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COMPARATIVE ANALYSIS OF ANXIETY AND COGNITIVE INDICATORS IN ADOLESCENTS BEFORE AND AFTER THE COVID-19 PANDEMIC

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Abstract

The 21 st century will be remembered with the problems made by the Covid-19 pandemic and its role as a major stressor causing serious damage to health indicators. There have been various pandemics on Earth up to our time. However, the pandemic caused by coronavirus is considered the most severe: a number of adverse phenomena such as infection of people regardless of their social status, place of residence, financial situation, background, intellectual level, and most importantly age, the number of cases ending in death, the occurrence of serious health problems in those who have had disease, reduction of human life, shortening, inability of the immune system to recover over a long period of time, increased cognitive dysfunctions, significant psychological distress and behavioral changes caused. The study reflects the impact of pandemic stress on psychophysiological indicators in adolescents aged 12 and 13. It should be noted that before the pandemic, in February 2020, the indicators of psychological arousal, attention and memory were studied in 12- and 13-year-old adolescents who live in Khachmaz and Sheki. After the pandemic, in October 2022, the same adolescents (who were now 14 and 15 years old) were involved in the same psychophysiological studies. Changes caused by pandemic stress (especially social isolation and online learning) were investigated.

Keywords: *Covid-19 pandemic, pandemic stress, situational anxiety, individual anxiety, short-term memory, visual memory, attention*

Given that the Covid-19 pandemic played a role in creating a tragedy for humans, it is appropriate to call it a stressor. What problems has stressor caused? First, it caused changes in the way of life to which people have been accustomed for centuries, the introduction of mandatory bans on staying at home, the management of works from home, the transition of education to online system, the inability to implement national traditions,

the refusal to hold mass events, the increase in social isolation and hypokinesia, the wider use of electromagnetic radiation sources, etc. caused (Anguera, et al., 2016; Karamova, 2021; Tull, et al., 2020; Wanga, et al., 2021). According to the World Health Organization, the coronavirus has severely affected human health and increased chronic diseases, psychological disorders, and behavioral changes, in addition to deaths. Although the observed changes are increasing mainly in people over the age of 60, there is evidence of serious health problems in children and adolescents as well. The cause of the problem is the delayed adaptation to the new environment or inability to adapt; consequently, stressful situation occurs, psychophysiological indicators deviate from the standards, health indicators deteriorate, and other pathologies are caused (De Matos, et al., 2020; Verduzco-Gutierrez, et al., 2021; Wolf, et al., 2022).

The COVID-19 pandemic is a pandemic caused by the SARS-CoV-2 coronavirus (Renyi, et al, 2020). Although the disease was first reported in Wuhan, China, in December 2019, it soon spread worldwide. The epidemic was declared a public health situation of international concern and a pandemic by the World Health Organization on January 30, 2020 (Vu, et al., 2020; Saunes, et al., 2020; World Health Organization, 9 May 2020). In Azerbaijan, since March 2020, important measures have been taken by state authorities in connection with the pandemic, the "Stay Home", online education, etc. has been applied.

It's known from the literature that the coronavirus pandemic continues to enslave the population, especially those aged 0–18 years and over 60 years. Thus, people in these age groups are most vulnerable to the disease. According to the WHO General Rules, during a pandemic, people with acute respiratory infection (ARI) should stay at home, minimize contact with family members and strangers and self-isolate if having any symptoms. There is already information that the spread of coronavirus (COVID-19) has caused fear, anxiety, stress and depression in people all over the world (Karamova, 2021; Shishkova, et al., 2023; Wolf, et al., 2022). The caused stress depends on the level of reaction to the incident, past life experiences, character, temperament and the society lived in. During the spread of an infectious disease, stress can be caused by several factors in particular:

- People fear and worry about their health and the health of their beloved;
- Changes in sleep or dietary patterns (insomnia and loss of appetite);
- Difficulty concentrating on work and other things;
- Aggressiveness of other chronic illnesses;
- Increased use of alcohol, tobacco, energy drinks or other addictive substances;
- Prevalence of sedentary lifestyle during the day and hypokinesia, etc. (Anguera, et al., 2016; De Matos, et al., 2020; Hamadani, et al., 2020; Sacco, et al., 2022).

Disruption of daily habits to which a person is accustomed causes a number of changes, the largest of which is disruption of their biological clock. In such case, the psychological problems such as insomnia, fatigue, stress occur. Furthermore, staying at home for long periods of time, not being able to see friends, the sudden loss of freedom can lead to emotional distress and depression in a person as stressors. Thinking about the possibility of persistent infection with the coronavirus causes fear and anxiety. According to studies, it is known that fear and anxiety states that were at a maximum level, during quarantine, will decrease to a minimum level after 4–6 months of quarantine. However, some psychological problems, such as depression, post-traumatic stress disorder, sleep disorders, can be observed both during the quarantine and after the quarantine (Loades, et al., 2020; Shishkova, Sergeevna, et al, 2023). Even after the pandemic, the signs of psychological change cases such as the a long period of fear in population, adaptation to society, not to leave home without no masks, and other protective equipment, avoid communication with people, etc. (Shishkova, Shishkov, et al, 2023). Given the above, the study is of great importance.

Aim of the study

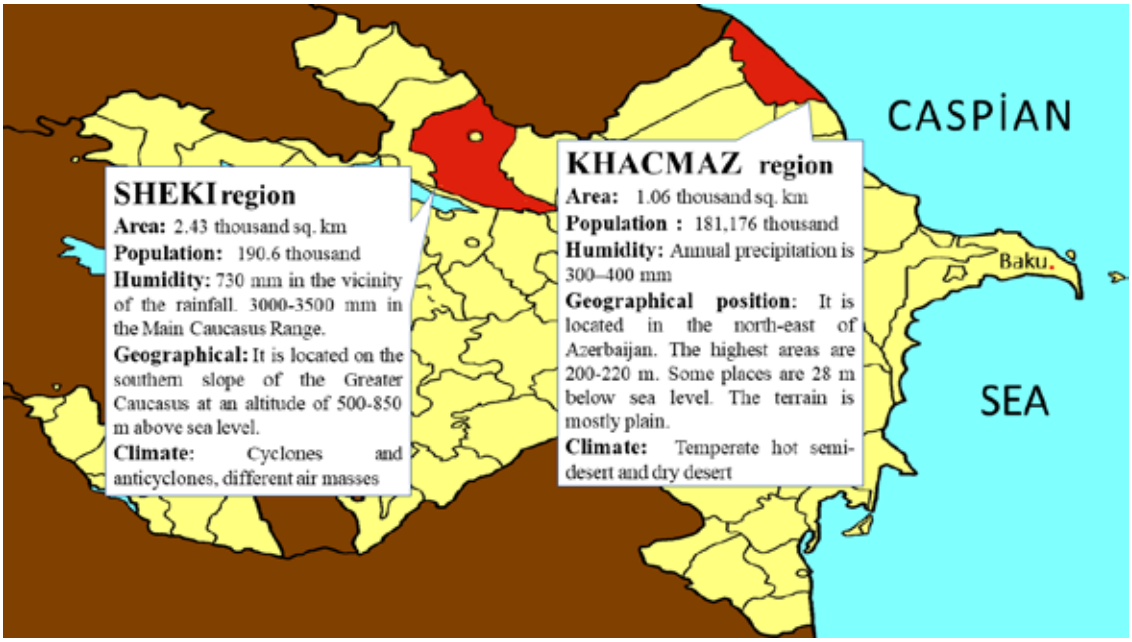
The main aim of the study was to identify the impact of the Covid-19 pandemic on psychological arousal, short-term memory, visual memory and attention indicators of adolescents.

Object and stages of the study

Psychophysiological studies of adolescents aged 12–13 and 14–15 living in Khachmaz and Sheki cities of Azerbaijan Republic were conducted (Fig. 1).

The study was conducted in 2 phases. Phase I: Before the pandemic, in February 2020; Phase II: After the pandemic, in October 2022. The 12–13 year olds who participated in the Phase I study also re-participated in the post-pandemic phase of the study, conducted in 2022.

Figure 1. *Geographical location of the cities of Khachmaz and Sheki of the Republic of Azerbaijan*



Methods of research

The Spielberger-Hanin test was used to study indicators of psychological arousal, situational and individual arousal indicators were determined. Short-term memory and visual memory, attention parameters were studied.

The Spielberger-Hanin test is used to study and assess individual and situational anxiety in people. This test, which measures levels of anxiety and arousal in psychodiagnosis, is mainly used in counseling and clinical practice when working with children. The test is presented in the form of a questionnaire consisting of 40 questions and is divided into two parts (20 questions each). The first part (questions 1–20) assesses situational arousal, and the second part (questions 21–40) assesses individual arousal. According to the instructions, the children provide scoring to the questions on 1 to 4 based on whether each idea fits them or not. The results are calculated by a special calculation method, and the level of situational arousal and individual arousal are determined. According to the results, if the answer is up to 30 – low level of anxiety; 31–45 points – average level of anxiety; 40–46 points – average level of anxiety with a tendency to high, and the result above 46 points characterizes a high level of anxiety.

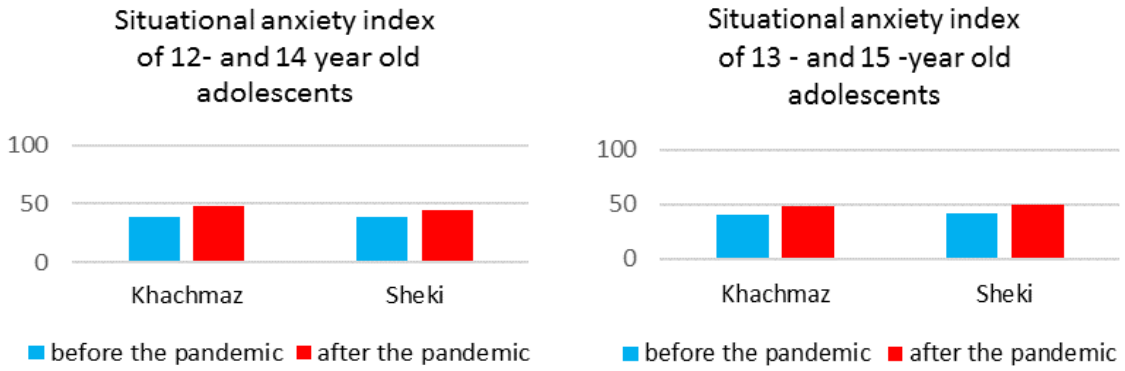
Psychophysiological testing methods were conducted on one of the regular school days, and the subjects were involved in the testing voluntarily.

Obtained results and their discussion

As already have been mentioned, the study was conducted in two stages and we have 3 groups of results. Initially, the results of the study of psychophysiological indicators of adolescents 12 and 13 years in 2020 are shown in Figure 2. It was found that in adolescents 12 years old living in Khachmaz, situational anxiety is 39.34 ± 1.24 points, individual anxiety is 46.65 ± 1.23 points, and in adolescents 13 years old situational anxiety is 40.14 ± 1.87 points, individual anxiety is 45.21 ± 1.39 points. The study of short-term memory, visual memory and

attention indexes among the cognitive indicators of adolescents living in Khachmaz showed that they are within the normal range. Thus, in adolescents 12 years, visual memory is 9.45±2.21 points, short-term memory index is 7.45±0.98 points, attention index is 10.05±1.67 points; in adolescents of 13 years, visual memory is 10.04±2.31 points, short-term memory is 6.48±1.83 points, attention index is 8.55±1.59 points.

Figure 2. *Comparison of pre-pandemic and post-pandemic situational anxiety in adolescents living in Khachmaz and Sheki*



In 2020, before the pandemic, there were no significant changes in the adolescents involved in the study in Sheki city. Thus, adolescents 12 years of age have a situational anxiety score of 38.5±1.65 and an individual anxiety score of 43.27±1.93 (Figure 3), and adolescents 13 years of age have a situational anxiety score of 41.5±1.81, and an individual anxiety score of 47,88±1.57.

Figure 3. *Comparative characteristics of the pre-pandemic and post-pandemic study of the individual anxiety index of adolescents who live in the cities of Khachmaz and Sheki*

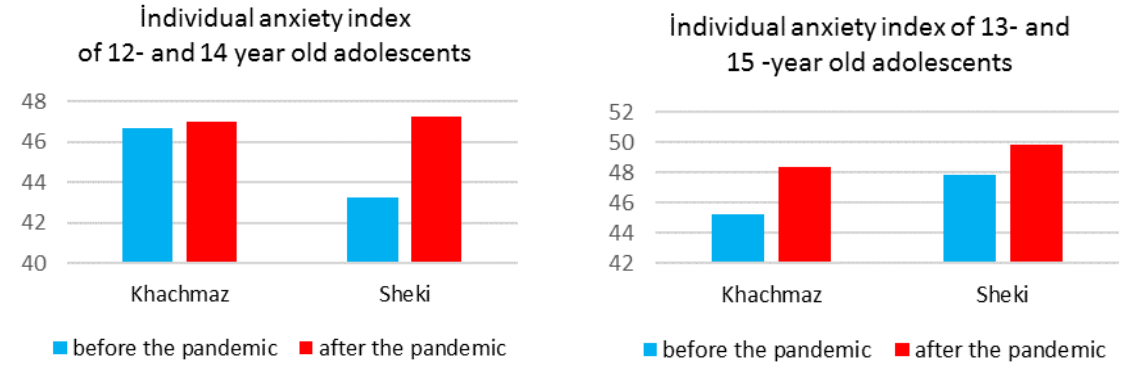
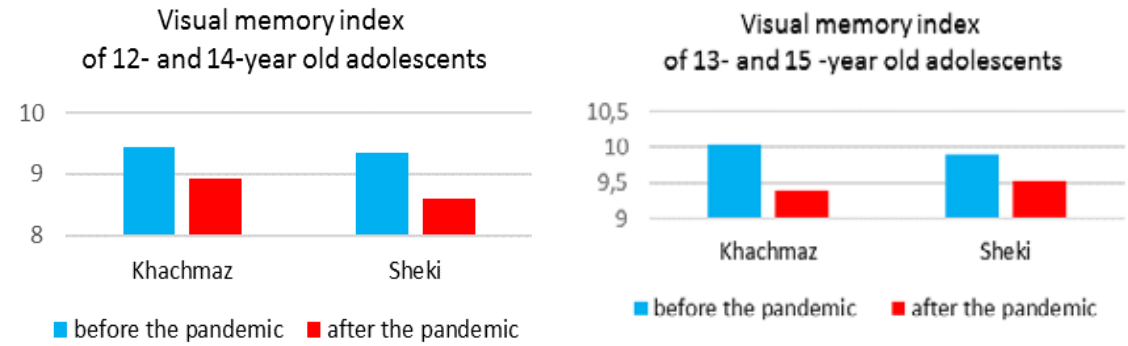


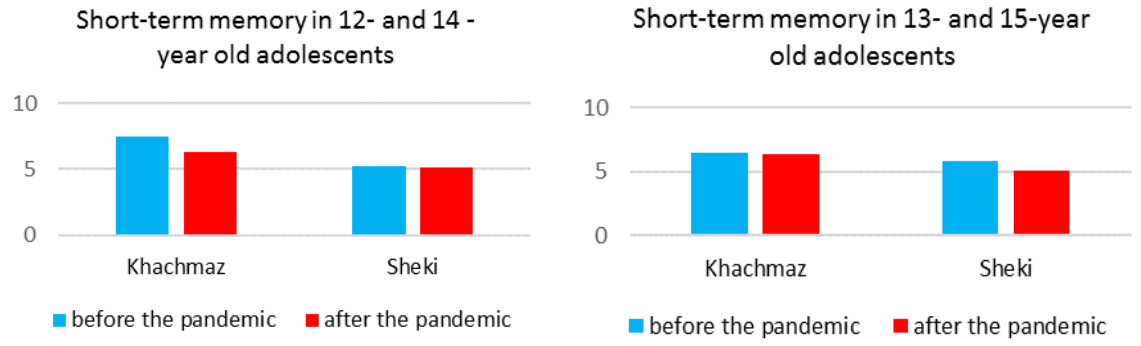
Figure 4. *Comparison of pre-pandemic and post-pandemic visual memory scores of adolescents who live in the cities of Khachmaz and Sheki*



In adolescents 12 years of age, visual memory is 9.34±1.29 points, short-term memory index 5.21±1.35 points, and attention index 8.97±1.89 points; In adolescents 13 years of age, visual memory is 9.89±1.27 points, short-term memory is 5.83±1.39 points, and attention index is 7.71±1.38 points.

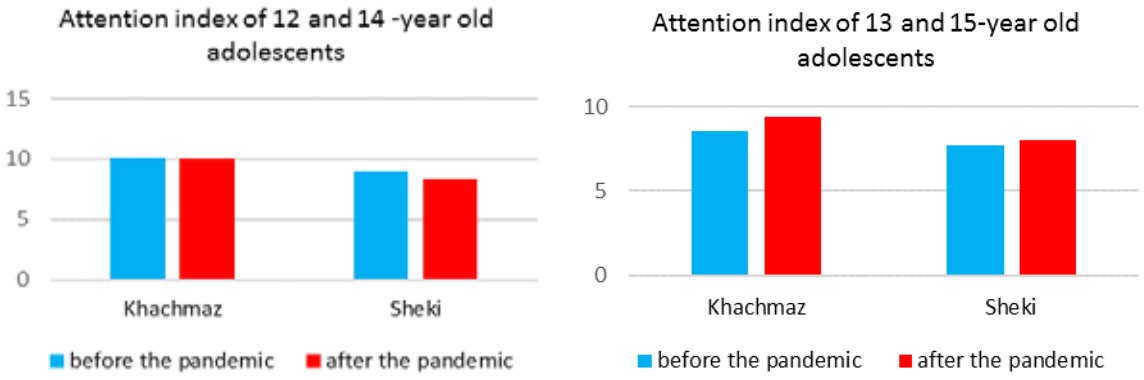
In 2022, after the pandemic, given that these adolescents were 14 and 15 years old, they were re-examined psychophysiologically. Thus, the study conducted in the city of Khachmaz found that the pandemic stress partially causes psychophysiological changes in adolescents. In adolescents 14 years old, situational anxiety was 47.85±1.24 points, individual anxiety was 47±1.22 points, visual memory was 8.93±1.09 points (Fig. 4), while short-term memory index was 6.33±1.12 points (Fig. 5), and attention index was 10±1.93 points; In adolescents 15 years old, situational anxiety was 48.73±1.87 points, individual anxiety was 48.33±1.76 points, visual memory was 9.41±1.68 points, short-term memory index was 6.41±1.77 points, attention index was 9.33±1.34 points (Fig. 6).

Figure 5. *Comparison of short-term memory scores before and after the pandemic in adolescents who live in the cities of Khachmaz and Sheki*



The results of the testing carried out after the pandemic in the city of Sheki in 2022 have shown interesting facts. Thus, in adolescents 14 years old situational anxiety was 44.5±1.97 points (Fig. 2), individual arousal was 47.27±1.54 points (Fig. 3), visual memory was 8.59±1.91 points (Fig. 4), and short-term urgent memory index was 5.09±1.69 points (Fig. 5), and the attention index was 8.32±1.44 points (Fig. 6), while in 15-year-olds, the situational anxiety was 49.95±1.76 points, individual arousal was 49.88±1.09 points, visual memory was 9.53±1.27 points, short-term memory index was 5.03±1.98 points, and attention index was 8.04±1.75 points.

Figure 6. *Comparison of pre-pandemic and post-pandemic study of attention span of adolescents who live in the cities of Khachmaz and Sheki*



During the analysis of the results of the study, it was found that the pandemic created stress and caused the development of stress symptoms. Especially the trace of stress is more noticeable in adolescents living in Sheki city. This can be explained with the fact that in conditions of social isolation, adolescents mostly sit still, watch TV, sleep or eat, do not

lead an active lifestyle, etc. Most of the population of the city of Khachmaz live in houses with yards, and in this regard, it is known that in conditions of social isolation they move more, do physical labor, even if they do not leave their yards, and engaged in preventing the development of hypokinesia, as evidenced by the relative change in the studied indicators.

In spite of the fact that much time has passed since the pandemic, it was noticed that stress reactions persist in adolescents. Such facts as a high level of anxiety indicators and a relative weakening of cognitive indicators can be explained by the fact that full adaptation to the new conditions after the pandemic has not occurred, and the persistence of tension of psychophysiological indicators has weakened the adaptation process (Avittan, Kustovs, 2023; De Figueiredo, et al, 2021; Rodman, et al., 2022; Rossi, et al., 2021; Roy, et al., 2022).

Conclusion

The pandemic conditions, which played a stress factor role, led to an increase in indicators of psychological anxiety in adolescents and a relative weakening of memory and attention processes. Rapid development of adolescents, incomplete processes of neurohormonal regulation and adaptation created conditions for preservation of stress reactions after the pandemic (Azizi, et al., 2020; Rosanna, et al., 2023; Vanderlind, et al., 2021; Wong, et al., 2020; Shishkova, Imamgayazova, & Kapustina, 2023). Due to the fact that the cognitive processes of 14-year-olds are more complex than those of younger adolescents, their level of individual arousal was higher. It was found out that the fact of settlement in different geographical areas has influenced the level of stress development. Pandemic stress has been more pronounced in adolescents living in the city than in adolescents living in other regions. Pandemic stress has caused symptoms similar to the action of other stressors and negatively influenced psychophysiological indicators.

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