Comparison between simple visual reaction time in obese, overweight and normal children

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ABSTRACT

Present study aims at comparing simple visual reaction time among obese, overweight and normal children. The statistical population of the study includes 120 students, [60 girls and 60 boys, Age= 8 to 12] who were selected by Purposive Random Sampling method and according to Body Mass Index have been classified in three obese, overweight and normal groups. For doing so the individual questionnaires and health information of students have been requested then SINA Software was used to measure the reaction time. Validity and reliability of this software has been reported as 0.79 and 0.87 respectively using test – retest method. Collected data has been evaluated by ANOVA method. There was no significant difference in the findings of visual reaction among three groups (P=0.786). Achieving conflicting results with other studies may be related to the use of simple reaction time. Therefore, further research and the use of other reaction measures are required in this regard.

Introduction

The prevalence of obesity is increasing among children (1). Obesity is identified as an epidemic illness and its relationship with multiple factors which threaten the health has been determined (2). It has been concluded that there is a poor coordination in overweight and obese children (3.4). Maybe the difference exists in the performance of obese and overweight children about special motional duties which are done less cooperatively and also this difference is mostly related to the
their abilities to move their body mass that is particularly opposed to gravity in time-limited skills (5). Among the cognitive activities, which attracted the interest of researchers in recent years, is reaction time and prediction skill (6). The reaction time is the time gap between the moment of facing a stimuli or the arrival of signal suddenly till the moment of starting to respond that sudden stimuli. Perceptual abilities are essential for successful performance of the most daily activities (7). Obesity refers to much body fat or too much body mass regarding the height which increases the risk of suffering from illnesses for that person (8). Moreover the importance of these abilities is essential in difficult sport conditions especially at high speeds to prepare appropriate physical responses. In a way that a successful athlete must guess the physical behaviors of opponent properly in the early physical phases and react correctly (9). Measuring the reaction time is common in many exercises and sport programs moreover it is widely used in the laboratory in order to measure the speed of information process (10.11). In previous studies measuring the reaction time, was done for two reasons. First Measuring the reaction time is a component of real life tasks (as to start sprinting) and the most important reason is that the reaction time represents stimuli identification, response selection and response planning and it is also considered as a general indicator of the functional integrity for the central nervous system (12). In order to measure the reaction time and predicting skills normally Electromyography and computer software can be used. In EMG methods the reaction time is calculated just for a particular muscle, therefore studying cognition and decision-making of that person is not possible but through computerized methods the overall reaction time of the person can be evaluated quickly and easily. So using these tests lead us to the new sights of the brain mechanisms. Obesity is related to the weak inhibiting responses and attention control (13). Bruce Keller (2009) has argued that obesity may affect the central nervous system and reduce the cognitive capacity and lead to dementia (14). Since the speed importance of response to stimuli, whether in sports or in daily conditions is undeniable, and also considering the prevalence of obesity in children around the world, this study works on three groups of children with different weights (normal, overweight and obese) in terms of the reaction time to the stimuli.
Methodology

Participants:

The statistical population of this study is composed of 8 to 12 aged students in Shahr-e-Ghods. Among 60 girls and 60 boys the purposive random sampling has been done in a way through which 20 normal girls, 20 overweight girls and 20 obese girls should be present in test process. The same classification was done for boys. For doing so the students individual questionnaires and health information were requested. All participants of this study have no visual problems. The exclusion criteria included, to have chronic or severe diseases, such as neurological, cardiovascular and metabolic ones in the past, taking any medicines that affect the person’s cognitive and physical performance, use of stimulant drinks such as coffee, alcohol and carbonated beverages before the test session, and the reluctance of the students to continue the test. At first each of the participants signed a consent form and then they were evaluated by initial assessments included individual questionnaires and measuring of height and weight.

Research Process

During the test process, each test sample sat on a comfortable chair. The chair’s height was adjustable so that the feet of participant were placed on the ground. In front of each participant with the distance of 2 meters a qualitative 24” LG LCD was placed and in order to measure the simple visual reaction time SINA Measurement Software has been used. System software was installed on the laptop, which was located 2 meters far from LCD, and since the laptop was connected to LCD through ports, the content is visible both on the laptop screen and LCD screen (Figure 1). The menu selection and test start and determination were only controlled by the test taker who was sitting at the laptop. The location of laptop was in a way that the test stimuli were selected randomly by the test taker without participant’s notice.

After loading the page of visual reaction time measurement and appearing the red circle on laptop and LCD screen the participant should press the bottom which has been specified before. This test was repeated ten times in three stages for each individual. The obtained data of ANOVA method was analyzed using SPSS22 Software.
Findings:

The result of variance analysis showed that regarding the visual reaction time there is no significant difference among different groups (F=.024, P=.078). Moreover in different groups of study, there was no significant difference between boys and girls (F= 3.63, P=.078).

Table 1: visual reaction time in normal, overweight and obese boys and girls

<table>
<thead>
<tr>
<th></th>
<th>Square Mean</th>
<th>Df</th>
<th>F</th>
<th>p</th>
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<td>Modified Model</td>
<td>12052.48</td>
<td>5</td>
<td>1.16</td>
<td>.033</td>
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<td>Group</td>
<td>2516.42</td>
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<td>.024</td>
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<tr>
<td>Gender</td>
<td>37784.55</td>
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<td>3.63</td>
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<tr>
<td>Interaction</td>
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<td>.076</td>
<td>0.46</td>
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<tr>
<td>Error</td>
<td>10409.49</td>
<td>83</td>
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Discussion:

This study is among the first studies which studied the difference of simple visual reaction time in three groups of normal, overweight and obese children aged 8 to 12. The findings of this research showed no significant difference in three classified groups according to heir weights (P=.0786). As noted above, there is no
significant difference in three weight categories and two gender groups and this means children with different weights (normal, overweight and obese) aged 8 to 12 have the same performance in simple visual reaction time. While the girls were better than boys in simple visual reaction time, this difference has been observed in gender and this may be a cause of early physiological and neurological structure of girls compare with boys. Cournot Studies (2006) have shown the difference of visual reaction time in obese and non-obese people and proved that non-obese people react in short time in compare with obese ones (15). That result is inconsistent with the result of present study. In one study it is indicated that in the difference of visual reaction time in obese and non-obese people there is no significant difference in simple visual time reaction for red color among obese and non-obese people but when the yellow color is used to determine the visual reaction time then significant difference is observed (16). Reaction time reaches to its highest point at the age of twenty-five and no actual change is observed till the age of sixty (17). Hadkenz has also reported that at the age of nineteen the speed of reaction reaches to its highest point (18). Many researchers have studied the effect of maturation on the reaction time of girls and boys at the age of 9 to 19 and have concluded that by increasing the age the average reaction time becomes less considerably, while women are always faster than men in responding the stimuli, however the reaction time of girls decreases at the age of fifteen to seventeen, but the reaction time of men continually increasing (19). Since observing no difference in three groups of obese, overweight and normal children may be due to age range of these children or the type or the means of test, it is recommended that researchers work on different age range, or different tests such as the tests for measuring selective or differential reaction time, measuring movement time, changing the type of test and software, in order to test the participants.

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