ANALYSIS OF THE IMPACT OF ELECTRONIC SPORTS ON ANXIETY AND BIOCHEMICAL FACTORS OF PLAYERS

ANÁLISIS DEL IMPACTO DE LOS DEPORTES ELECTRÓNICOS EN LA ANSIEDAD Y FACTORES BIOQUÍMICOS DE LOS JUGADORES

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ABSTRACT

An obvious characteristic of computer games is stress, competition, and physiological alterations in the body. It is regarded as an important subject including those factors in e-sports, getting progressively popular in the digital era. The psychological and physiological impacts of e-sports, conducted in a competitive ambiance, on the body and mind over the course of competitions are not yet known. The aim of the paper is determining the impacts of players performing in e-sports games on some biochemical and hormonal factors shaped in the body during the game. In the group of research, there are twenty electronic sports volunteer players playing in e-sports games. Samples are gathered from the players in the study thirty minutes before and after electronic sports games. Given the results, it is concluded that e-sports players’ ACTH, cortisol, and testosterone levels rose substantially.

Keywords: computer games; E-Sports; physiological impacts; competition.
RESUMEN

Una característica obvia de los juegos de computadora es el estrés, la competencia y las alteraciones fisiológicas en el cuerpo. Se considera un tema importante que incluye esos factores en los deportes electrónicos, y se vuelve cada vez más popular en la era digital. Aún no se conocen los impactos psicológicos y fisiológicos de los deportes electrónicos, realizados en un ambiente competitivo, en el cuerpo y la mente durante el transcurso de las competencias. El objetivo del artículo es determinar los impactos del desempeño de los jugadores en los juegos de deportes electrónicos en algunos factores bioquímicos y hormonales que se forman en el cuerpo durante el juego. En el grupo de investigación, hay veinte jugadores voluntarios de deportes electrónicos que juegan en juegos de deportes electrónicos. Se recopilan muestras de los jugadores en el estudio treinta minutos antes y después de los juegos de deportes electrónicos. Dados los resultados, se concluye que los niveles de ACTH, cortisol y testosterona de los jugadores de deportes electrónicos aumentaron sustancialmente.

Palabras clave: juegos de computadora; ESports; impactos fisiológicos; competencia.

INTRODUCTION

The prevalence of electronic sports (E-sports), the media coverage rate, and the entity of spectators and participants have risen considerably over the past years. Consequently, scientific studies over the subject of electronic sports started to attract popularity (Tharawadeepimuk & Wongsawat, 2021). New e-sports studies predictably define e-sport games as a commonly played in a team-level pf individual competitive way with amateur-level and professional rating tools. Moreover, e-sport games are expanding sports that need fine motor coordination, perceptual-cognitive capacity, and physiological changes to perform at a good level (Cadegiani & Kater, 2019; Gomes et al., 2021).

Electronic sports are regarded as competitive computer games in which individuals or teams compete against each other. In addition, some researchers see it as competitive sports in which participant might expand their hand-eye coordination and mental ability when playing (Silva et al., 2022). The digital factors of electronic sports, and also the anxiety that occurs in the competitive environment of electronic sports players, lead to psychophysiological issues in the body and mind (Mehrsafar et al., 2019; La Fratta et al., 2021).

Although there stands no known explanation of anxiety, it can be defined as the overall of an person's response to several physical and mental problems and abnormalities raised by psychological or physiological elements (Webster et al., 2018). Despite the fact that stress and anxiety may be chronic, dire, or traumatic in the body, it is a psycho-physiological reaction including physiological changes and cognitive assessment in reactor to health-threatening, stress, or stimulation in the person’s body (Lima et al., 2022). All of those responses as a consequence of stress and anxiety activate intense neuro endocrine reactions in the body, and hence, the release of testosterone, stress hormones cortisol, biochemical changes and ACTH (billurubin, urea, glucose, insulin, creatinine) arise in the organism. The information acquired from the relevant research indicate that the biological reactions of the person to anxiety are the hormones’ release and the rise in biochemical responses (Denerel & Lima, 2022).
Heightened stress markers; such as biochemical alterations (creatinine, urea, glucose, insulin, bilirubin) and hormones (ACTH, cortisol, testosterone) prior to and within E-sports games have an effect on the athletes’ performance (Heydari et al. 2018; Michałowska-Sawczyn et al., 2020).

To sum up, so as to generate prospective sports psychology training and intervention methods, it seems crucial to detect stress and anxiety in the electronic sports ambiance and its effects on psycho physiological, cognitive, and motor efficiency (Mihailescu et al., 2021). There seems to be a necessity for experimental analyses to advocate the idea that it is related to stress.

The main aim of this research is to evaluate the effect of athletes playing in electronic sports competitions on several biochemical and hormonal markers generated in the organism over the course of competitive games.

METHODS

Research Group

The research group comprises twenty male electronic sports players (volunteer) took part in electronic sports contests and didn’t hold any kind of metabolic issues. This research attempted to prove and reveal the effect of anxiety, stress, and physiological alterations experienced in the course of an electronic sports competition on particular biochemical indicators and stress hormones.

Tools

Samples have been gathered from the players twice, thirty min. before and after the electronic sports games. To calculate testosterone, cortisol, insulin, urea, ACTH, glucose, creatinine, bilirubin total levels and bilirubin direct, samples gathered from competitors before and after the games. The examination of the samples gathered has been conducted by experts in a private hospital lab.

Data Analysis

In the process of data analysis, the data was analyzed utilizing the SPSS software. Normality test has been employed to define if the data within the group demonstrated a normal distribution. After it has been defined that the data demonstrated a normal distribution, Paired Samples t-test has been deployed to make a comparison into the pre-post test data of the research group. Significance has been considered as p<0.05.

RESULTS AND DISCUSSION

<table>
<thead>
<tr>
<th>Table 1. Athletes’ Stress Hormones Pre-post Test Values (mean ± s)</th>
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</thead>
<tbody>
<tr>
<td><strong>MEASUREMENTS</strong></td>
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<tr>
<td></td>
</tr>
<tr>
<td>CORTISOL</td>
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<tr>
<td>TESTOSTERONE</td>
</tr>
<tr>
<td>ACTH</td>
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<tr>
<td>GLUCOSE</td>
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</tbody>
</table>
Table 1 demonstrated the pre-posttest mean values of the hormones ACTH, urea, cortisol, testosterone, creatinine, glucose, insulin, bilirubin total and bilirubin direct levels.

Table 2. The Results of Athletes’ Biochemical factors t-Test Examination

<table>
<thead>
<tr>
<th>MEASUREMENTS</th>
<th>PRE-TEST</th>
<th>POST-TEST</th>
<th>T</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>X</td>
<td>SS</td>
<td>X</td>
<td>SS</td>
</tr>
<tr>
<td>INSULIN</td>
<td>14.220</td>
<td>0.100</td>
<td>15.810</td>
<td>0.390</td>
</tr>
<tr>
<td>UREA</td>
<td>13.000</td>
<td>3.210</td>
<td>10.650</td>
<td>2.990</td>
</tr>
<tr>
<td>BILIRUBIN TOTAL</td>
<td>0.650</td>
<td>0.110</td>
<td>0.640</td>
<td>0.100</td>
</tr>
<tr>
<td>BILIRUBIN DIRECT</td>
<td>0.180</td>
<td>0.010</td>
<td>0.170</td>
<td>0.010</td>
</tr>
<tr>
<td>CREATININE</td>
<td>0.640</td>
<td>0.080</td>
<td>0.660</td>
<td>0.070</td>
</tr>
</tbody>
</table>

While Table 2 is analyzed, biochemical and hormonal values of electronic sports of participants after and before the contest are presented. It can be observed that there existed a statistically significant difference between the pre-posttest amounts of the competitors’ testosterone, cortisol, and ACTH levels (p<0.05). Moreover, it can be seen that there stood a significant difference between the pre-post-test amounts of glucose, urea, insulin, creatinine and bilirubin total levels of the research group (p<0.05).

Today, the advances of new technologies has greatly affected the domain of sports, as it has in every other arenas, and has led to the development of the concept of electronic sports. Considering the studies, electronic sports, which are on the basis of digital games and also offer a competitive ambiance, demonstrate physiological, hormonal, metabolic, psychological, and responses in the body. Nonetheless, the hormonal alterations that happen during electronic sports in gamers’ organisms have never been discovered. The aim of the current article was to discover particular biochemical and hormonal alterations that electronic sports’ players generate in their bodies over the course of contests.

It is safe to say that the competitive environment and anxiety levels in sports generate several changes in the body. Stress and competition are among the actions in which the most severe environment is faced in electronic sports, which is among those sport branches, and dealing with stress is among the vital elements in reaching success. Regarding that, the psycho-physiological stress response that occurs over the course of electronic sports festivals stimulates hormonal and physiological alterations in the body (Gomes et al., 2021). Testosterone, cortisol, and ACTH hormone levels are proved to generate...
significant changes. Heydari et al. (2018) analyzed the physiological alterations of the competitive ambiance generated in electronic sports’ players on the athletes and concluded that the levels of cortisol in the players rose substantially after and before the contest. Michałowska-Sawczyn et al. (2020) in an examination investigated the impact of the experience on cortisol levels of players in an electronic sports game. Given the results, they noticed that experienced electronic sports competitors held higher pre- and post-competition cortisol levels compared to inexperienced participants. Silva et al. (2022) revealed that the electronic game they played by generating a competitive ambiance greatly impacted the testosterone and cortisol levels of undergraduate students. In another research, Tharawadeepimuk and Wongsawat (2021) stated that contests in which a competitive ambiance is generated impact the players psycho physiologically. They analyzed the studies on electronic sports.

Denerel and Lima (2022) in their research, analyzed the impacts of outdoor and indoor contests on the psycho physiological factors and indicators of elite rugby athletes, discovered that there stood an alteration in testosterone and cortisol hormone levels based on the variation in the venue of the contests. Rice et al. (2019) analyzed the impact of win-losing state of female football athletes on hormonal factors, and they discovered that there was an alteration in levels of testosterone of the winning group players in comparison to the losing group players. Lima et al. (2022) discovered in their relevant research that the anxiety level of experienced players prior to the contest in young swimmers has an effect on the stress hormones’ release. Mehrsafar et al. (2019) analyzed the hormonal impacts of combat simulation in taekwondo athletes and discovered that taekwondo combat simulation application substantially impacted the testosterone and cortisol levels of players.

With the training or competition, some physiological alterations happen in the body. Regular exercise schemes are an efficient way for metabolic alterations and also for raising insulin and glucose tolerance in the body. Those alterations are the biological reactions determining the athletes’ performance. Based on the study’s results, it is concluded that the competitive atmosphere of electronic sports athletes before and after the contest impacts the urea, glucose, insulin, creatinine, bilirubin total and bilirubin direct the players. Gomes et al. (2021) discovered in a research that the physiological alterations of the competitors before and after the 2 kinds of electronic sports sessions vary. In another research, Rowland & Van Lankveld, (2019) defined that regular exercise scheme resulted in alterations in creatinine, glucose, urea, and some biochemical factors of players. Shulze et al. (2021) in their review research examined the impact of electronic sports on anxiety. They stated that electronic sports result in psychological and physiological health issues because of its competitive essence and excessive play. In another work, Mihailescu et al. (2021) concluded that the glucose and insulin levels of the players rose substantially after an intense workout. La Fratta et al. (2021) arrived at the conclusion that their regular exercises are efficient in uric acid, glucose, and some biochemical factors of university students. Cadegiani and Kater (2019) research, they concluded that exercises of varied severity led to alteration in insulin, glucose, and some biochemical indicators of the research group.

**CONCLUSION**

Overall, in conclusion, it can be stated that the electronic sports games performed by the research members increased testosterone, insulin, cortisol, ACTH, glucose, and creatinine levels, while reducing bilirubin and urea levels. This study demonstrates that electronic games performed in a competitive ambiance, along with anxiety, affect the biochemical and hormonal indicators of electronic sports players. These existing data may be raised through including new athlete and age groups in future studies, elevating the bar for athletic performance.
REFERENCES


