https://doi.org/10.31489/2025BMG1/23-35

UDC 159.9.072 Received: 25.06.2024| Accepted: 22.11.2024

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Assessment of adaptive body reactions to the professional and pedagogical activity in teachers of secondary schools

The intensity of teaching work consists of intellectual workload indicators, which includes heuristic (creative) activity, processing, checking and monitoring the completion of tasks, working in conditions of time deficit and emotional stress. All this determines the functional quality of the main job, the presence of conflict situations caused by professional activity, sensory loads and low motor activity. The purpose of the study is the adaptive responsiveness to the professional and pedagogical activity in age dynamics among teachers of secondary schools. The objects of the study were female teachers of secondary schools of Karaganda city. The assessment of the working capacity by Work Ability Index, personal anxiety, blood pressure, heart rate variability, calculation of body mass index, registration of the number of steps per day, and a sociological survey were carried out. Statistical processing was carried out using the STATISTICA 10.0 software package. The analysis of the results of the study showed that teachers' fatigue increases in age dynamics due to the presence of stressful situations during their work. Fatigue is accompanied by a high level of personal anxiety, physical inactivity and body mass index increase. Since the cardiovascular system, due to its morphofunctional features, is one of the first to respond to stressful influences, signs of tension were noted in it. Intensive work activity of teachers and the impact of various aspects of the work process (workloads, lack of time, stress, physical inactivity, etc.) can lead to an increase in fatigue, body mass index, and stress on the cardiovascular system in age dynamics.

Keywords: teachers of secondary schools, age dynamics, physical inactivity, tension, fatigue.

Introduction

The problem of fatigue among intellectual workers is one of the key problems in the field of occupational hygiene and physiology. It is closely related to the issues of adaptation, efficiency and restoration of functional reserves of the body. Pedagogical activity belongs to the category of intellectual work characterized by irregular but significant psycho-emotional stress, the need to make atypical decisions, and the active mobilization of psychological and energy resources. Work on the development of important qualities that contribute to the improvement of adaptive abilities is usually not given due attention [1]. According to [2], school teachers are included in the category of employees who are exposed not only to professional stress, but also to unfavorable hygienic conditions in the school environment and the work process.

The assessment [3] of the physiological and hygienic aspects of teaching, conducted in university conditions, allows considering the work of teachers as excessively stressful, corresponding to the third level of nervous tension, with a high intellectual and sensory load.

Employees of educational institutions often face chronic fatigue, irritability, anxiety and depression, and after work week they recover emotionally and psychologically much more slowly [4, 5]. C. Fiorilli et al. [6] indicate that one of the main causes of teachers' disability, retirement due to ill health and staff turnover is stress.

The professional activity of teachers is accompanied by high workload, unfavorable working conditions, lack of a rational work and rest regime, as well as an imbalance between labor costs and remuneration. All of the above may reduce the labor productivity for some time and is most often due to internal resources depletion, so as disruption of the body's systems that ensure its functioning (psycho-physiological, regulatory) [7]. Numerous psychological, medical, and sociological studies [8, 9] show that the professional group of teachers is characterized by extremely low indicators of both physical and mental health. And these indicators decrease as the length of service in an educational institution increases [10].

Consequently, the working capacity of teachers is determined by the presence of a certain condition or set of conditions that affect the quality of professional tasks.

The purpose of the study is to assess the adaptive responsiveness to the professional and pedagogical activity in age dynamics among teachers of secondary schools.

Experimental

The study involved female teachers of secondary schools of Karaganda city aged 21 to 62 years (85 persons). All participants were divided into 3 age groups: group 1–23 women under 30 years old (average age 25±0.85 years, experience 3.66±0.66 years), group 2–26 women from 30 to 45 years old (average age 37.38±0.89 years, experience 13.23±1.32 years), group 3–36 women over 45 years of age (average age 51.8±0.63 years, experience 26.76±1.14 years).

The working capacity assessment was carried out using the WAI (Work Ability Index) questionnaire [11]. The WAI result is calculated by summing up the points that ultimately determine the level of working capacity: 44–49 points — very good working capacity; 37–43 points — good working capacity; 28–36 points — average (unsatisfactory) working capacity; 2–27 points — poor working capacity.

The Spielberger — Khanin test was used to determine the level of personal anxiety (PA): up to 30 points — low personal anxiety, 31–44 points — moderate personal anxiety, 45 or more — high personal anxiety.

The state of the cardiovascular system was determined by blood pressure and pulse rate.

Blood pressure and heart rate were taken as the indices of the cardiovascular system functioning.

The heart rate was assessed by its variability (HRV) using the software and hardware complex Varikard — 2.4 software and hardware complex using the statistical assessment method [12]. The symbols of HRV indicators used in the work corresponded to international HRV assessment standards and indicative standards.

The number of steps was recorded using an OMRON pedometer (HJ-203-ED) (Japan). A questionnaire to assess preventive and medical activity, as well as self-assessment of citizens' health was the instrument of the sociological survey [13]. It was also determined the body mass index (BMI) using the following formula: BMI= Body weight (in kg)/ Height*Height (in meters).

The statistical analysis of the study results was implemented using the standard software package STASTICA 10.0, which includes the calculation of the average value of a variable, its standard error and the Student's confidence criterion (t). Statistical processing of percentages included calculating the percentage of persons meeting a certain standard relative to the total number in groups, as well as determining the percentage error. Shifts at $p<0.05$ were considered reliable.

Results and Discussion

The results of the study showed (Tab. 1) that in the course of work, the highest level of average WAI values was observed in the first two age groups of secondary school teachers (under 30 and 30–45 years old) — 39±0.88 and 37.1±0.86 points, which, in accordance with the quantitative gradation, corresponded to the level of "good working capacity" (37–43 points) [14]. In age group 3 (over 45 years old), there was a significantly reduced level of average WAI values to 36.5±0.88 points ($p<0.05$), which corresponded to the boundary level between "good working capacity" and "unsatisfactory working capacity" (28–36 points).

Table 1

The age dynamics of individual indicators among teachers of secondary schools

Parameters	under 30 years of age	30–45 years of age	over 45 years old
WAI, points	39 ± 0,88	37,1 ± 0,86	36,5 ± 0,88*
Number of steps	6026,3 ± 473,85	4393,2 ± 165,82*	3392,5 ± 170,59*
BMI, conv. units	23,6 ± 1,13	25,6 ± 0,56	28 ± 0,64*
PA, conv. units	44,8 ± 1,29	44,4 ± 0,79	45,2 ± 0,94
**Note – the difference with age group 1 is significant ($p<0.05$)*			

The analysis of the percentage ratio of working capacity levels revealed a dynamics in which there was a gradual decrease in the percentage of teachers with high working capacity index in age group 1 from 73.1±0.017 % to 55.3±0.01 % in age group 3 ($p<0.05$). A corresponding increase in the percentage of teachers with average working capacity index from 26.9±0.017 % in age group 1 up to 40.4 ±0.01 % in age group 3 and the appearance of teachers with low working capacity index in age group 2 and 3 (5.6 ± 0.004 % and 10.6±0.006 %, respectively) (Fig. 1).

Figure 1. Percentage ratio of WAI working capacity levels among teachers of secondary schools in age dynamics

The results of a weekly calculation of the number of steps per day revealed that in age group 1 the average number of steps was 6026.3±473.85, in age group 2 — 4393.2±165.82 ($p<0.05$), in age group 3 — 3392.5±170.59 ($p<0.05$).

Teachers of age groups 1 and 2 had an average BMI of 23.6±1.13 and 25.6±0.56, respectively, which corresponded to the "Norm" criterion [15]. In age group 3, there was a significant increase in BMI to 28.0±0.64 ($p<0.05$), which corresponded to the "Excess" criterion. The percentage analysis showed that in age group 1, BMI corresponded to the "Norm" criterion in 69.2±0.017 % persons, in age groups 2 and 3, the sum of the "Excess" and "Obesity" criteria was 68.0 and 71.6 %, respectively (Fig. 2).

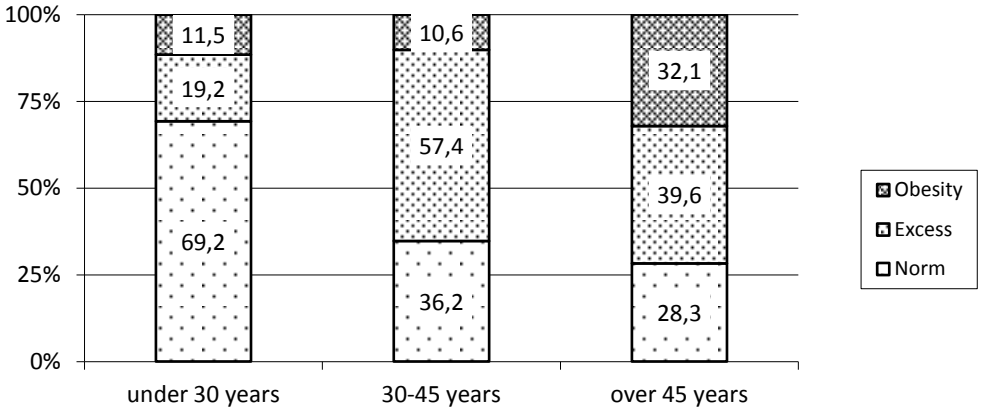

Figure 2. Percentage ratio of BMI criteria in age dynamics among teachers of secondary schools

Table 2

Answers to the question "Do you feel stress while working?"

Answers	under 30 years	30–45 years	over 45 years
no	7,6 ± 0,01 %	18,3 ± 0,007 %	33,9 ± 0,008 %
rarely	42,3 ± 0,019 %	26,5 ± 0,009 %	30,1 ± 0,008 %
often	38,4 ± 0,018 %	34,6 ± 0,009 %	26,4 ± 0,008 %
constantly	11,5 ± 0,012 %	12,2 ± 0,006 %	5,6 ± 0,004 %

The analysis of the results of the questionnaire revealed the presence of stressful situations in the work of teachers. To the question "Do you feel stress while working?" the sum of the answers "Constantly" and

"Often" in age groups 1 and 2 corresponded to 50 and 46.93 %, respectively. In the age group 3, there was a decrease in this indicator to 32.0 % (Tab. 2).

The average values of PA level in all age groups were on the borderline between moderate (31–44 points) and high (45 points or more) (44.4 ÷ 45.2). The analysis of the percentage ratio showed that a high level of anxiety prevailed in age group 1 (57.6±0.019 %). In age groups 2 and 3, the average level of anxiety prevailed (63.8±0.01 % and 52.8±0.009 %, respectively) (Fig. 3).

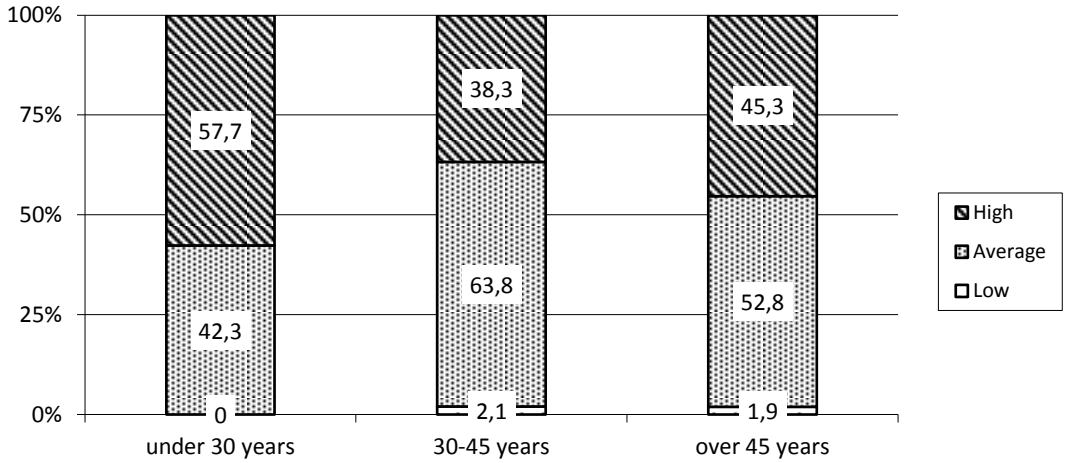

Figure 3. The percentage ratio of PA levels in age dynamics among teachers of secondary schools

Regarding to the dynamics of the cardiovascular system, it can be noted that there was an increase in systolic blood pressure (SBP) and diastolic blood pressure (DBP) from 105.71+2.87 (70+2.57) mmHg in age group 1 up to 114.68+3.53 (80.31+3.42) mmHg in age group 2 ($p<0.05$) and further increase in age group 3 up to 122.03+2.96 (82.4+2.33) mmHg ($p<0.05$). The pulse rate in age groups 2 and 3 was relatively stable (77.34 ÷ 77.46 beats/min) (Fig. 4).

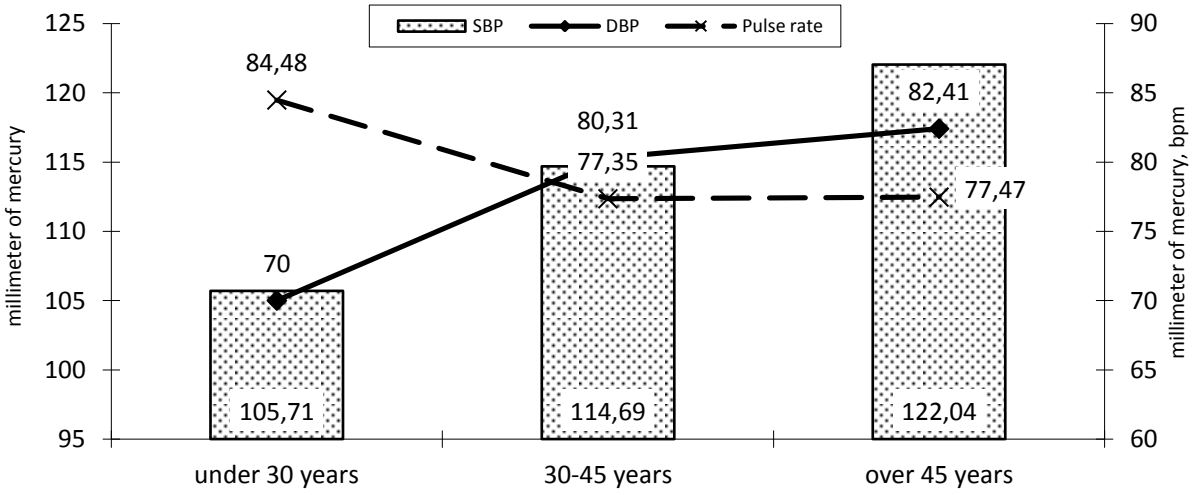

Figure 4. Age-related dynamics of blood pressure and pulse rate in teachers of secondary schools

RMSSD decrease (the square root of the average value of the squares of the differences in the values of consecutive pairs of R-R intervals) was registered in teachers at production activity in the age dynamics: from 46.79+6.62 in age group 1 to 34.88+3.05 in age group 3, respectively ($p<0.05$) (Tab. 3).

Table 3

Age-related dynamics of heart rate variability (HRV) in teachers of secondary schools

Parameters	under 30 years	30–45 years	over 45 years
RMSSD, msec	35,55+4,08	29,88+4,88	23,58+3,54*
SI, conv. units	344,82+94,18	358,24+89,92	401,26+62,53
TP, msec^2	2297,47+352,62	1559,06+349,82	1236,23+259,88*
LF/HF, conv. units	1,69+0,34	2,93+0,54*	3,89+0,81*
IC, conv. units	2,88+0,65	5,09+0,9*	6,48+1,14*
**Note – the difference with age group 1 is significant (p<0.5)*			

The total power (TP) of the spectrum in age dynamics significantly decreased from 2297.47+352.62 msec^2 in age group 1 to 1236.23+259.88 msec^2 in age group 3 (p<0.05). The average values of LF/HF and IC in age group 1 were 1.69+0.34 and 2.88+0.65, respectively, in age group 2 there was a significant increase to 2.93+0.54 and 5.09+0.9 (p<0.05), in age group 3 — 3,89+0,81 and 6.48+1.14 (p<0.05) (Tab. 3).

It was registered the PHF (spectrum power of the high-frequency component of variability as % of the total oscillation power) decrease from 37.19+5.75 % in age group 1 to 26.21+4.03 % in age group 3 (p<0.05), the PLF (power of the low-frequency spectra) and PVLF (very low-frequency component of variability as % of the total power fluctuations) increase from 39.15+3.69 and 23.86+4.4 %, respectively, in age group 1 to 42.64+2.72 and 31.13+2.83 % in age group 3 (p<0.05) (Fig. 5).

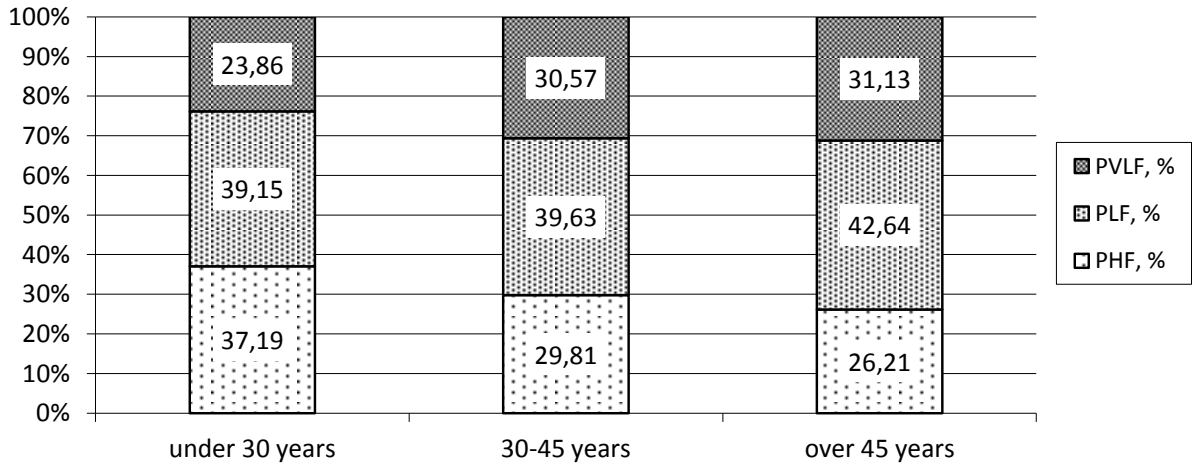

Figure 5. Dynamics of the power spectrum of the high-frequency variability component in % of the total oscillation power of teachers of secondary schools of various age groups

Thus, the professional activity of teachers negatively affects the functional activity of their organs and systems, especially the cardiovascular system, and introduces an imbalance in the activity of regulatory mechanisms that carry out their interrelation. This can negatively affect the body's resistance not only to adverse factors of the educational process, but also to social and everyday ones, and may affect the working capacity of teachers of secondary schools.

The work of teachers is characterized by versatility, a high level of responsibility, a significant load on the visual analyzer (due to the need to monitor a variety of objects of attention and maintain a high level of concentration), intense vocal load, prolonged stay in a stationary position, lack of physical activity, unbalanced daily routine, nutrition and rest, as well as other stressful factors, which can affect health and well-being [7].

In addition to traditional objective research methods, subjective indicators are also used to assess the functional state of intellectual workers. These studies include sociological surveys of employees assessing

the nature of the work process, the level of fatigue, working hours, lifestyle and other aspects. One of these subjective indicators is the WAI.

Analysis of the WAI questionnaires showed that teachers' fatigue increases with age. As the results of the study showed, teachers of secondary schools of various age groups showed significant changes in WAI during their work. The highest level of average WAI values was observed in age groups 1 and 2 (under 30 years and 30–45 years) and corresponded to the level of "good working capacity" [14]. In the age group 3 (over 45 years old) WAI corresponded to the boundary level between "good working capacity" and "unsatisfactory working capacity".

The analysis of the percentage ratio of working capacity levels showed a slightly different picture, a gradual decrease in the age dynamics of the percentage of teachers with high working capacity and an increase in the percentage with average working capacity and low working capacity.

According to the authors [16], decreased performance is characterized by mental states such as fatigue, monotony and tension/stress. Monotony is often accompanied by inactivity. E.V. Katamanova [2] notes inactivity and often forced poses in the workplace of teachers. A sedentary lifestyle contributes to the development of many pathological abnormalities in the state of health, which later lead to various chronic diseases.

According to the results of a weekly calculation of the steps number per day, it was found that teachers of educational schools have low motor activity and tend to decrease with age. Physical inactivity is usually accompanied by an increase in body weight [17]. This is due to the fact that restriction of physical activity (hypokinesia) and insufficient amount of motor effort (inactivity) lead to disruption of many body functions, including blood circulation, respiration, musculoskeletal system and digestion [18]. Studies [19] show that the majority of intellectual workers have an increase in actual body weight compared to the ideal one, which is largely due to insufficient physical activity and insufficient level of motor activity both in the workplace and in everyday life.

Teachers of educational schools also showed an increase in body mass index in age dynamics. If in age groups 1 and 2 BMI corresponded to the "Norm" criterion [15], then in age group 3 BMI corresponded to the "Excess" criterion. The percentage analysis showed that the sum of the criteria "Excess" and "Obesity" in age groups 2 and 3 significantly prevailed and amounted to 68.0 and 71.6 %, respectively.

The work of a teacher presupposes high standards of both professional skills and personal qualities of a specialist. This profession is one of the most stressful among all social professions [20]. The professional activity of a teacher is accompanied by numerous stressful factors that determine professional stress and negatively affect the effectiveness of professional activities of teaching staff. The questionnaire survey showed that almost half of the teachers of educational schools (46.93 ÷ 50 %) experienced stress during work. It was noted [21] that a violation of adaptive mechanisms and low stress tolerance with prolonged chronic influence of stressful factors leads to a number of psychosomatic diseases.

Anxiety is particularly significant among the mental factors affecting the success of teaching activities. Personal anxiety is understood as a relatively constant individual trait in which a person tends to perceive a variety of situations as potentially threatening and respond to them with an appropriate level of anxiety. This reactive disposition is activated when certain "threatening" stimuli are perceived, such as loss of prestige, decrease in self-esteem, loss of self-esteem, and other aspects [22].

Anxiety is directly related to the risk of neurosis and is one of the factors that negatively affect the body's adaptive abilities in stressful situations [23].

The results of PA studying in a sample of teachers of educational schools show that in age group 1, more than half of the surveyed teachers had a high level of anxiety (57.6±0.019 %). Therefore, it can be concluded that the educational activities of teachers cause an increase in the level of anxiety and a decrease in professional confidence. A number of works on pedagogy and psychology [24, 25] note that despite the fact that young teachers after graduating from various pedagogical educational institutions, having good theoretical training, deep knowledge in the field of pedagogy, psychology and methods of teaching subjects, often do not have sufficient skills in educational work conducting, as well as communicating with children and their parents. This is reflected in the level of anxiety and is manifested by insecurity in the workplace. At the same time, the adaptation process of a young teacher to industrial activity can last for several months or even years [26].

This is confirmed by the results of an assessment of the level of anxiety among teachers of educational schools, where an average level of anxiety was observed in age groups 2 and 3. This may indicate that anxiety is more of a personal quality, rather than just a reaction to external stimuli. Consequently, teachers' anxiety level is determined by the process of adaptation to professional activity, and its manifestation is not ex-

pressed as a tendency to negative reactions to various situations at work and at home that threaten their "I-concept", but more as part of their personal characteristics [26].

Due to its morphofunctional features, the cardiovascular system is one of the first to respond to stressful influences. This system is also often subject to pathological changes caused by stress factors [27]. Teachers of secondary schools showed signs of stress of the cardiovascular system in age dynamics, expressed in an increase in the level of systolic and diastolic blood pressure. This is due to the fact that with age there is an increase in physiological sensitivity to the effects of "workload" or the effects of "workload" accumulate over many years [28].

People in professions with a high intensity of work experience deterioration in the functional capabilities of the cardiovascular system and an increase in the prevalence of risk factors for cardiovascular diseases. An analysis of the literature has demonstrated a tendency to increase the prevalence of overweight and obesity, which are key risk factors for diseases of the cardiovascular system, while reducing physical activity associated with professional activity [29].

One of the subtle psychophysiological indicators of human adaptation to environmental influences is changes in vegetative balance, which can be identified through the analysis of indicators of the cardiovascular system, including special attention to heart rate variability (HRV). Currently, the analysis of heart rate and its variability is one of the most frequently used methods in modern physiology. This method allows assessing the state of the regulatory mechanisms of physiological functions, including the general activity of regulatory systems, neurohumoral regulation of the heart and the relationship between the divisions of the autonomic nervous system — sympathetic and parasympathetic [30].

Intensive work activities of teachers and the impact of various aspects of the work process can lead to increased stress on the cardiovascular system [31–33]. The constant influence of these factors on the mechanisms of regulation of the functioning of the cardiovascular system can lead to pathological changes. With age, teachers of secondary schools have an imbalance in the work of the autonomic nervous system (ANS), expressed in a decrease in the activity of the parasympathetic division (PD) and an increase in the activity of the sympathetic division (SD) of the ANS, which is expressed by a decrease in sinus arrhythmia and an increase in the activity of the sympathetic division of the ANS. This is reflected in the negative dynamics (RMSSD). According to J. Sztajzel [34], RMSSD is one of the most frequently used indicators, and its application is preferable due to its better statistical properties.

The most sensitive indicator of the overall activation of the sympathetic system of the body, which occurs during emotional stress, is the index of tension of regulatory systems (stress index (SI). According to the classification of O.Yu. Shiriaev and E.I. Ivleva, teachers of secondary schools [35] have SI in a state that meets the criterion of a supersympathicotonic state, which means that the body is in a stressful situation with an overstrain of regulatory systems. However, it should be noted that SI has a number of disadvantages, including abnormality (values can vary in an arbitrary range), the nonlinear nature of changes and hypersensitivity. Therefore, we should not focus only on SI values [36-37]. In this regard, we analyzed the results of the spectral analysis of heart rate variability (HRV), which allowed assessing the activity of PD and SD of ANS, not only absolute, but also relative — the percentage of activity of various departments, as well as the role of humoral factors in the regulation of heart rhythm. According to [38], spectral analysis is highly accurate in determining the contribution of the departments of the ANS to heart rate variability. The methods of statistical analysis of HRV do not allow to clearly distinguishing the degree of activity of each division of the ANS on the heart rate, which makes it impossible to reliably assess the state of the departments of the ANS separately. Spectral analysis, on the contrary, provides a similar opportunity. The high-frequency (HF) and low-frequency (LF) spectra of the heart rate are, to a greater extent, respectively associated with the parasympathetic regulation of heart rhythm and the state of sympatho-parasympathetic balance [39–41]. The other two HRV spectra (VLF and ULF) are controlled by different levels of humoral regulation [12, 42, 43].

The spectral characteristics of the heart rate of secondary school teachers also indicate an increase in the activity of SD with a decrease of the activity of PD. This is evidenced by a decrease in the age dynamics of the total power spectrum (TP, ms^2), which reflects the total activity of the vegetative effect on the heart rate. At the same time, it should be taken into account the fact that an increase in the sympathetic effects of the ANS leads to a decrease in the total power of the spectrum (TP).

According to the spectral analysis data, two important indices are calculated — the ratio of the average values of the low-frequency and high-frequency HRV component (LF/HF) and the index of centralization (IC), for which there was a positive dynamics in the age aspect among teachers of secondary schools. But it should be borne in mind that the LF/HF ratio characterizes the overall sympathovagus balance, and its in-

crease indicates the activation of the subcortical sympathetic nerve center, and IC as an indicator characterizing the level of centralization of heart rate control and a shift in activity towards the activity of the central regulatory circuit and a decrease in the activity of the autonomous circuit [41].

The activity of SD ANS is also indicated by the analysis of the percentage ratio of the power of the spectra of frequency characteristics of variability from the total oscillation power. Thus, in teachers of secondary school in the age dynamics, there is a change in the balance of the percentage ratio of individual components of variability in % of the total oscillation power, which is characterized by a decrease in the power of the high-frequency (PHF, %) and an increase in the power of the low-frequency (PLF, %) and very low-frequency spectrum (PVLF, %), which indicates a high level of vasomotor activity center (PLF, %), SD (PVLF, %) and low activity of PD ANS (PHF, %).

This conclusion is based on the fact that high-frequency oscillations (HF) are mainly associated with respiratory movements and reflect vagal control of heart rhythm (activity of PD ANS). At the same time, low-frequency oscillations (LF) have a mixed origin, and their power is mainly influenced by the dynamics of the SD ANS tone and somewhat lower — PD. A number of authors [44, 45] note that very low frequencies (VLF) reflect SD ANS activity and cerebral ergotropic activity on underlying structures. They also characterize the influence of higher vegetative centers on the cardiovascular subcortical center and can serve as a reliable marker for assessing the relationship between autonomous (segmental) levels of blood circulation regulation and suprasegmental, including pituitary-hypothalamic and cortical levels [12]. The work activity of teachers leads to changes in the spectrum of the structure (for example, an increase in the contribution of VLF waves), which indicates a strain in the work of regulatory systems. This also indicates the transition of the regulation of body functions from the reflex to the humoral-metabolic level. Although the latter is more reliable, since it works slower and is not able to provide rapid mobilization under psycho-emotional stress.

Thus, high workloads, unfavorable working conditions, and the lack of rational work and rest regimes turn the teacher's work into a sub-extreme activity. It is obvious that the professional activity of a teacher can temporarily reduce his working capacity due to the intense workload. Fatigue occurs as a result of depletion of internal resources and an imbalance between different body systems (physiological, psychological and regulatory). While maintaining the load, fatigue turns into a chronic form, leading to the formation of personality formations, such as increased anxiety, a tendency to depression, neurotic reactions and other manifestations.

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Н.К. Смагулов, А.Ә. Арыстанбай, Г.М. Тыкежанова, Д.В. Агеев

Жалпы білім беру мектептері мұғалімдерінің кәсіби-педагогикалық қызметіне организмнің бейімделу реакцияларын бағалау

Педагогикалық жұмыстың қарқындылығы эвристикалық (шығармашылық) белсенділікті, тапсырмаларды өңдеуді, тексеруді және орындалуын бақылауды, уақыт тапшылығы мен эмоционалдық күйзеліс жағдайындағы жұмысты қамтитын интеллектуалдық жүктеменің көрсеткіштерінен тұрады. Мұның бәрі негізгі жұмыстың функционалдық сапасын, кәсіби белсенділіктен, сенсорлық жүктемелерден және төмен қозғалыс белсенділігінен туындаған жанжалды жағдайлардың болуын анықтайды. Зерттеудің мақсаты — жалпы білім беретін мектеп мұғалімдерінің жас динамикасындағы кәсіби-педагогикалық іс-әрекетке организмнің бейімделу реакцияларын бағалау. Зерттеу нысанына Қарағанды қаласының жалпы білім беретін мектептерінің әйел мұғалімдері алынды. Жұмысқа қабілеттілікті бағалау WAI, жеке алаңдаушылық, қан қысымы, жүрек соғу жиілігінің өзгергіштігі, дене салмағының индексін есептеу және тәулігіне қадамдар санын тіркеу, сондай-ақ әлеуметтік сауалнама бойынша жүргізілді. Статистикалық өңдеу STATISTICA 10.0 бағдарламалық пакетін қолдану арқылы жүзеге асырылды. Зерттеу нәтижелері мұғалімдердің жұмыс барысында күйзелістік жағдайлардың болуына байланысты жасы ұлғайған сайын шаршағанын көрсетті. Шаршау жеке мазасыздықтың жоғары деңгейімен, гиподинамиямен және дене салмағының индексінің жоғарылауымен бірге жүреді. Жүрек-қантамыр жүйесі өзінің морфофункционалдық ерекшеліктеріне байланысты күйзеліске алғашқылардың бірі болып жауап беретіндіктен, ол қарбаластық белгілерін көрсетеді. Мұғалімдердің қарқынды еңбек қызметі және еңбек процесінің әртүрлі жақтарының әсері (жүктеме, уақыттың жетіспеушілігі, күйзеліс, гиподинамия және т.б.) шаршаудың жоғарылауына, дене салмағының индексіне және жас динамикасында жүрек-тамыр жүйесіне жүктеме әкелуі мүмкін.

Кілт сөздер: жалпы білім беретін мектеп мұғалімдері, жас динамикасы, гиподинамия, қарбалас, шаршау.

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Оценка адаптационно-приспособительных реакций организма на профессионально-педагогическую деятельность учителей общеобразовательных школ

Интенсивность педагогической работы складывается из показателей интеллектуальной нагрузки, включающей эвристическую (творческую) деятельность, обработку, проверку и контроль выполнения заданий, а также работу в условиях дефицита времени и эмоционального напряжения. Все это опреде-

ляет функциональное качество основной работы, наличие конфликтных ситуаций, вызванных профессиональной деятельностью, сенсорными нагрузками и низкой двигательной активностью. Цель исследования — оценка адаптационных реакций организма на профессионально-педагогическую деятельность в возрастной динамике у учителей общеобразовательных школ. Объектами исследования выступили учителя-женщины общеобразовательных школ города Караганды. Оценка работоспособности проводилась по WAI, личностной тревожности, артериальному давлению, вариабельности сердечного ритма, расчет индекса массы тела и регистрации количества шагов в день, а также социологическому опросу. Статистическую обработку проводили с использованием программного комплекса STATISTICA 10.0. Результаты исследования показали, что утомляемость учителей увеличивается в возрастной динамике из-за наличия стрессовых ситуаций в процессе их работы. Утомляемость сопровождается высоким уровнем личностной тревожности, гиподинамией и увеличением индекса массы тела. Поскольку сердечно-сосудистая система, в силу своих морфофункциональных особенностей, одна из первых реагирует на стрессовые воздействия, в ней отмечаются признаки напряжения. Заключение. Интенсивная трудовая деятельность педагогов и влияние различных сторон трудового процесса (нагрузки, нехватка времени, стрессы, гиподинамия и др.) могут приводить к повышению утомляемости, индекса массы тела и нагрузки на сердечно-сосудистую систему в возрастной динамике.

Ключевые слова: учителя общеобразовательных школ, возрастная динамика, гиподинамия, напряженность, утомляемость.

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