THE ADMINISTRATION OF THE RORSCHACH INKBLOT METHOD AND CHANGES IN AUTONOMIC NERVOUS SYSTEM ACTIVITY

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The administration of some psychological methods can be a temporary source of stress and evoke in some patients a pathophysiological reaction with a negative health outcome. The aim of the study was to find out whether the administration of the Rorschach Inkblot Method (RIM) can change the autonomic nervous system (ANS) activity in terms of shifting the sympathovagal balance towards sympathetic activity. The RIM test was applied to 39 healthy females (22.8 ± 2.4 years). ANS activity was measured by the spectral analysis of heart rate variability (SA HRV) before, during, and after the RIM test. The same algorithm as in the previous procedure was employed in 30 healthy females (21.41 ± 1.7 years), however the Stroop color word test (SCWD), a very powerful stressor with a marked impact on ANS activity, instead of the RIM, was administered. Five relative parameters of SA HRV were used: percentages of VLF (very low frequency), LF (low frequency) and HF (high frequency) components (from the spectral power total) and VLF/HF and LF/HF ratios. Changes in VLF/HF and LF/HF during the RIM and SCWT tests were used to compare the tests. During the RIM administration, a significant decrease in spectral power in HF (%), a significant increase in VLF (%) and LF (%), and a significant increase in LF/HF and VLF/HF ratios have been shown. No significant differences in VLF/HF (markers of stressful situations) among the RIM and the SCWT were found. The administration of the RIM can act as a powerful stressor and causes a significant decrease in parasympathetic activity and the shift of sympathovagal balance towards sympathetic activity. Administration of RIM and SCWT tests can produce stress of comparable intensity, with a similar impact on ANS activity.

Keywords: Rorschach test, psychological stress, heart rate variability, spectral analysis, vagal activity, sympathetic activity, sympathovagal balance.

INTRODUCTION

If we try to understand human beings in well being and in sickness, we must approach each individual with respect to multiple interacting factors (Engel, 1977; Ruiselová & Prokopčáková, 2005), in order to take into account his/her special needs (Štěrbová, 2003). At the same time we can see that the approaches of some researchers in different areas of human sciences tend to be simplified, more or less preferring only certain aspects of human existence and avoiding others. In many studies in psychology, researchers base their findings solely on interviews, observations or questionnaires while avoiding physiological aspects of personality. At the same time it is unquestionable that detailed information about physiological changes under certain conditions (e.g. under stress, during psychological assessment or relaxation training) can significantly improve our understanding of human existence or some psychosomatic disorders. The autonomic nervous system (ANS) plays a very important role in complex stress response. Many approaches have been developed to measure ANS activity; some of which can be applied in the practice of clinical psychology. Apart from the traditional methods of ANS assessment (e.g. pupilometry, evaluation of serum catecholamines or changes in heart rate (HR) or blood pressure in standardized situations – Ewing, Martyn, Young, & Clarke, 1985) we can also find relatively new ways of doing psychophysiological assessment. One of these ways is the spectral analysis (SA) of heart rate variability (HRV) (Aubert & Ramaekers, 1999; Task Force, 1996). A growing number of studies focus on the analysis of the influence of experimentally induced stress (or the administration of psychological assessment methods) on selected aspects of human immune response and other physiological functions. Del Rio and colleagues (1998) found an increased level of plasmatic adrenaline among females in menopause during the administration of the Stroop color word test and Lindqvist, Kahan, Melcher and Hjemdahl (1993) used SCWT to study cardiovascular and sympathoadrenal response among people with primary hypertension. From the review of relevant literature we can conclude that researchers use, as experimental stressors, mostly performance tests such as: (a) the Stroop test; (b) mirror drawing; (c) mental arithmetic; or (d) various memory tasks.

One of the methods that is instrumental towards an elicitation of experimental stress is the RIM. RIM is one of the most common psychological tests used for the analysis of the personalities of respondents. It is a projective technique, using the projection of thoughts and personality traits to 10 unknown mottles (objects of strange shapes). The ways in which respondents select and emphasize specific aspects of shapes reflects personal interests, tendencies, experiences and needs. Svoboda (1999) argues that the RIM is a unique test because of its sensitivity to detect a respondent's personality in its full complexity. Only a limited number of studies focus on the changes of physiological parameters during the RIM. Keltikangas-Järvinen, Kettunen, Ravaja and Näätänen (1999) examined the relationship of temperament dimensions, serving as markers for behavioral activation and inhibition systems, with autonomic stress reactivity in 35 middle aged males. They found that the temperament activation of the skin was positively related to the task induced changes in respiratory sinus arrhythmia (RSA) amplitude, but unrelated to HR reactivity; on the other hand, temperament inhibition was positively associated with HR reactivity. In another study, Kettunen and colleagues (1998) studied electro-dermal activity (EDA), HR, and subjective and behavioral arousal during the administration of the RIM in 37 middle aged men. The authors found that EDA phases and HR accelerations were synchronized and they suggested that an intraindividual analysis of physiological time series data can extend our understanding of the individual differences in the ANS functions. Kettunen, Ravaja, Näätänen and Keltikangas-Järvinen (2000) analyzed the relationship of RSA to the coactivation of autonomic and facially expressive responses in 37 adult men during the administration of the RIM. They concluded that spontaneous autonomic and expressive responses tend to be parallel in time and that the changes in RSA were positively related to coupled autonomic expressive reactions. Masling, Price, Goldband and Katkin (1981) monitored the EDA in male subjects with high (orals) and low numbers (non orals) of oral dependent RIM responses. They found that orals showed in the presence of associates a lesser electrodermal increase than orals sitting alone or non orals either alone or with their associates.

It seems to be clear that the administration of psychological methods can be a temporary source of stress and potentially influence results. Cherrington, Moser and Lennie (2002) stated that for persons with acute cardiac disease, the administration of psychological instruments might be psychologically stressful and have two unintended negative effects: (a) if patients experience acute stress merely as a result of reading and completing the instruments, they can score spuriously high; (b) psychological stress may evoke (e.g. in patients with acute cardiac disease) a physiological reaction with a negative health outcome. The authors stated that, in the relevant literature, there is a gap in studies about the influence of the administration of psychological methods to those patients with acute myocardial infarction. According to the authors, the administration of psychological methods amplifies that physiological reactivity, which one would expect regarding the changes in specific parameters. The activation of the hypothalamic pituitary adrenal axis would lead to an increased level of cortisol in the saliva, to an increase in HR and a decrease in HRV. However, there were no significant differences, e.g. in salivary cortisol, HR or blood pressure between the measurements prior to the administration of several questionnaires and 30 minutes afterwards. The authors concluded that the administration of psychological instruments used in the mentioned study did not cause any stress reaction. A limitation of this study is the small sample size and the fact that respondents used drugs affecting their ANS activity (β blockers).

Many authors (Aubert & Ramaekers, 1999; Šiška, 2002b; Tonhajzerová, Javorka, & Petrášková, 2000; Tonhajzerová, 2008) claim that the changes in some parameters of SA HRV can be related to the level of arousal from experiencing a stressful situation. We believe that the assessment with the help of the RIM represents a specific interpersonal situation, in which many factors can play an important role (being challenged by a new task, an opportunity for a creative approach to reality, fear of the unknown, an unpleasant confrontation with less structured material, etc.). We can also state that in many cases the assessed person shows clear outer signs of stress. The purpose of the study was to evaluate the level of psychological stress during the administration of the Rorchach inkblot method (RIM) and the Stroop color word test (SCWT). The first aim of our study was to evaluate the level of stress during RIM administration on the basis of changes in ANS activity as assessed by SA HRV (part 1). The second aim was to compare the changes in SA HRV during RIM with the changes during the administration of a known and significant experimental stressor (part 2). For this purpose we used the SCWT, which was in many studies recognized as a very powerful stressor with a marked impact on ANS activity (Becker et al., 1996; Fauvel et al., 1996; Grillot et al., 1995; Manuck, Olsson, Hjemdahl, & Rehnqvist, 1992; Šiška, 2002a). The authors hypothesize that RIM administration excites the sympathoadrenal system and that the actions of the both psychological tests act as similar stressors.

METHOD

Participants

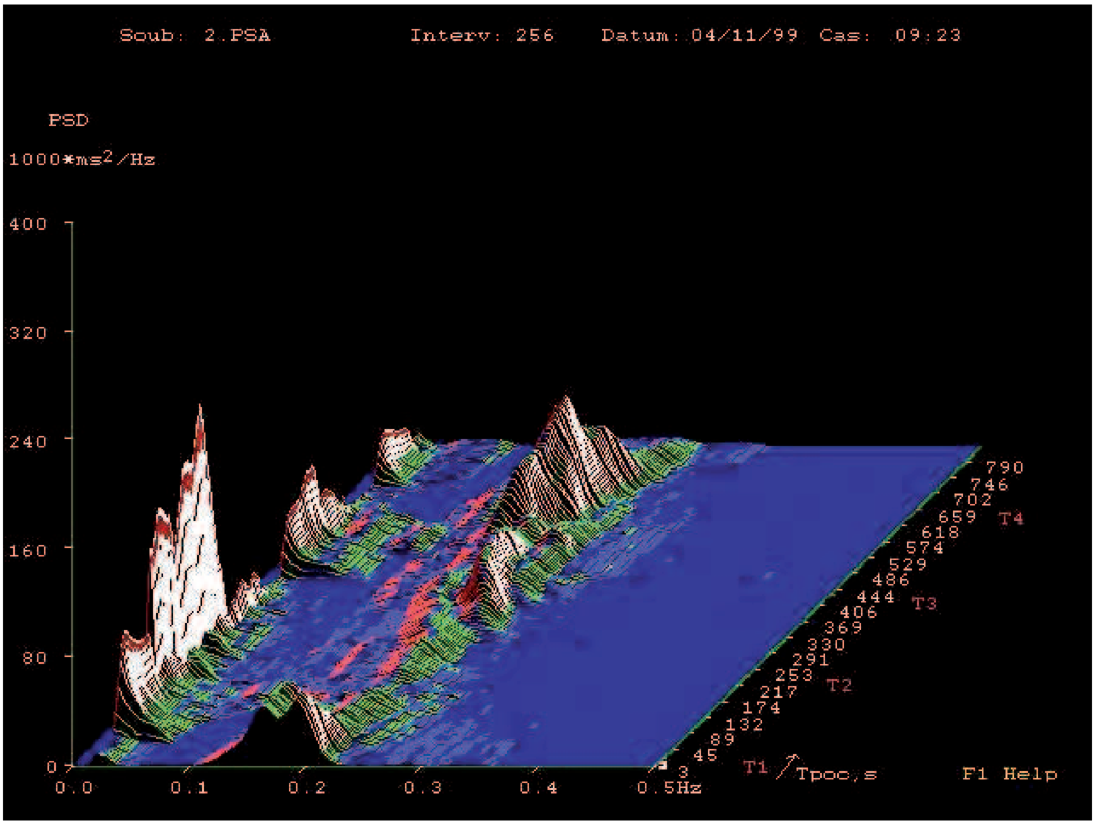
Participants in part 1 (the administration of the RIM) were 39 healthy females with an average age of 22.8 ± 2.4 years. During the experiment none of them used any substances which could affect ANS activity (e.g. β blockers). The conditions of the experiment were strictly standardized. All measures were done from 8 a.m. till 11 a.m. in a quiet room with a constant temperature. Participants were also asked to abstain from greater physical activity within 24 hrs prior to the testing. They were asked to eat only a light breakfast and not to smoke or drink coffee in the morning on the testing day. Participants in part 2 (the administration of the SCWT) were 30 healthy females with an average age of 21.41 ± 1.7 years. The conditions of the examination were the same as in Part 1 (a quiet room, no β blockers, etc.).

Measure

SA HRV represents a non invasive method which can be used to get important information about specific efferent regulatory influences of the parasympathetic (and partly also sympathetic) nervous systems and about the interaction of psychological and physiological processes. Its basic principle is based on information about a series of so called R-R intervals (intervals between consecutive heartbeats) which is transformed into the spectral power of range from 0.02 to 0.40 Hz. Their short term analysis (minimally 5 minutes and 300 heartbeat periods) allows the differentiation of three spectral components:

1. VLF (very low frequency) – range 0.02–0.05 Hz;
2. LF (low frequency) – range 0.05–0.15 Hz with a mean frequency of approximately 0.10 Hz;
3. HF (high frequency) – range 0.15–0.40 Hz with a mean around a respiratory frequency of 0.25–0.30 Hz (Fig. 1).

Fig. 1
Three dimensional graph of power spectral density acquired by means of VariaPulseTF3 System in different intervals



Legend:
T1– before test
T2 – during test
T3 – after test (all the intervals in sitting position)
T4 – standing position

Spectral power within the HF range is related to the efferent activity of the parasympathetic nervous system vagal activity (Aubert & Ramaekers, 1999; Berntson et al., 1997; Task Force, 1996). One of its main components (a frequency of approx. 0.25–0.30 Hz) is represented by the above mentioned RSA, which is seen as the non invasive index of the parasympathetic control of HR. The LF component (called Mayer's pressure wave) is considered by some authors (e.g. Pagani et al., 1991) to be an indicator of the sympathetic modulation of HR; others, however, suppose a certain level of vagal activity here as well and it seems that supporters of this opinion are in the majority today (Task Force, 1996). The LF component is influenced mostly by baroreceptor activity and corresponds with slow changes in blood pressure variability. Spectral power in the VLF component represents a relatively unclear phenomenon, which is usually related to the thermoregulatory sympathetic activity of the vascular system, the level of circulating catecholamines, and to the oscillations of the renin-angiotensin system (Berntson et al., 1997).

In order to assess the relation between the sympathetic and parasympathetic modulation of HR in more details, the LF/HF ratio was proposed, and is used as an indicator of sympathetic activity or its predominance (index of so called sympathovagal balance); some authors, however, deny its general applicability and/or suggest using it only under certain conditions (Eckberg, 1997). The ratio VLF/HF can be seen as one of the markers of the experiencing of stressful situations (Šiška, 2002a; Tonhajzerová, Javorka, & Petrášková, 2000). Therefore, the VLF/HF ratio, together with the LF/HF ratio, was used in this study. For the continuous registration of R-R intervals we used the VariaPulseTF3 System, which was developed by the group of researchers at the Faculty of Physical Culture, Palacký University, Olomouc, Czech Republic. This system allows measurements and the telemetric transfer of signals typical for the full length of R-R intervals (in milliseconds) of the ECG recording (Salinger et al., 1998). The obtained data are stored in a PC and analyzed with special software, which allows for the measuring of R-R intervals, filtration of artifacts or arrhythmias, the calculation of the frequency spectrum with the use of Fast Fourier Transformation, statistical analysis and saving the data (Salinger et al., 1994). Breathing frequency, which can markedly influence the spectral power distribution wasn't measured for technical reasons; this is one of the limits of the study. On the other hand, breathing frequency accelerates during stress. Therefore, it is hardly likely that the results of our study could be influenced by the breathing frequency $<$ 0.15 Hz, which means less than 9 breaths per minute.

Stroop colour word test

The Stroop color word test (SCWT) is a psychological test of our mental (attentional) vitality and flexibility. The task takes advantage of our ability to read words more quickly and automatically than we can name colors. When implementing the classic form of the SCWT, the subject is initially required to read words representing the names of some basic colors, then he/she tries to quickly name the colors of, for example, small rectangles and at the end he/she goes through the so called subtest of interference (Šiška, 2002b). The subtest of interference is based on the assumption that looking at the name of a color which is other than what the actual color is (e.g. the word red is written in green), the subject strongly tends to read the name instead of saying the color in which the word is written (which is what the instruction requires). The cognitive mechanism involved in this task is called directed attention, you have to manage your attention, inhibit or stop one response in order to say or do something else. When reading quickly, the person gets into a conflict filled stressful situation because the answer is influenced by the learned reaction (in this case by the tendency to read words, not to name the colors).

Rorschach inkblot test

The Rorschach inkblot test is a psychological test in which subject's perceptions of inkblots (ambiguous images) are recorded and then analyzed using psychological interpretation. The tester and subject typically sit next to each other at a table, with the tester slightly behind the subject. This is to facilitate a "relaxed but controlled atmosphere". There are ten official inkblots, each printed on a separate white card, approximately 18 × 24 cm in size. Each of the blots has near perfect bilateral symmetry. Five inkblots are of black ink, two are of black and red ink ant three are multicolored, on a white background. After the test subject has seen and responded to all of the inkblots (free association phase), the tester then presents them again one at a time in a set sequence for the subject to study: the subject is asked to note where he sees what he originally saw and what makes it look like that (inquiry phase). The subject is usually asked to hold the cards and may rotate them. The general goal of the test is to provide data about cognition and personality variables such as motivation, response tendencies, cognitive operations, affectivity, and personal/interpersonal perceptions. The underlying assumption is that an individual will class external stimuli based on person specific perceptual sets, and including needs, base motives, conflicts, and that this clustering process is representative of the process used in real life situations (Klopfer & Davidson, 1962).

Procedure

Part 1 (RIM)

Each participant was informed about the study and its objectives and then was asked to sign an informed consent form. After the taking of a brief interview, the participants were asked to sit quietly. Subsequently, the RIM was administered and the participant's responses were recorded. After responding to the last card, the participant was asked to sit quietly again. During all of these phases, HR was recorded by means of VariaPulseTF3 to obtain the required numbers of R-R intervals for the short term recordings of SA HRV (about a 5 minute long measurement period in each interval). So we obtained three recordings from all participants: pre-test (prior to the RIM), test (the first 5 minutes of the RIM administration), and post-test (after the RIM). For the assessment of the above mentioned recordings we used SA HRV. We were interested in finding any statistically significant differences in the relative spectral power of each component (%) – VLF (% VLF), LF (% LF), and HF (% HF), and in the VLF/HF and LF/HF ratios.

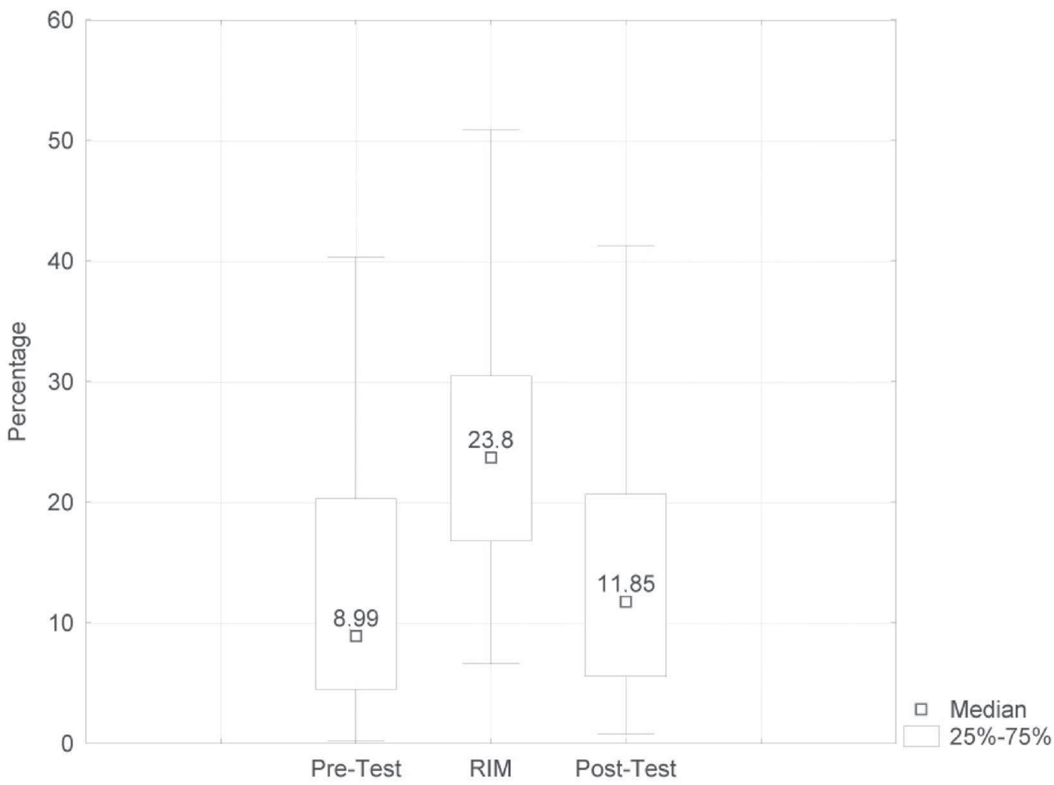
Part 2 (SCWT)

We used the same procedure (algorithm) as in part 1, however the Stroop color word test, instead of the RIM, was repeatedly administered. So we obtained three recordings from all participants: pre-test (prior to SCWT), test (5 minutes of SCWT administration), and post-test (after SCWT). The values of the VLF/HF and LF/HF were compared between the RIM and SCWT. The first parameter is considered to be a marker of stressful conditions and the second is seen as an index of the so called sympathovagal balance (see above).

Statistics

Basic statistical analysis showed that the distribution of values of most monitored variables was noticeably asymmetrical. For comparison of changes in selected parameters of SA HRV (part 1) we decided to use only non parametric statistics, specifically Friedman ANOVA for repeated measures. The differences between particular situations (pre-test: test, test: post-test, and pre-test: post-test) were evaluated with the help of a mul-

Fig. 2
Differences in relative powers of VLF



tiple comparison method (by means of the Wilcoxon matched pairs test and the Bonferroni adjustment). This is accomplished by dividing the pre-set α level (0.05) by the number of tests being performed (in our case 0.05: 3 = 0.0166). Any test that results in a p-value of less than 0.0166 would be considered to be statistically significant. For the comparison of possible differences between the administrations of SCWT (part 2) and RIM (part 1) we used the Mann-Whitney test. All statistical calculations were done with the use of the software STATISTICA®.

RESULTS

Part 1

During the RIM administration (in comparison with pre-test and post-test, Fig. 2–6) we found a decrease in % HF (pre-test vs. test: Z = 5.01, p < 0.01, test vs. post-test: Z = 5.22; p < 0.01),an increase in % VLF (pre-test vs. test: Z = 4.09, p < 0.01, test vs. post-test: Z = 4.10; p < 0.01), and % LF (pre-test vs. test: Z = 3.54, p < 0.01, test vs. post-test: Z = 3.92, p < 0.01), and an increase in LF/HF ratio (Ppe-test vs. test: Z = 4.507; p < 0.01, test vs. post-test (Z = 4.73; p < 0.01) and VLF/HF ratio (pre-test vs. test: Z = 5.01, p < 0.01, test vs. post-test: Z = 5.39, p < 0.01).

After the administration of the RIM we found a relatively fast return of the monitored parameters of SA HRV to the initial levels, and no significant differences between the post-test and the pre-test: % VLF (Z = 0.89, p = 0.37), % LF (Z = 0.49, p < 0.01), % HF (Z = 0.25, p = 0.80), VLF/HF (Z = 0.11, p = 0.91), and LF/HF (Z = 1.02, p = 0.318).

Part 2

Among the values of VLF/HF at particular intervals of the examination (pre-test, test a post-test) we found no significant differences between the RIM and the SCWT (pre-test: Z = 0.73, p = 0.47; test: Z = –1.46, p = 0.14; post-test: Z = 1.19, p = 0.23). The LF/HF ratio showed out a non significant difference in the pre-test (Z = 1.17, p = 0.24), but the differences in the two following phases were significant (test: Z = –2.46, p = 0.01; post-test: Z = 2.26, p = 0.02, Fig. 7 and 8).

Fig. 3
Differences in relative powers of VLF

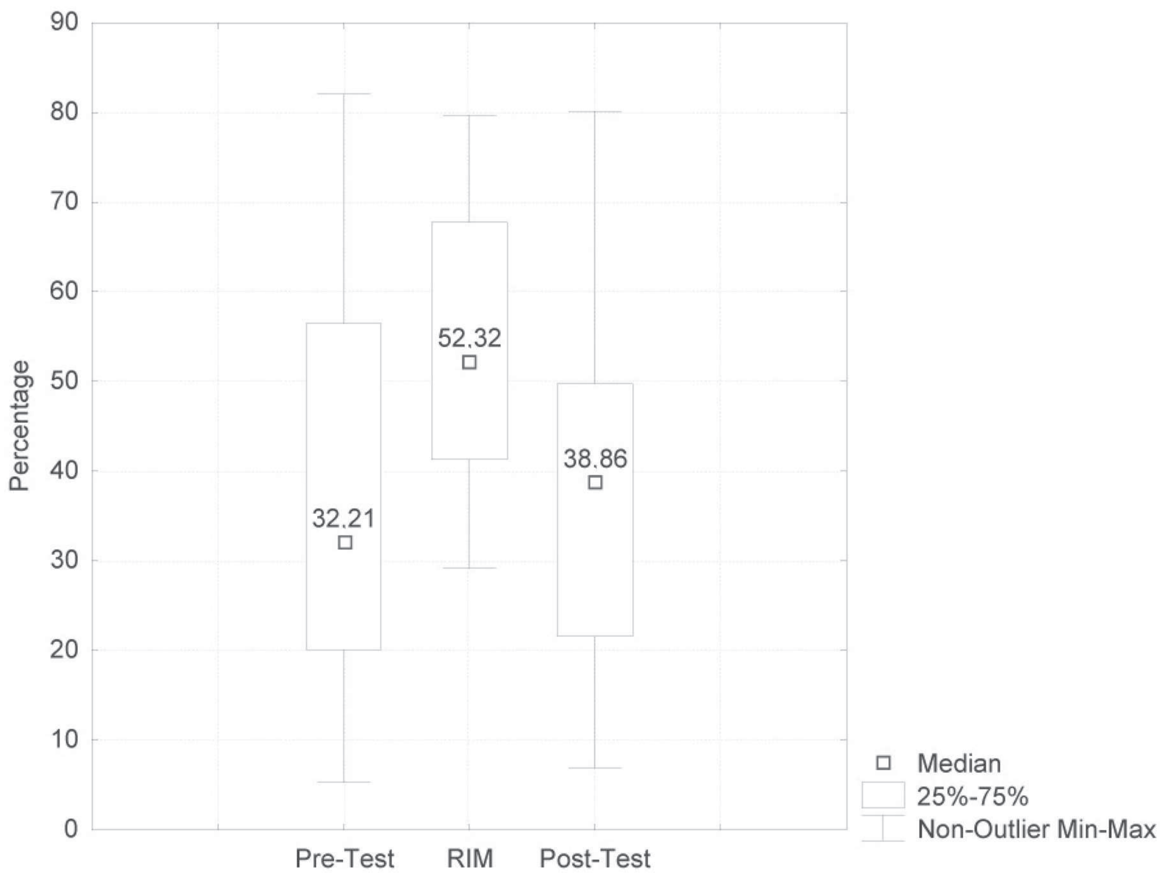


Fig. 4
Differences in relative powers of HF

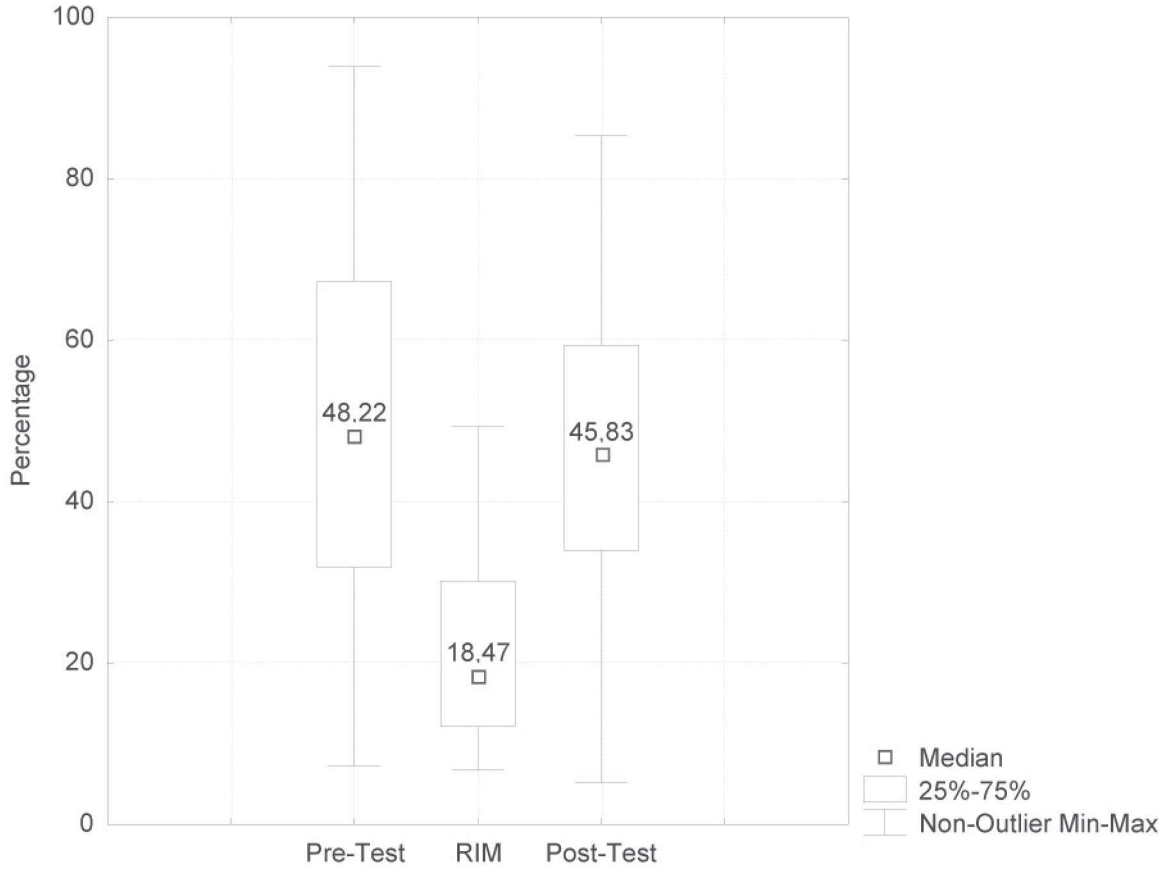


Fig. 5
Differences in VLF/HF

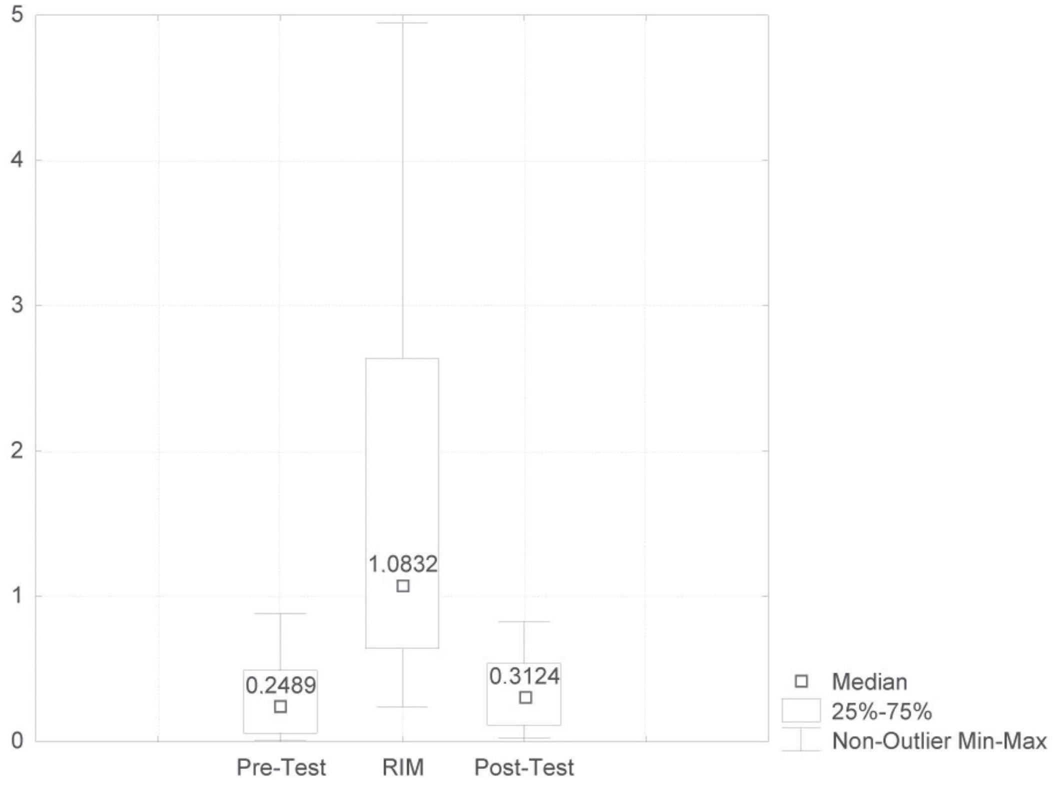


Fig. 6
Differences in LF/HF

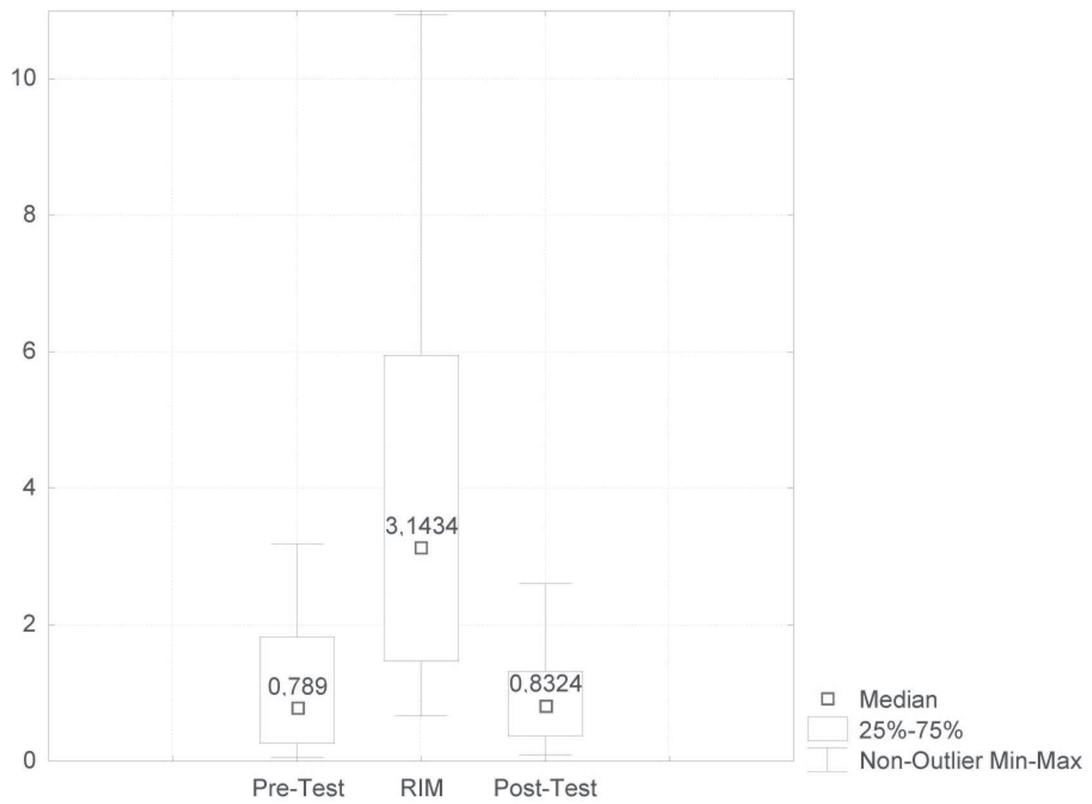


Fig. 7
Differences in LF/HF

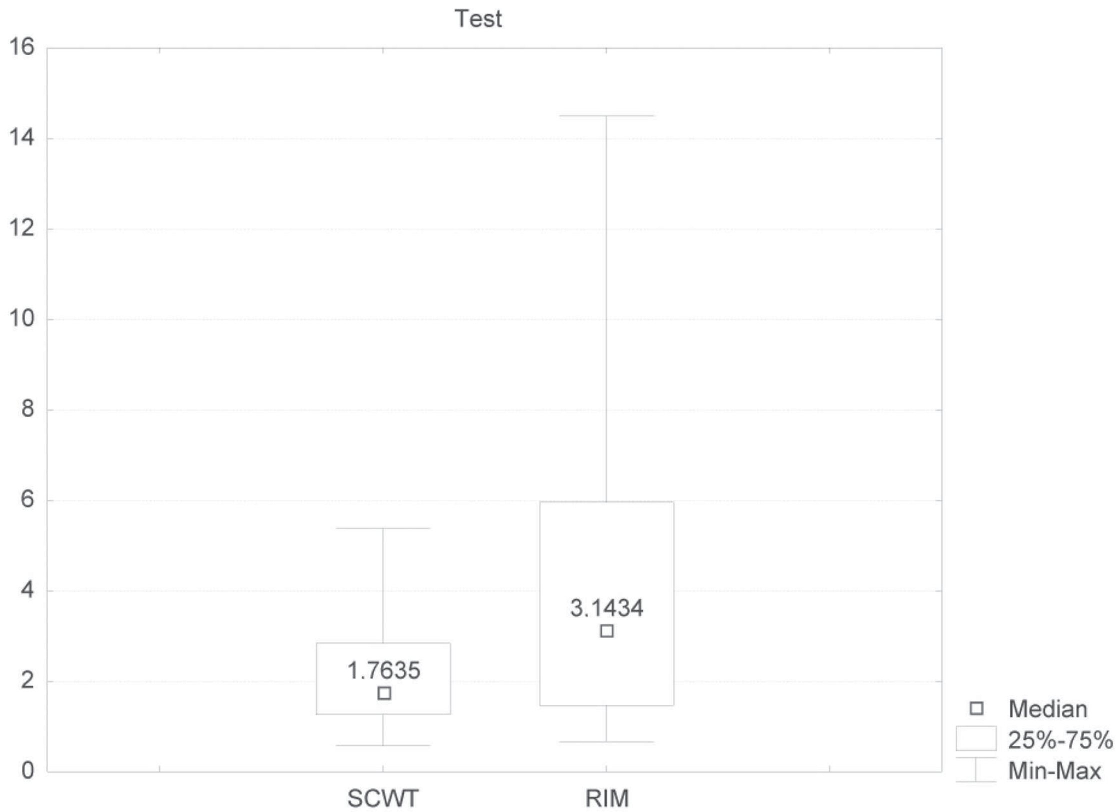
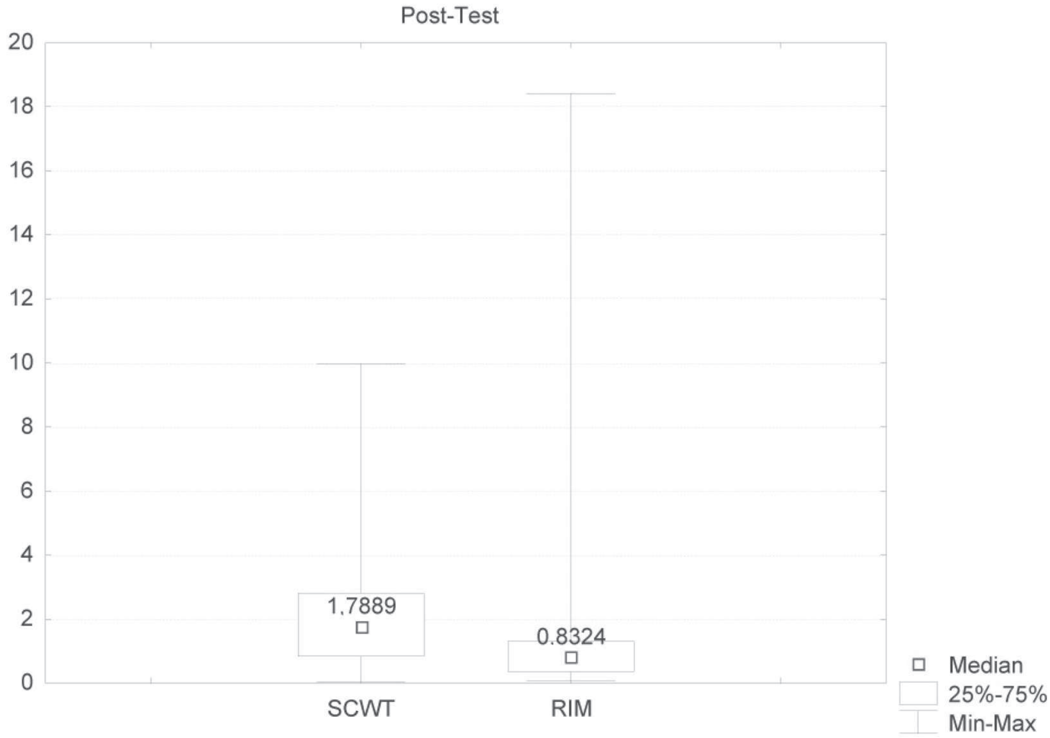


Fig. 8
Differences in LF/HF



DISCUSSION

Human existence is complex and everything interacts with everything else. In the professional area there is a consensus that for maintaining homeostasis the ANS is one of the most important factors. According to McEwen and Stellar (1994) it is better to use term alostasis as we should not ignore the variability of physiological processes in their dependence on outside influences. ANS is structurally and functionally intended to manage relationships between inner and outer conditions and to coordinate somatic processes with the aim of assuring adaptive reaction to changing life conditions. The functions of ANS depends on the tuning of physiological and behavioral responses, which are coordinated centrally and peripherally (Hamill, 1996). At the same time it is supposed that practically every mental or physical activity has its reflection in changes in ANS activity.

It is evident that the administration of the RIM (at least in the first minutes after beginning) can act as a powerful stressor, which causes a clear decrease in parasympathetic activity and a shift of sympathovagal balance towards sympathetic activity (a decrease in HF % and an increase in VLF %, LF %, LF/HF and VLF/HF). The results of many studies (Aubert & Ramaekers, 1999; Berntson et al., 1997; Grillot et al., 1995; Hoshikawa & Yamamoto, 1997; Task Force, 1996; Tonhajzerová, 2008) show that similar changes in the autonomic efferent activity are typical for stressful situations. Everyday clinical experience supports these findings. For example, we can see that for some persons the administration of the RIM represents a stressful situation, which can be reflected in non verbal expressions (increased motor instability, tremor, blushing, etc.) as well as in open verbal statements (they complain about their eyes hurting from the cards; they are not for "such things"; they judge tables as non sense daubs and refuse to share their associations in order to escape from stressful situation). The level of experienced stress can – in our opinion – potentially affect the productivity and spontaneity of respondents (e.g. the problem of so called low R). It can also lead to the activation of censorship, to lower willingness to share some interpretations or to use certain determinants, etc. This, in the final analysis, determines the quality of responses and, naturally, the reliability of our diagnostic judgment. We should keep this fact in mind when interpreting Rorschach protocols and we should try to create a testing environment, which can lower the stress, anxiety and tension of our patients/clients and lead to more valid results.

From the comparison of changes in selected parameters of SA HRV in particular phases of examination (with respect to psychological methods used, i.e. the RIM and the SCWT) we can see that in the VLF/HF ratio there were no significant differences, whereas the LF/HF ratio during the administration of the RIM (Test phase) was even significantly higher than during the SCWT. In the post-test phase, the situation was inverse – the LF/HF after the SCWT was significantly higher than the LF/HF after the RIM. On the basis of the obtained results, we conclude that the administration of both methods can produce stress of comparable intensity, with a similar impact to the autonomic modulation of heart activity. The difference in the post-test phase is difficult to explain (different types of stress?) and requires further research.

In our study we used the SA HRV method for the evaluation of changes in the autonomic modulation of HR, which is judged by many authors as being a reliable and sensitive indicator of the actual, current functional state of the ANS. At the same time, we would like to bring attention to the fact that the clinical use of SA HRV preceded full understanding of all its physiological correlates and, solely on its basis, we cannot evaluate the state of sympathetic and parasympathetic activity under varying conditions (Malik & Camm, 1993). As this method is relatively accessible and non invasive, it has been used in many areas and by many researchers, but some of the results of published studies seem to be somewhat contradictory. It is therefore important to state that this method is sensitive to many influences, which we do not fully understand yet (Aubert & Ramaekers, 1999; Task Force, 1996). A generally accepted opinion is that measuring the dynamics of changes in SA HRV parameters under varying natural and experimental conditions deepens our understanding of the psycho-physiological foundations of this method and thus increases the opportunities for its adequate application in clinical practice (Berntson et al., 1997; Fagard, Pardaens, & Staessen, 1999; Task Force, 1996). The above mentioned facts lead to a certain degree of caution in the interpretation of the results of our study. Another limitation is the low sample size or the reduction of the sample only to females, which lowers its ecological validity and shows the need to further study this phenomenon.

CONCLUSION

We would like to emphasize that SA HRV appears to be a very suitable method for the evaluation of the psychophysiological reactions of persons under different conditions, as it provides a very sensitive and fast evaluation of changes in the cardiovascular system (specifically periodic changes in HR), which are strongly determined also by the current functional state of the ANS. Our results confirmed the hypothesis that RIM administration induces a significant decrease in parasympathetic activity and shifts sympathovagal balance towards sympathetic activity. The administration of the RIM and SCWT tests could produce stress of comparable intensity, with a similar impact on ANS activity. The next step in our research could be focused on searching for the relationship between selected indicators of RIM and the dynamics of changes of SA HRV parameters. The combination of personality assessment with the use of the RIM together with the evaluation of changes in psychophysiological parameters (e.g. autonomic modulation of heart activity) can, in our opinion, lead to a more profound understanding of the human complex stress response, of the etiology and pathogenesis of certain psychosomatic disorders, to broaden opportunities for the identification of persons with a high to pathological reactivity to stress, to help with the planning of appropriate therapeutic procedures or in the evaluation of the effect of relaxation techniques in persons with more serious psychosomatic problems, etc.

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APLIKACE RORSCHACHOVY METODY A ZMĚNY V AKTIVITĚ AUTONOMNÍHO NERVOVÉHO SYSTÉMU

(Souhrn anglického textu)

Použití některých psychologických metod může přechodně působit jako zdroj stresu a u některých pacientů vyvolat patofyziologické reakce s negativním dopadem na zdraví. Cílem této studie bylo zjistit, zda aplikace Rorschachovy metody (Rorschach Inkblot Method – RIM) může ovlivnit aktivitu autonomního nervového systému (ANS) ve smyslu posunu autonomní rovnováhy směrem k sympatiku. Test RIM byl aplikován u 39 zdravých žen (22,8 ± 2,4 roku). Aktivita ANS byla hodnocena pomocí spektrální analýzy variability srdeční frekvence (SA HRV) před testem RIM, v jeho průběhu a po jeho ukončení. Stejný postup byl zachován i v souboru 30 zdravých žen (21,41 ± 1,7 roku), avšak test RIM byl zaměněn za Stroopův test (Stroop color word test – SCWT), který se používá jako uznávaný zátěžový faktor ovlivňující významně aktivitu ANS. Pro hodnocení aktivity ANS bylo použito pět relativních ukazatelů SA HRV: percentuální podíl komponent VLF, LF a HF na celkovém spektrálním výkonu a poměry mezi komponentami (VLF/HF a LF/HF). Tyto poměry byly použity pro porovnání změn aktivity ANS, ke kterým došlo při použití obou psychologických testů (RIM a SWCT). Během aplikace testu RIM došlo k významnému poklesu spektrálního výkonu HF (%), významnému vzestupu VLF a LF (%) a významnému vzestupu poměrů VLF/HF a LF/HF. Mezi testy RIM a SCWT nebyly shledány žádné rozdíly v dynamice VLF/HF (ukazatel stresu). Aplikace testu RIM může vyvolat silnou stresovou reakci spojenou s významným poklesem vagové aktivity a posunem autonomní rovnováhy směrem k sympatiku. Aplikace testů RIM a SCWT může vyvolat stres podobné intenzity a s podobným dopadem na aktivitu ANS.

Klíčová slova: Rorschachův test, psychologický stres, variabilita srdeční frekvence, spektrální analýza, aktivita vagu, aktivita sympatiku, sympatovagová rovnováha.

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In memory of our dear colleague, first author of this article, dr. Emil Šiška, the great professional, sincere person and good friend to us. Despote of several years elapsed from the implementation of the experiment, coauthors preserved original design and results of experiment and the major part of the test which was mostly a matter of the first author. Only some interpretations of the results were changed so that corresponds to current knowledge.

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