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The study of the biological age of university teachers in the period of urgent transition to distance education as a result of pandemic

In the article, the biological age of university teachers was studied (using the express method of V.P. Voytenko), a total of 127 people (64 women, 63 men) were examined, they were divided into three groups according to their age (1st group – 23-39 years old, 2nd group – 40-59 years old, 3rd group – 60 years old and older). A special health self-assessment questionnaire and a number of physiological indicators and mathematical formulas were used to calculate the value of biological age (BA); the appropriate biological age value (ABA) was calculated; he obtained biological age and the corresponding biological age were compared, it was determined how many years the subjects' aging rate was ahead or behind their peers. This approach makes it possible to divide people of the same age into several degrees according to the degree of "age wear", as well as according to the "reserve" of health (degrees I and II – slow aging, III – BA corresponds to the population standard, IV and V – accelerated aging). The research was conducted during the transition of universities to distance education during the pandemic (October-November, 2020). More than half of the teachers (55.90%) were found to be experiencing accelerated aging (grade IV-V of BA), and this was more common among men than among women. Among those examined, the rate of aging is evident in the youngest group of teachers. Due to the pandemic, in the period of urgent transition from the usual traditional educational format to distance learning, the accelerated rate of aging according to biological age indicators was observed in almost all groups of teachers: 23%-80%. And there is a conclusion that the gender and age of the subjects affect the biological age.

Keywords: health, stress, distance education, pandemic, age, biological age, university teachers, gender.

Introduction

The human's age is a concept that interests every person. In general, the appearance of a person corresponds to the previous years of life. But sometimes a person's appearance does not correspond to his age. People can look older or younger than their age. Calendar or passport age means how many years a person has lived. In addition, there is also a concept of biological age [1].

Biological age is the age of the human body (health), not the number of years of life. People themselves are interested in knowing their real age. For that, it is necessary to determine the biological age of a person. This allows not only a true assessment of the state of health, but also to detect the beginning of functional deterioration as early as possible and take measures before the first signs of health problems appear.

Russian scientist P. N. Sokolov (1935) published a study of biological age. He described the method of calculating the biological age indicators by dividing the table of age transitions in order to divide the informative signs (skin wrinkles) into their intensity levels using the ranks of middle-aged groups [2]. In 1975, Scientists such as T.L. Dubina, A.N. Razumovich [3] first reviewed the concept of biological age in periodicals. In addition, T.L. Dubina can be called a Russian pioneer in the development of methods for determining the biological age of humans and laboratory animals [4]. It is known that the employees of the Institute of Gerontology of the Academy of Sciences in USSR, conducted in the 80s years under the leadership of V.P. Voytenko, intensively developed new methods in the study of biological age. A detailed description of the biological age determination method, which can be used by other researchers, was published by V.P. Voytenko and co-authors in 1984 [5]. At present time, there are many methods for determining BA, which are analyzed in detail in a review article by S.G. Abramovich [6].

The formation of modern higher education aimed at the transition to the global educational space, multifaceted changes in pedagogical practice are accompanied by a radical violation of stereotypes in the minds, actions and lifestyles of subjects of higher professional education. In this regard, the study and analysis of conditions related to the health of university teachers is of particular relevance.

Currently, methodologies are being developed that combine physical and psychological-social components of the human race with other fields and consider human health as a whole system. Health is one of the necessary conditions for the effective professional activity of a modern person and is the main and relatively non-specific basis of the productivity of all aspects of work and the general well-being of a person. At the same time, the modern teacher's work, which requires a high demand for mental stability, the lack of objective criteria for evaluating work results, the large number of daily processes at work and its high temp, and the constant reforms in the field of education and the decrease in the social status of the teacher lead to a long-term stress on his nerves and it can lead to health problems. [7] This is also related to the urgent transition of higher education institutions to distance learning due to the pandemic [8]. That's why; the purpose of this study is to assess the status of personal health of university teachers by determining their biological age.

Experimental

127 teachers of Karaganda University named after E.A. Buketov participated in the experiment (64 women, 63 men). We divided teachers into 3 groups according to age: 23-39 years old, 40-59 years old; 60 years old and older.

To determine the biological age of teachers, we chose the express method of V.P. Voytenko [5]. The logical scheme of assessment of BA includes the following stages: calculation of the value of BA for a given person (a mathematical formula using a series of physiological indicators and self-assessment of health according to a special questionnaire); calculate the appropriate biological age (ABA) value for this individual; comparison of obtained (BA) and appropriate value (ABA): to determine how many years the subject is ahead or behind his peers. The obtained value is relative: the calculation point is the population standard – the average value of the degree of aging (ABA) at this calendar age (BA) for the population. This method makes it possible to classify people of the same age according to the degree of "age wear", and therefore according to the "reserve" of health (grades I and II – slow aging, III – BA corresponds to the population standard, IV and V – accelerated aging).

In this version, the following parameters were determined for the calculation of BA: body mass (kg), arterial blood pressure (BAP and pulse pressure calculation – PP), static balance (SB, sec), as well as self-assessment of health according to a special questionnaire (SAH, etc.).

Results and Discussion

Examination of basic physiological indicators, analysis of self-assessment of university teachers and calculation of individual numbers of BA and ABA according to A.P. Voytenko's express method made it possible to classify the results shown in Table 1. Biological age also indicates the degree of physiological wear of the body and shows the slowing down of the aging of the body compared to the calendar age.

Table 1 shows that 21.26% of teachers belong to the slow aging group. Based on the data in the table, teachers are aging according to their population (22.83%). In addition, the analysis showed that more than half of the teachers (55.90%) are experiencing a rapid aging rate and these indicators are a stress load during the pandemic period.

Table 1

Average biological age of university teachers (%)

n-127	BAranks				
BA-47,07	I	II	III	IV	V
	6.30 (8)	14.96 (19)	22.83 (29)	20.47 (26)	35.43 (45)

The biological age describes the physiological status of the human body, in particular, the status of the cardiovascular, respiratory and nervous systems, it would be a matter of attention to determine BA indicators separately in men and women. Because the ability of men's and women's bodies to work has significant differences due to their hormonal characteristics [7].

It can be seen from the table that 11.11% of the examined teachers were in the group of men of I and II degrees. People in this category have a slower rate of aging and this indicates that they have a good reserve of health. The rate of aging of 9.52% of the examined (grade III) corresponds to the population standard, and

a significant group of male teachers (79.37%) has an accelerated rate of aging, which means that they are at the limit of health. And the data obtained from women turned out to be different. A third (31.25%) of the examined female teachers have a slow aging rate. 35.94% met the population standard and female teachers with a rapid aging rate were also in this range (32.82%) (Table 2).

Table 2

Average biological age of male and female university teachers

n-63	BA ranks of men				
	I	II	III	IV	V
	1.59 (1)	9.52 (6)	9.52 (6)	19.05 (12)	60.32 (38)
n-64	BA ranks of woman				
	10.94 (7)	20.31 (13)	35.94 (23)	21.88 (14)	10.94 (7)

Thus, our studies have shown that there's the existence of gender differences in the leading morpho-functional systems of the organism. Male teachers were more exposed to chronic stress in the context of the urgent transition to distance education [9].

It is known that the reaction to stress is manifested in different ways depending on the age characteristics of the organism [10]. In this regard, we considered BA indicators in three groups of teachers according to their age: 1st group 23-39 years old: 2nd group 40-59 years old: 3rd group 60 years old and older. Indicators of men and women, divided by age, were considered separately.

As can be seen from Table 3, 2.86% of male university lecturers aged 23-39 years were assigned to the 1st and 2nd degrees, and the same result was recorded in the 3rd degree, and 94.29% of the university teachers have a fast aging rate. 5.6% of 18 examined male teachers in group II were assigned to grades 1 and 2, that is, slow aging of these teachers can be observed. 22.2% correspond to the population standard, and 72.2% have rapid aging. According to our data, half of the male adult group is aging slowly, 10% of the teachers correspond to the population standard for BA, and 40% were found to be aging faster than the population standard.

Table 3

BA indicator of teachers in terms of age (%), KarU

Ranks	Tested groups (men) KarU		
	1-group (23-39 years old) n-35	2-group (40-59 years old) n-18	3-group (60 years old and older) n-10
I	0	0	10
II	2.86	5.6	40
III	2.86	22.2	10
IV	14.29	27.8	20
V	80	44.4	20

The examination of the features of the BA in women showed the following data (Table 4). Among the group of young teachers, 21.21% of those examined were assigned to the category I and II, and the rate of aging of these categories is slowly passing. In 36.36% of the studied female teachers, the rate of aging corresponds to the population standard, that is normal. And 42.42% of women have an accelerated rate of aging, that is, they are in a state of extreme health.

Table 4

BA indicator of teachers in terms of age(%), KarU

Ranks	Tested groups (women) KarU		
	1-group (23-39 years old)	2-group (40-59 years old)	3-group (60 years old and older)
I	3.03	18.52	25
II	18.18	22.22	25
III	36.36	37.03	25
IV	27.27	14.81	25
V	15.15	7.41	-

In the second age group, the number of female teachers with a slow aging rate is increasing, they constitute 40.74% of the examined and correspond to the population standard of 37.3%. In addition, 22.22% of the examined middle-aged female teachers have an accelerated rate of aging (Table 4).

Among female teachers in the oldest third group, those with a slow aging rate were 50%, and among those tested, 25% corresponds to the population standard, and a quarter of these female teachers appeared in the category of fast aging.

Conclusion

During the determining the biological age according to the method of V.P. Voytenko, the research showed that more than half of the teachers (55.90%) felt an accelerated rate of aging (grades IV-V of BA), through this research we can see that the stress pressure during the pandemic period had a significant impact.

The received BA indicators showed gender differences in the work of leading morphological and functional systems of the body. The health of male teachers is chronically stressed due to the urgent transition to distance education.

BA indicators vary depending on the age of the examinees. The highest rate of aging is observed in the studied group (23-39 years old), and this process is more prevalent among male teachers.

An urgent transition from the usual traditional education format (during the pandemic) to distance education showed that there is an accelerated aging rate in a significant group of teachers (23-80) according to the BA indicators. At the same time, the biological age is affected by the gender and age of the person who was tested.

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Пандемия салдарынан қашықтықтан білім алуға шұғыл көшу кезеңінде университет оқытушыларының биологиялық жасын зерттеу

Мақалада университет оқытушыларының биологиялық жасы (БЖ) (В.П. Войтенконың экспресс-әдісі бойынша) қарастырылған, барлығы 127 адам (64 әйел, 63 ер) зерттелді, олар жастарына қарай үш топқа бөлінді (1-топ — 23-39 жас; 2-топ — 40-59 жас; 3-топ — 60 жас және одан жоғары). Биологиялық жастың (БЖ) мәнін есептеу үшін арнайы денсаулықты өзін-өзі бағалау сауалнамасы және бірқатар физиологиялық көрсеткіштер мен математикалық формулалар қолданылды; тиісті биологиялық жастың мәні (ТБЖ) есептелді; алынған биологиялық жас және тиісті биологиялық жас салыстырылды, зерттелушілердің қартаю жылдамдығы құрдастарынан қанша жыл бұрын немесе артта қалғаны анықталды. Мұндай тәсіл жастары бірдей адамдарды «жасына қарай қаусауы» дәрежесі бойынша, сонымен

қатар денсаулығының «қоры» бойынша бірнеше дәрежеге бөлуге мүмкіндік береді (I және II дәрежелер — баяу қартаю, III — БЖ популяциялық стандартқа сәйкес келеді, IV және V — жеделдетілген қартаю). Зерттеу жұмыстары пандемия кезінде жоғары оқу орнының қашықтықтан оқытуға көшуі кезінде жүргізілді (2020 жылғы қазан-қараша). Оқытушылардың жартысынан көбі (55,90%) тез қартаю қарқынын (БЖ IV-V дәрежесі) бастан кешіргені белгілі болды, бұл ретте әйелдерге қарағанда ерлер арасында осындай жағдай анағұрлым көп. Тексерілгендердің ішінде қартаю қарқыны ең жас оқытушылар тобында айқын көрінді. Пандемияға байланысты әдеттегі дәстүрлі оқу форматынан қашықтықтан оқытуға шұғыл ауысу кезеңінде биологиялық жас көрсеткіштері бойынша қартаюдың жедел қарқыны оқытушылардың барлық топтарында дерлік байқалды: яғни 23%-80%. Ал биологиялық жастың шамасына зерттелушілердің жынысы мен жасы әсер етеді деген тұжырым бар.

Кілт сөздер: денсаулық, стресс, қашықтықтан білім беру, пандемия, жас, биологиялық жас, жоғары оқу орнының оқытушылары, гендер.

А.Б. Мырзабаев, Г.Т. Тнимова, Г.Г. Соколова, М.Т. Бодеев, Е. Кабдолла

Исследование показателя «биологический возраст у преподавателей университета» в период срочного перехода на дисстанционное образование в результате пандемии

В статье изучен биологический возраст (БВ) (экспресс-метод В.П. Войтенко) преподавателей университета. Всего обследовано 127 человек (64 женщины, 63 мужчины), которых разделили на три возрастные группы (1 группа — 23–39 лет; 2 — 40–59 лет, 3 группа — 60 лет и старше). Расчет значения БВ включал математическую формулу с использованием ряда физиологических показателей и самооценки здоровья по специальной анкете; расчет должного значения биологического возраста (ДБВ); сопоставление полученной (БВ) и должной величины (ДБВ) вычисляли, на сколько лет обследуемый опережает или отстает от сверстников по темпам постарения. Такой подход позволяет ранжировать лиц одного КВ по степени «возрастного износа» и, следовательно, по «запасу» здоровья (I и II ранги — замедленное постарение, III — БВ соответствует популяционному стандарту, IV и V — ускоренное постарение). Исследование проведено в период пандемии при переходе вуза на дистанционное обучение (октябрь–ноябрь 2020 г). Оказалось, что более половины преподавателей (55,90 %) испытывают ускоренный темп постарения (IV–V ранги БВ), при этом среди мужчин таковых больше, чем женщин. Темпы постарения наиболее выражены у молодой группы обследованных (23–39 лет) и в возрастном аспекте у преподавателей-мужчин. Срочный переход на дистанционное образование с обычного традиционного (в период пандемии) проявился в регистрации значительной группы преподавателей (23–80 %) с ускоренным темпом постарения по показателям БВ. При этом на величину биологического возраста влияют пол и возраст обследованного.

Ключевые слова: здоровье, стресс, дисстанционное образование, пандемия, возраст, биологический возраст, преподаватели вуза, гендер.

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