

Listening to a Foreign Text as a Stress Influence Factor

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ABSTRACT

Cardiovascular diseases occupy a leading role in the structure of morbidity and mortality worldwide. This fact justifies the necessity to study cardiovascular risk factors and develop new ways of cardiovascular prevention. Stress is an established cardiovascular risk factor. Future research was needed to understand the effect of listening to a foreign text on some cardiovascular parameters. The study involved 42 students (21 Russian-speaking students and 21 English-speaking students) of the second course of Medical academy named after S. I. Georgievsky. Indicators of systolic blood pressure, diastolic blood pressure and heart rate were recorded, the level of personal anxiety was determined using the Spielberger-Hanin test during the rest, after listening to the native and foreign texts. A linear correlation between the indicators of personal anxiety and the level of systolic blood pressure in both groups was revealed. A statistically significant shift in cardiovascular parameters was established after listening to a foreign text in students' groups. The received data of cardiovascular parameters show the necessity to continue further investigate the influence of foreign language learning process to the human cardiovascular system. This research can show possible predictions of the cardiovascular pathology development in susceptible individuals.

Keywords: cardiovascular disease, risk factor, stress, foreign language text

1. INTRODUCTION

The development of world science is oriented to international cooperation which is realized through negotiations and discussions. This fact pointed out the relevance of multilingualism [25]. Despite the many advantages of this phenomenon, there is a proved fact about the human organism which is connected with a foreign language and stressful effects [10]. The results of previous studies define difficulties arising problems of foreign language study and one of the most significant accumulated stress factors of migrants [13]. It is worth recalling that stress is a combination of nonspecific adaptive reactions of the body to the effects of various adverse factors (psychological or physical). And according to G. Selye's theory, it is divided into two types: eustress – positive stress caused by mild irritants and mobilizing the body, and distress – resulting from suprathreshold exposure and leading to disadaptation [19].

Psychosocial factors play an important role in the pathogenesis of cardiovascular diseases, the correlation between increasing the cardiovascular disease risk factors and worsening their prognosis is proved [24]. According to the European Society of Cardiology and Other Cardiovascular Disease Prevention Societies in Clinical Practice, the most significant risk factors are:

low socioeconomic status, inadequate social support, stresses in the workplace, depression, increased anxiety, and social deprivation [3, 15]. Taking into consideration the statistics of World Health Organization cardiovascular diseases occupy a leading role in the structure of morbidity and mortality worldwide and it justifies the necessity to investigate cardiovascular risk factors and develop new ways of cardiovascular disease prevention [15, 23].

The cardiovascular system is characterized by high reactivity, and its restructuring plays an overriding role in the adaptation process to change living conditions. This feature of the cardiovascular system ensures the effective functioning of the whole organism. Thus, the circulatory system is immediately involved in stress reactions, and, therefore, cardiac activity is the most informative indicator of changes in human organism under stress [14]. According to G. Selye's doctrine, emotional stress is considered as a complex of adaptive nonspecific reactions which take part in the regulation of vital physiological functions of the body [19]. It is proved the adaptive and functional reserves of the body are depleted in conditions of mental tension leading to disadaptation [11]. In turn, a decrease in the body's adaptive resources serves as a prognostically unfavorable factor and disadaptation is the main cause of the onset and progression of pathology [9, 14].

So, it is important to study the cardiovascular system reaction to foreign language listening. Thus, S. Hagi and

J. Scharloth report “more than a third of Swiss people experience depression when they speak standard German” [7]. Moreover, the study by S. Fisher showed an increase in the biological (cortisol) response to stress in participants speaking a second language [4]. Nevertheless, some authors believe that most people are able to cope with mild to moderate stressful effects because of the foreign language impact [2, 8]. However, it cannot be denied that personal anxiety is often observed during the second language learning process [10]. There are some studies about the reactions of the cardiovascular system to foreigners’ speaking but the process of listening to foreign language speech wasn’t investigated enough in these scientific works.

The results of D.V. Zhabin’s analysis showed that an increased level of students’ stress during the act of foreign language text listening “... it has a significant effect on the student’s body, causing both an increase in subjective anxiety and objective changes in the nervous and cardiovascular systems” [25]. And F.G. Sidtikov focuses on students’ adaptation to mastering language skills, which “...causes changes in the cardiovascular system work and psycho-emotional changes in the body” [20]. M.Yu. Pitkevich describes the importance of the cardiovascular system which is provide the adaptation to various conditions and loads [16].

Thus, the first body system that responds to external influences is the cardiovascular system. However, the effect of listening to a foreign language text on cardiovascular parameters has not been enough previously studied. The study is based on the hypothesis of the existence of a stress-induced reaction of the cardiovascular system when people listen to foreign speech.

2. MATERIAL AND RESEARCH METHODS

It was conducted the analysis of cardiovascular parameters under the influence of Russian and English texts listening activity. The experimental part involves students of 2-nd course of Medical Academy named S.I. Georgievsky. The exclusion criteria were various cardiovascular complaints and the history of cardiovascular disease. Furthermore, the students were advised to quit drinking alcohol and excessive physical exertion within 24 hours and from smoking within 2 hours before the study. In advanced each participant was provided with information on the research methodology completely. Also, the consents for being involved into the experiment for this research were signed by students.

The first group was represented by 21 Russian students who had Pre-Intermediate English language level (A2). To determine the level of English participants passed the KET (Key English Test) which is possible to find at Cambridge Assesment Site (<https://www.cambridgeenglish.org/exams-and->

tests/key/preparation/). The threshold for passing the test was considered more than 70% of the correct tasks.

The second group included 21 English speaking students who came to study at the academy from countries where the state language is English. The inclusion criterion was to present a certificate of successful passing the TORFL-1 test in Russian as a foreign language of the first certification level (B1).

The 1st stage was connected with the presenting the information and signing the consent, after having 10 minutes rest in a sitting position blood pressure and heart rate were measured using the automated OMRON M2 Classic device. Then the Spielberger-Hanin test was used to determine the level of personal anxiety.

The 2nd stage dealt with the subjects of the first group and students were asked to listen to an excerpt from the book “The Picture of Dorian Gray” by Oscar Wilde in their native (Russian) language for five minutes, and then cardiovascular parameters were re-recorded. The second group listened to a five-minute record of the corresponding text in English, and blood pressure and heart rate were measured again.

In five-minute rest the experimental part was continued. The 3rd stage was connected with Russian students who started listening to the adapted text in English, at the same time English-speaking students were involved into listening activity of the text in Russian. Blood pressure and heart rate parameters were recorded in both groups during the experiment. All students were warned about the need for thoughtful listening for presenting detailed information.

Analysis of the data was carried out using variation statistics methods using licensed application packages MedStat, Microsoft Excel. Statistical processing of the material was carried out using parametric methods (the distribution of signs corresponded to the normal distribution according to the Shapiro-Wilk test) of descriptive statistics (mean, standard error of the mean, 95% confidence interval (CI)), paired samples t-test. Correlations were calculated using Pearson correlation analysis at 95 % confidence interval. A p-value less than 0.05 was considered as statistically significant at 95 % confidence interval.

3. RESEARCH RESULTS

At the 1st stage of the research, the Spielberger-Hanin test was used to determine the level of students’ feelings of anxiety. The following values were obtained: the average indicator of personal anxiety in the Russian-speaking group was 40.2±2.6 points, among English-speaking students the level of personal anxiety was higher, and the average was 45.1±2.5 points.

According to our research data, the anxiety degree was up to 30 points – a low level of anxiety, from 31 to 45 points – medium (average, moderate), 46 points and above – high, so the students were divided into groups (Table I). Distribution of students by level of personal anxiety

Table 1. Distribution of students by level of personal anxiety

Group	Categorization of the personal anxiety	%	The average value of personal anxiety (M ± m)
1 group (n=21)	Low level (≤ 30 points)	38.1	28.5±0.5
	Average level (31–45 points)	33.3	41.1±1.6
	High level (≥ 46 points)	28.6	54.7±3.1
2 group (n=21)	Low level (≤ 30 points)	14.3	27.1±1.2
	Average level (31–45 points)	38.1	39.9±1.4
	High level (≥ 46 points)	47.6	54.7±2.0

Blood pressure is fundamental in the general health assessment so systolic blood pressure, diastolic blood pressure and heart rate were measured and the obtained data were collected, analysed and presented in the following way:

1) the systolic blood pressure was 119.8±1.7 mm Hg, diastolic blood pressure – 75.1±1.7 mm Hg, heart rate – 72.1±1.6 beats per minute in the Russian group;

2) the systolic blood pressure was 120.6±1.3 mm Hg, diastolic blood pressure – 74.7±1.3 mm Hg, heart rate – 75.0±1.4 beats per minute in the English-speaking group.

Correlation analysis revealed a linear relationship between the level of personal anxiety and the initial level of systolic blood pressure in both groups, and it was 0.63 (p<0.05) for the first and 0.57 (p<0.05) for the second group.

Table II illustrated the level of personal anxiety which is proved by the cardiovascular indicators in the groups.

Table 2. Cardiovascular parameters in subjects with different levels of personal anxiety

	Parameter	Study stage	Anxiety Level (M ± m)		
			Low level (≤ 30 points)	Average level (31–45 points)	High level (≥ 46 points)
1 group (n=21)	Heart rate, beats per minute	1	71.1±3.2	71.4±2.8	74.2±2.6
		2	70.1±2.0	76.1±3.0	77.2±2.9
		3	71.1±3.1	73.1±2.3	77.0±3.4
	Systolic blood pressure, mm Hg	1	115.8±2.7	118.6±2.2	126.5±1.9
		2	117.1±2.6	118.7±2.0	127.3±2.9
		3	118.1±1.8	118.0±1.5	127.0±2.5
	Diastolic blood pressure, mm Hg	1	72.6±2.0	73.3±3.1	80.5±2.0
		2	74.9±2.6	73.7±2.7	80.5±2.8
		3	73.5±2.6	73.1±3.1	79.7±3.4
2 group (n=21)	Heart rate, beats per minute	1	75.0±4.6	75.5±2.6	74.6±1.8
		2	80.7±4.7	77.8±2.2	75.2±1.7
		3	80.0±3.6	76.6±3.0	76.9±2.2
	Systolic blood pressure, mm Hg	1	112.3±1.2	120.1±2.4	123.5±0.9
		2	112.7±1.2	121.3±2.5	121.6±0.8
		3	115.0±1.5	122.0±3.0	124.5±1.2
	Diastolic blood pressure, mm Hg	1	67.0±1.5	74.4±1.9	77.2±1.5
		2	69.0±2.5	75.3±2.7	78.3±1.6
		3	69.7±3.2	75.0±2.3	79.5±0.9

When using the paired samples t-test in the English-speaking students' group we can see significant differences between the following indicators:

- 1) systolic blood pressure at rest and when listening to a foreign text ($p = 0.032$);
- 2) diastolic blood pressure at rest and when listening to a foreign text ($p = 0.023$);
- 3) heart rate at rest and when listening to a foreign text ($p = 0.025$).

Thus, a statistically significant shift in the systolic blood pressure was revealed when listening to the native and foreign texts in the English group ($p = 0.015$). There were no statistically significant shifts in Russian students' group.

It is necessary to touch the problem about anxiety which represents an individual psychological feature of a person (personal anxiety) or a reaction to adverse conditions (situational anxiety). Situational anxiety is defined by C. D. Spielberger as "...a condition reflecting an emotional response to a stressful situation" [21]. Some authors consider anxiety is the most potent psychosocial risk factor for the development of cardiovascular diseases [6].

The study found a linear correlation between the level of personal anxiety and the level of systolic blood pressure, there were statistically significant changes in the level of systolic blood pressure, diastolic blood pressure and heart rate in the English-speaking students' group which were probably associated with the stressful effect of listening to foreign speech. It is believed the characteristic of predisposed individuals who exhibit hyperreactivity and weakened recovery after listening to foreign speech, as they have a violation of autonomic nervous regulation which serves as potential biomarker. So, stress factors can affect human organism and course the development of cardiovascular diseases [12]. Our results are consistent with earlier studies [4, 7].

Similar results were obtained by Abramova E.I. et al., reporting about the emotional students' well-being in foreign language classes where it was possible to see personal and situational anxiety manifestation [1].

However, the identified pattern is especially important for taking into account indicating data that anxiety increases the risk of coronary heart disease by 60% in both men and women, regardless of traditional risk factors for cardiovascular disease [22]. Moreover, there is the evidence that increased anxiety in healthy people is associated with an increased risk of subsequent development of coronary heart disease [18] and cardiovascular death [5, 17].

Hence, the fact of detecting shifts in cardiovascular parameters precisely in the English-speaking students' group with an initially higher level of anxiety than among native Russian speakers who deserve special attention. E. Horvitz associates this phenomenon with a greater metacognitive awareness of English-speaking students and migrants about a foreign language [10]. We believe the constant contact of foreign students with the usage of Russian can be regarded as the equivalent of chronic stress exposure, contributing to the disadaptation

of the autonomic nervous system in susceptible individuals.

4. CONCLUSION

Listening to the foreign language text during the training led to a shift in cardiovascular parameters in the English-speaking students' group that may serve as a response to stressful effects. Moreover, an initially higher level of personal anxiety and consequently higher level of systolic blood pressure indicate the great susceptibility of English-speaking students to foreign speech.

This may be due to both better metacognitive awareness and constant stay in a foreign language environment. The described patterns in cardiovascular changes during the process of foreign language learning require further investigations because of making possible prevention recommendations of the cardiovascular pathology development in predisposed individuals.

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