of Body Mass Index on Cognitive Attention Function in University Students

Soma Bhattacharya¹ and Aparna Sarkar²*

¹Department of Physiology, Amity University Uttarpradesh, India
²Amity Institute of Physiology & Allied Sciences, Amity University Uttarpradesh, India

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*Corresponding author: Aparna Sarkar, Dept of Physiology, Amity Institute of Physiology & Allied Sciences, Amity Institute of Physiotherapy, Amity University Uttarpradesh, Noida, India, Email: asarkar@amity.edu

Abstract

Introduction and background: The relationship between obesity and attention, particularly in young adults has important implications for physical and psychological health and well being. A better understanding of this relationship could help target psychology services and public health strategies more effectively. The aim of the present study was to assess the effect of body mass index (BMI) of an obese person on their attention-cognition of the undergraduate allied health science students in Amity University, Noida.

Aim: The aims of this study were to find out the effect of BMI on attention-cognitive function on college students & to correlate BMI with attention of individual.

Methods: The study was carried out on 18-25yr old allied health science students of Amity University, Noida. Physical self concept was assessed using short version of physical self description questionnaire (PSDQ-S).

Statistical analysis: Unpaired t-test was applied to find out the level of significance between non-obese and obese groups. Pearson’s correlation was applied to find out any correlation between BMI and attention score. P was set at <0.05 which was considered to be significant.

Results: It was found that attention score obtained by obese group was less than the score obtained by non obese group (p<0.02). When BMI was correlated with attention score, it was found that obesity has negative impact on attention-cognitive function of individuals.

Discussion and conclusion: Childhood is a critical period in the development of certain cognitive functions and young people are confronted daily with learning situations. The effects of attention on obese is an important public health issues. There was decreased attention score in obese group when compared with non obese group. We concluded that the obesity has a negative effect on attention which is one of the essential components of cognitive function of an individual.

Keywords: Body mass index; Cognitive function; Attention; PSDQ-S; Time taken

Introduction

The prevalence of obesity is increasing world-wide & the major causative factors are related to life style changes occurring due to socio-economic transition. Reduced physical activity at work due to mechanization, improved motorized transport, preferences for viewing Television & consumption of fast food & sweetened carbonated drinks resulted in positive energy balance in most of the Asian countries. As youths move through adolescence, their participation in physical activity declines markedly. The immediate risks of obesity for physical health are well established [1]. Overweight and obesity are a major public health issue despite increased awareness, the prevalence of obesity continues to rise in many countries. There is growing evidence that obesity is also associated with adverse Neuro-cognitive outcomes including Alzheimer’s disease, stroke and vascular dementia. Research demonstrates an association between an adverse effect of obesity including attention with time taken [2].

The mechanisms for obesity related cognitive dysfunction remain poorly understood. Another likely contributor to obesity related cognitive dysfunction is reduced cardiovascular fitness. Many obese individuals have poor cardiovascular fitness, perhaps attributable to low levels of physical activity and attention found in this population. Similarly, a weight loss program combining diet and exercise was associated with improved Neuro cognitive functioning in obese adults [3]. The regular practice of physical activity is now recognized as an important element of good physical and mental health and this for all ages. The effect of obesity on attention-cognitive function
in allied health science students in Amity University, Noida. The study was done to evaluate the correlation between obesity and attention by using PSDQ-S.

**Material and Methods**

**Subjects**

The study population consisted of fifty Allied health science students of Amity University of both sexes at age group between 18-25 years. The height and weight of each student was recorded and BMI was calculated. Subjects are divided into two groups obese (experimental) and non-obese (control). The students having BMI of 18-24.9kg/m² (n=23) were selected randomly to form the control group. Obese students >25kg/m² (n=23) were considered to form control group. Subjects having physical and mental illness were excluded from the study. Stop watch was issued to every student to note down their attention time while filling PSDQ-S questionnaire.

**Procedure**

Written consent was obtained from the students and PSDQ-S (physical self description questionnaire) was administered to the participants on a single session. Confidentiality of subject’s information & data were maintained. The questionnaires were distributed during class time & instructions delivered verbally to complete the PSDQ sincerely & no discussion was allowed throughout the test. Time taken during filling the questionnaire was noted to score their attention. Diet chart was not prescribed to the subjects.

**Statistical analysis**

**Table 1: Demographic data of participants.**

<table>
<thead>
<tr>
<th>Sl.no</th>
<th>Variables</th>
<th>Non-Obese</th>
<th>Obese</th>
<th>SE</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Age (yrs)</td>
<td>19.73±1.32</td>
<td>21±2.74</td>
<td>0.694</td>
<td>2.087</td>
<td>0.0421*</td>
</tr>
<tr>
<td>2</td>
<td>Height (cm)</td>
<td>5.3±0.38</td>
<td>5.4±0.28</td>
<td>0.098</td>
<td>1.016</td>
<td>0.315</td>
</tr>
<tr>
<td>3</td>
<td>Weight (kg)</td>
<td>51.5±7.74</td>
<td>69.95±7.67</td>
<td>2.171</td>
<td>8.457</td>
<td>0.0001**</td>
</tr>
<tr>
<td>4</td>
<td>BMI (kg/m²)</td>
<td>19.73±2.02</td>
<td>26.44±1.35</td>
<td>0.394</td>
<td>17.033</td>
<td>0.0001**</td>
</tr>
</tbody>
</table>

**Table 2: Comparison of attention time taken between obese & non obese groups.**

<table>
<thead>
<tr>
<th>Sl.no</th>
<th>Variables</th>
<th>Non-Obese</th>
<th>Obese</th>
<th>SE</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Time taken (sec)</td>
<td>295.86±47.47</td>
<td>340.34±93.46</td>
<td>21.378</td>
<td>2.0806</td>
<td>0.0433*</td>
</tr>
</tbody>
</table>

Statistical analysis was done using SPSS statistics software version 19. The normally distributed continuous data was presented as Mean±SE. Students t-test (unpaired) was applied to compare the mean time taken by non-obese and obese group to fill up questionnaire. The difference was considered statistically significant if probability of chance was less than 0.05 (p<0.05). Pearson’s correlation test was to find out correlation between obesity and time taken (Table 1 & 2).

It was found from Table 2 that mean difference between time taken for PSDQ-S questionnaire between obese and non-obese groups was significant (p<0.04). There was decreased attention score in obese group when compared with non-obese group.
Pearson's correlation test was applied to find out correlation between BMI & attention score in obese group. It was found that $r = 0.0638$. It showed that a weak negative correlation was existing between these two variables. The nearer the value is to zero, the weaker the relationship. The value of $R^2$, the coefficient of determination, is 0.0041. When Pearson's correlation test was applied between BMI & attention score in non-obese group, it was found that $r = 0.1057$ which indicated a strong negative correlation between the variables. The value of $R^2$, the coefficient of determination is 0.0112 (Figure 1-3).

Discussion & Conclusion

The study was designed to examine the effect of obesity on attention. There was a significant difference between non-obese and obese groups. These results demonstrated that in obese subjects, attention score was lower than non-obese subjects. It was stated that the consequences of obesity may differ in ideal body size and obesity stigma. This study demonstrated that there was an interaction between obesity and attention that affects IQ of college students. The results showed that being obese i.e. the presence of a socially undesirable characteristic has little negative consequences on the self perceptions of Indian students. Similar results had been reported earlier in a study carried out on Chinese students aged 16-25yrs. The authors had suggested that apparently the negative stigma associated with obesity varies from culture to culture; therefore there were no negative consequences in Chinese students. Studies based predominantly on western research had shown that obese children and adolescents had significantly lower self esteem.

Our study stated that BMI had weak correlation with attention. Authors indicated that there is no significant correlation between BMI and impulse control reaction. Obesity apparently does not have the socially undesirable connotations for Indian youth. Marsh et al reported reciprocal effects between self concept and accomplishment i.e. self concept is both a cause of subsequent accomplishments and an effect of prior accomplishments [8]. Our subjects were college going undergraduate students. Obese subjects earned lower attention score which imparted a negative impact on attention.

Greater BMI was still associated with poorer cognitive function in the current sample in our study. The majority of studies, both in adults and children, found that overweight/obesity was associated with reduced cognitive ability and school out comes [15-17]. In a large group of children and adolescents between 8 and 16 years of age, overweight children performed poorly in tests measuring visuospatial organization and general mental ability even after adjusting for a number of potential confounders. However, some studies show a continuous relationship between BMI and cognitive performance that is not limited to overweight players. Alternatively, obesity could have some adverse effect on brain function, possibly due to the secretion of hormones, pro-inflammatory cytokines or growth factors by adipose tissue that can cross the blood brain barrier [18]. Cornet et al. [4] showed that the performance of individuals with high body mass index were lower than those of low BMI individuals.

We concluded from this study that BMI has negative impact on attention which is one of the important components of cognition of the individual.

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References


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