Acta Salus Vitae, Vol 11, No 2 (2023)

ISSN 1805-8787 actasalus@palestra.cz

INFLUENCE OF STATIC AND DYNAMIC CHANGES IN BODY POSITIONS ON FUNCTIONAL CHANGES OF THE CARDIOVASCULAR SYSTEM

Petr KOLISKO; Simona BROKEŠOVÁ; Milada SÁROVÁ; Jakub KREJČÍ

Abstract

The autonomic nervous system (ANS) plays an important role in the regulation of heart activity, breathing and blood pressure. Through changes in sympathetic and parasympathetic activity, it participates in the regulation, coordination and integration of internal organ function. The method of spectral analysis of heart rate variability (SAHRV) is used to examine the functional status of autonomic regulation of heart activity. During the examination, clino-ortho-clinostasis is used, which makes it possible to assess the reactivity of functional changes in the sympathetic and parasympathetic systems.

We were therefore interested in what functional changes in the autonomic regulation of heart activity will occur during static and dynamic changes in the position of the body head down and up at angles of ± 45°.

For the research, we used the method of spectral analysis of heart rate variability, supplemented by blood pressure measurement during the experiment. The experimental group included 24 healthy women aged 20-30. Before and after the experiment, a standard examination of the functional state of the autonomic nervous system was performed in the clino-ortho-clinostatic position.

During the experimental sequence, changes in sympathetic, vagus, heart rate and blood pressure reactivity were monitored in the following positions:

- *in an inclined position of the body with the head up – angle +45°*
- *in an inclined position of the body with the head down – angle -45°*
- *during dynamic changes in oblique body positions +-45°*

An auto-traction reclining couch was used for the investigation of oblique positions.

***The results:** During the application of oblique positions of the body, there are significant changes in the activity of the autonomic regulation of heart activity.*

In the head down position, there is an increased activation of the parasympathetic, a decrease in heart rate and an increase in systolic and diastolic pressure.

During dynamic changes in body positions +- 45°, there is significant alternating activation of baroreflexes, modulated by sympathetic and vagal aktivity.

***Conclusion:** The research study draws attention to the existence to multiple interconnections of regulatory mechanisms between the autonomic nervous system, cardiovascular and cardiorespiratory systems.*

Keywords

autonomic nervous system, sympathetic, parasympathetic, oblique body positions ± 45°, spectral analysis of heart rate variability

ISSN 1805-8787 actasalus@palestra.cz

1 INTRODUCTION

The autonomic nervous system (ANS) plays an important role in the regulation of heart activity, breathing and blood pressure. Through changes of the sympathetic and parasympathetic activity, it participates in the regulation, coordination and integration of internal organ function. The method of spectral analysis of heart rate variability (SAHRV) is a non-invasive method that enables examination of the functional state of the autonomic regulation of cardiac activity. During the examination, clino-ortho-clinostasis is used, which makes it possible to assess the reactivity of functional changes of the sympathetic and parasympathetic system (Brychta et al, 1997; Javorka 2008).

In a number of research works, the influence of the static inverted body position (head down position) on the functional changes of the cardiovascular system was investigated (Kolisko et al., 1997; Geberová, 2010; Malhotra, 2021; Vijayalakshmi, Madanmohan, 2006; etc). Dynamic changes of the oblique body position head up, head down, which occur during some human activities (aerobatics, weightlessness, diving, acrobatics, etc.), were minimally investigated. An unpublished prospective study (Kolisko, 2008) brought attention to these changes.

Therefore, we were interested in what functional changes of the autonomic nervous system, heart activity and blood pressure will occur, when applying horizontal, vertical and inclined positions of the body head down and up at ± 45° angles.

2 RESEARCH QUESTIONS

2.1. What changes of the sympathetic and parasympathetic functional activity, heart rate and blood pressure will occur during the ortho and clinostatic position (standing - lying). (intervals M1T2 : M1T3, M3T2 : M3T3)

2.2. Do sympathetic and parasympathetic functional activity, heart rate and blood pressure change pre and after the application of oblique body positions?

2.3. What changes in sympathetic and parasympathetic activity, heart rate and blood pressure occur during aplication static oblique positions of the body with the head up +45° and head down - 45° (Intervals M2T1 : M2T2).

2.4. What changes in sympathetic and parasympathetic activity, heart rate and blood pressure occur during dynamic changes in oblique body positions at angles + - 45°? (M2T3 interval)

3 METHODOLOGY

Methods used

- Spectral analysis of heart rate variability (SAHRV) supplemented by blood pressure measurement during the examination.
- An experiment with purposefully manipulated independent variables during the experiment (see 3.3. Variables).

Research file

24 healthy women, age 20-30. Before the measurement the conditions for the examination were observed: (24 hours in advance absence of alcohol, nicotine, nutritional supplements, medication, only light physical load, spontaneous respiratory rate > 9 breaths/min.) The examination was carried out in the morning before meals.

3.1. Examination methodology

- 10 minutes rest before examination.
- M1 measurement: examination of autonomic nervous system reactivity before: 1. in the supine position - clinostasis, (interval T1); 2. in the standing position - ortostasis (interval T2); 3. in the supine position - 2nd clinostasis (interval T3).
- M2 measurement: interval T1 The static oblique body position + 45°); interval T2 the static oblique body position -

45°); interval T3 - the dynamic changes of oblique body positions (± 45°).

- 10 minutes rest
- M3 measurement: identical to measurement M1.
- The length of each measured intervals (T) was 300 heart beats; gap between measured intervals 60 sec.

3.2. Used instrumentation
Sima Varia TF7 diagnostic system, Omron digital calibrated tonometer, Autotraction positioning couch (See attachment figure 1).

A method of spectral analysis of heart rate variability (SAHRV) by the Sima Varia TF7 diagnostic system, enables the recording of R-R intervals and ECG in lead V5, during the measurement. Duration of each measured interval (T) = 300 heart beats. The software of the system enables the conversion of data into numerical form in the frequency range of 0.02 – 0.5 Hz using a fast Fourier transformation and the frequency and spectral analysis of the three frequency band: Very Low Frequency (VLF) 0.02 - 0.05 Hz, Low Frequency (LF) 0.051 Hz - 0.15 Hz and High Frequency (HF) 0.151 - 0.5 Hz. which provide information on sympathetic (LF frequency) and parasympathetic (HF frequency) activity. A prerequisite for the correct interpretation of monitored SAHRV parameters in the LF and HF frequency bands is a spontaneous respiratory frequency > 9 respiratory cycles/min.

The result of the spectral analysis of heart rate variability is a graphical and numerical output protocol.

3.3. Variables
Manipulated independent variables throughout the experiment.
Body positions: lying (clinostasis 0°), standing (orthostasis +90°), static oblique body position with head up (+45°), static oblique position with head down (-45°), dynamic changes in oblique positions of the body, with head up and head down+- 45°. Body position change interval 5 seconds

Observed dependent variables (monitored parameters of SAHRV, heart rate, blood pressure)

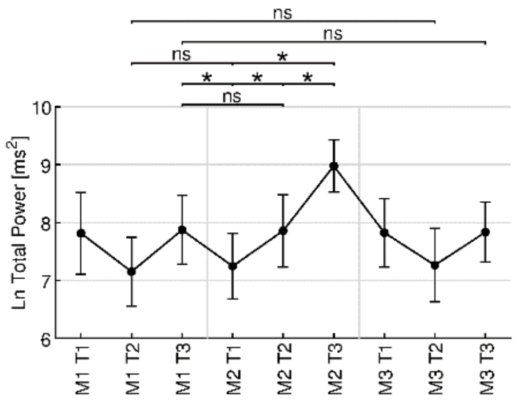
- Total spectral power/ms2 (Total Power) in the frequency band 0.02 – 0.5 Hz;
- Spectral power of the frequency component LF/ms2 (Power LF) - frequency band 0.051 – 0.15 Hz (sympathetic activity);
- Spectral power of the frequency component HF/ms2 (Power HF) - frequency band 0.151 – 0.5 Hz (parasympathetic activity);
- Ratio LF/HF (Ratio LF/HF) – an indicator of sympathovagal balance;
- Relative values of spectral power LF and HF (Rel. Power LF, HF) that express the proportion of sympathetic and vagus (parasympathetic) activity in %.
- Average heart rate values in individual measurement intervals (SF/min.).
- Average values of systolic and diastolic blood pressure (mm. Hg).

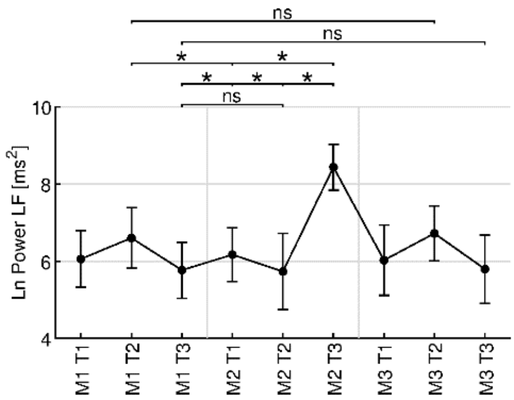
3.4. Statistic methods
Numerical data of the results SAHRV were logarithmized.The following statistic methods were used to evaluate the ensemble effect after analyzing the normality of the data distribution: ANOVA, Fischer's LSD test, Kolmogor-Smirnov test, Cohen's d, to evaluate the size of the effect. We considered statistically significant changes at the level of significance $p < 0.050$ (*) with the current size of Cohen's d ≥ 0.50. The measurement results were processed in the form of graphs and tables.

4 RESULTS AND DISCUSION

4.1. Results are presented in graphs and tables. Statistically significant changes in the comparison of individual positions (T) and measurements (M) during the experiment are marked with * ($p < 0.050$.).

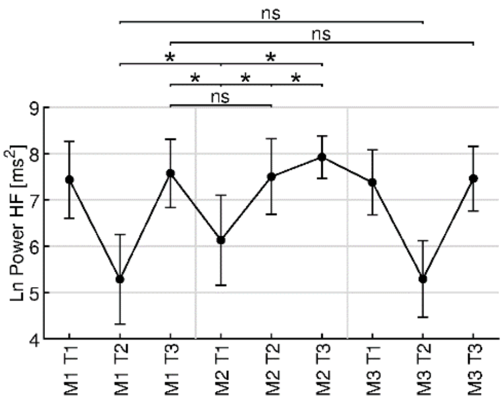
Figure 1, 2. Changes of the total spectral power (Total Power) and spectral power in the LF frequency band (Power LF).

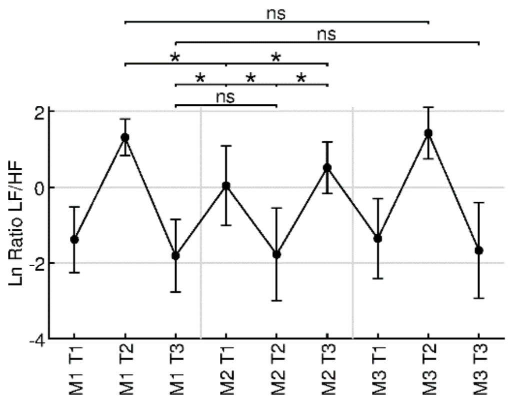




Comment:
M1 – **state pre**: M1T2 standing position; M1T3 supine position
M2 – **static and dynamic body positions**: M2T1 oblique position of the body upside down; M2T2 oblique position of the body with the head up. M2T3 dynamic changes in oblique body positions +- 45°
M3 – **status post**: M3T2 standing position; M3T3 supine position
Ln – logarithmic average value

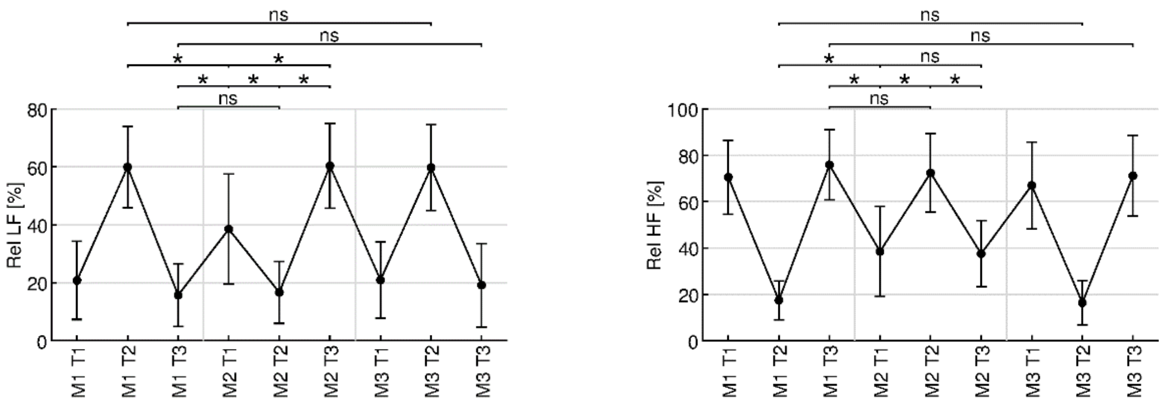
Figure 3, 4. Changes of the spectral power in the HF frequency band (Power HF) and sympathovagal balance (Ratio LF/HF)





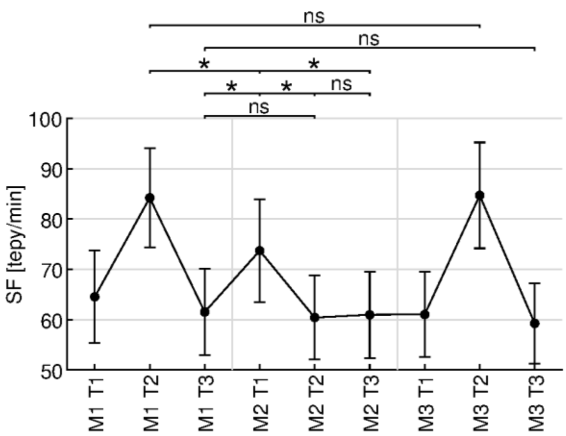
Comment:
M1 – **state pre**: M1T2 standing position; M1T3 supine position
M2 – **static and dynamic body positions**: M2T1 oblique position of the body upside down; M2T2 oblique position of the body with the head up. M2T3 dynamic changes in oblique body positions +- 45°
M3 – **status post**: M3T2 standing position; M3T3 supine position
Ln – logarithmic average value

Figure 5, 6. Changes of the relative spectral powers (%) in LF and HF frequency bands



Comment:
M1 – **state pre**: M1T2 standing position; M1T3 supine position
M2 – **static and dynamic body positions**: M2T1 oblique position of the body upside down; M2T2 oblique position of the body with the head up. M2T3 dynamic changes in oblique body positions +- 45°
M3 – **status post**: M3T2 standing position; M3T3 supine position

Figure 7. Changes of the Hert Rate/min. (SF/min)



Comment:
M1 – **state pre**: M1T2 standing position; M1T3 supine position
M2 – **static and dynamic body positions**: M2T1 oblique position of the body upside down; M2T2 oblique position of the body with the head up. M2T3 dynamic changes in oblique body positions +- 45°
M3 – **status post**: M3T2 standing position; M3T3 supine position

Table 1 Changes of the Systolic blood pressure/mm Hg

1. comparison		2. comparison					
Measur. Interval	**Mean ± SD**	**Measur. Interval**	**Mean ± SD**	**P**		**D**	**Efekt**
M1 T2	118 ± 9	M3 T2	121 ± 9	0,030	*	0,52	Střední
M1 T3	108 ± 8	M3 T3	107 ± 7	0,238		0,24	Malý
M2 T1	112 ± 8	M2 T2	129 ± 6	0,000	*	-3,32	Velký
M1 T3	108 ± 8	M2 T1	112 ± 8	0,010		0,67	Střední
M1 T3	108 ± 8	M2 T2	129 ± 6	0,000	*	-3,18	Velký
M1 T2	118 ± 9	M2 T1	112 ± 8	0,020		-1,89	Velký

Table 2 Changes of the Diastolic blood pressure/mm Hg

1. comparison		2. comparison					
Measur. Interval	Mean ± SD	Measur. Interval	Mean ± SD	P		D	Efekt
M1 T2	79 ± 7	M3 T2	78 ± 5	0,203		0,26	Malý
M1 T3	67 ± 6	M3 T3	67 ± 5	0,820		-0,05	Triviální
M2 T1	75 ± 6	M2 T2	86 ± 6	0,000	*	-2,31	Velký
M1 T3	67 ± 6	M2 T1	75 ± 6	0,000	*	-1,93	Velký
M1 T3	67 ± 6	M2 T2	86 ± 6	0,000	*	-4,24	Velký
M1 T2	79 ± 7	M2 T1	75 ± 6	0,000	*	0,89	Velký

Comment:
M1 – **state pre**: M1T2 standing position; M1T3 supine position
M2 – **static and dynamic body positions**: M2T1 oblique position of the body upside down; M2T2 oblique position of the body with the head up. M2T3 dynamic changes in oblique body positions +- 45°
M3 – **status after**: M3T2 standing position; M3T3 supine position

4.2. Comment on the results

4.2.1. Changes during the clinostatic position (M1T3, M3T3) compared to the orthostatic position (M1T2, M3T2).

Effects of clinostatic position:

- a significant increase of total spectral power (Total power); (Graph 1)
- a significant increase the activity of the parasympathetic (Power HF, Rel. Power HF, Ratio LF/HF); (Graph 3, 4, 5, 6)
- a significant reduction in sympathetic activity - Power LF (See chart 2, 3,4, 5, 6.)
- a significant reduction in heart rate; (Graph 7)
- a significant reduction in systolic and diastolic blood pressure (Table 1, 2). See research question 2.1.

Compared to the standing position, in the clinostatic position there is a significant increase in the activity of the parasympathetic system, the heart rate decreases and at the same time there is a decrease in systolic and diastolic blood pressure.

These functional changes in monitored parameters are characteristic of the optimal function of the autonomic nervous system.

4.2.2. Changes in standing - supine positions - Status pre and post:

Comparation standing and supine positions status pre - post (M1T2 : M3T2); (M1T3 : M3T3).

- There were no significant changes in monitored parameters. See research question 2.2.

The application of oblique body positions cannot be understood in young, healthy individuals as a stress stimulus that affects the functional activity of the cardiovascular system.

4.2.3. Changes during the static oblique body position with Head down -45° (M2T2) versus oblique body position with Head up +45° (M2T1)

Static oblique position of the body with Head up (M2T1) +45°

The position is characterized by balanced sympathetic and vagus activity (LF/HF, Rel. Power LF : Rel. Power HF (Graph 4, 5, 6). See research question 2.3.

Comparation of static oblique position with head down -45° (M2T2) and static oblique body position with Head up +45° (M2T1)

- a significant increase parasympatetic activity (Power HF, Relative Power HF); (Graph 3, 6)
- sympathetic activity does not change significantly (Power LF, Relative Power LF); Graph 2, 5)
- a significant increase in favor of the parasympathetic activity (Ratio LF/HF). (Graph 4)

- a significant reduction of the Heart rate, (Graph 7)
- a significant increase of the systolic and diastolic blood pressure. (Table 1, 2). See research question 2.3.

The reaction of heart rate, blood pressure and the activity of the autonomic nervous system in the oblique position with head down, draws attention to the existence of integrated regulatory mechanisms of cardiovascular system, that sensitively regulate functional relations between the activity of baroreceptors, heart rate and blood pressure.

4.2.4. Dynamic changes of oblique position with head up and head down +-45° (M2T2) versus Static oblique position with head down -45° (M2T3).

Dynamic changes of the oblique positions head up, head down ± 45° are characterized by:

- a significant increase of the total spectral power (Total power); (Chart 1)
- a significant increase in sympathetic activity (Power LF,); (Chart 2)
- a significant increase in sympathovagal balance (LF/HF) in favor of sympathetic activity.
- a significant reduction in parasympathetic activity (Rel. Power HF).
- Heart rate (SF/min). does not change significantly; (Chart 7).
- Blood pressure values during dynamic changes in body position could not be measured by the digital tonometer. See research question 2.4.

During dynamic body position changes +-45 ° there are cyclic changes in blood redistribution in the upper and lower part of the body. Rhythmic changes of body positions activate baroreceptors and lead to changes in blood pressure. These rapid blood pressure changes could not be measured by a clasic digital tonometer.

5 CONCLUSIONS

The regulation of the heart rate variability modulated by the right vagosympathetic in the sinoatrial node area very sensitively responds to changes on the body position.

During changes in the horizontal and vertical position of the body, typical changes in sympathetic and vagal activity, heart rate and blood pressure occur in healthy individuals.

A number of cardiovascular mechanisms (intra and extra mechanisms) are activated during the body position changes. The coherence of these regulatory mechanisms creates a high level of adaptation plasticity in a healthy person (Vojáček, Kettner, 2017).

During the oblique static position of the body with head down -45° (interval M2T2), there is an opposite reaction of heart rate and blood pressure. (The heart rate decreases, peripheral blood pressure in the upper body increases.

During weightlessness, these short-term regulatory mechanisms of the cardiovascular system during inverted body positions (Head down position, -45°, - 90°) and dynamic changes of body position have not been investigated yet.

The results of the study can be used in therapeutic practice when applying spinal traction on an auto-traction couchette. However, it is necessary to respect the contraindications in individuals with cardiovascular, cardiorespiratory and other internal diseases.

6 REFERENCES

Brychta, T., Stejskal, P., Salinger, J. (1997). Spektrální analýza variability srdeční frekvence. Vliv posturálních změn, tělesné zátěže a věku na dynamiku změn frekvence jednotlivých spektrálních komponent variability srdeční frekvence. *Medicina Sportiva Bohemica et Slovaca*. 6(3), pp. 75-79.

Geberová, Z. (2010). *Obrácená poloha těla a její vliv na aktuální funkční změny stavu autonomní regulace srdeční činnosti*. [Diplomová práce]. Univerzita Palackého v Olomouci.

Javorka, K., et al. (2008). *Variabilita frekvencie srdca*. Vydavatelstvo Osveta.

Kolisko, P., Salinger, J., Opavský, J., Jandová, D., Tillich, J., Dostálek, C., Patell, M., Watters, H. & Barrington, C. (1997). *Jógová cvičení a diagnostika funkčních změn autonomního nervového systému pomocí diagnostického systému TF 3, 4*. Univerzita Palackého v Olomouci.

Malhotra, V., et al. (2021). Effect of head down tilt on heart rate variability. *Journal of family medicine and primary care*. 10(1), 2021, pp. 439-442. Doi: 10.4103/jfmpc.jfmpc_1642_20

Vijayalakshmi, P., Madanmohan. (2006). Acute effect of 30 degrees, 60 degrees and 80. *Indian journal of physiology and pharmacology*. 50(1), pp. 28-32.

Vojáček, J., Kettner, J. et al. (2017). *Klinická kardiologie*. Maxdorf Jessenius.

7 CONTACTS

doc. PaedDr. Petr Kolisko, Ph.D

Palestra College of Physical Education and Sports, Prague; Balneological clinic, Hotel Prezident, Karlovy Vary.
Karlovy Vary – Bohatice Sluneční 21

e-mail: petr.kolisko@seznam.cz

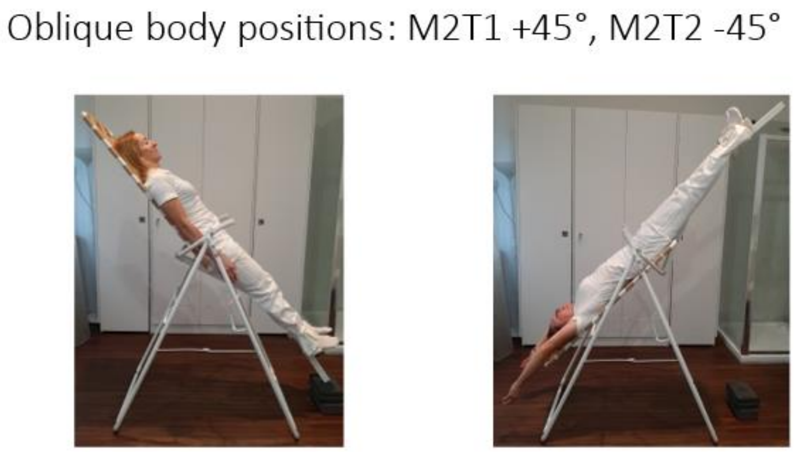
Simona Brokešová
Palestra College of Physical Education and Sports, Prague

Milada Sárová
Balneological clinic, Hotel Prezident, Karlovy Vary

Jakub Krejčí
Faculty of Physical Culture, UP Olomouc

Attachments

Autotraction positioning couch



CASE ANALYSIS

A HEALTHY WOMAN: AGE 22.3 YEARS; HEIGHT 168 CM; WEIGHT 63 KG; BMI 22.8; NON-SMOKER, MEDICATION 0; REGULAR PHYSICAL ACTIVITY 4 TIMES A WEEK FOR APPROXIMATELY 60 MIN. (RUNNING AND FITNESS).

Graphic records of SAHRV results (measurement M1, M2, M3)

Figure 1 State pre (measurement M1): interval T1 – supine position, T2 – standing position, T3 – 2nd supine position

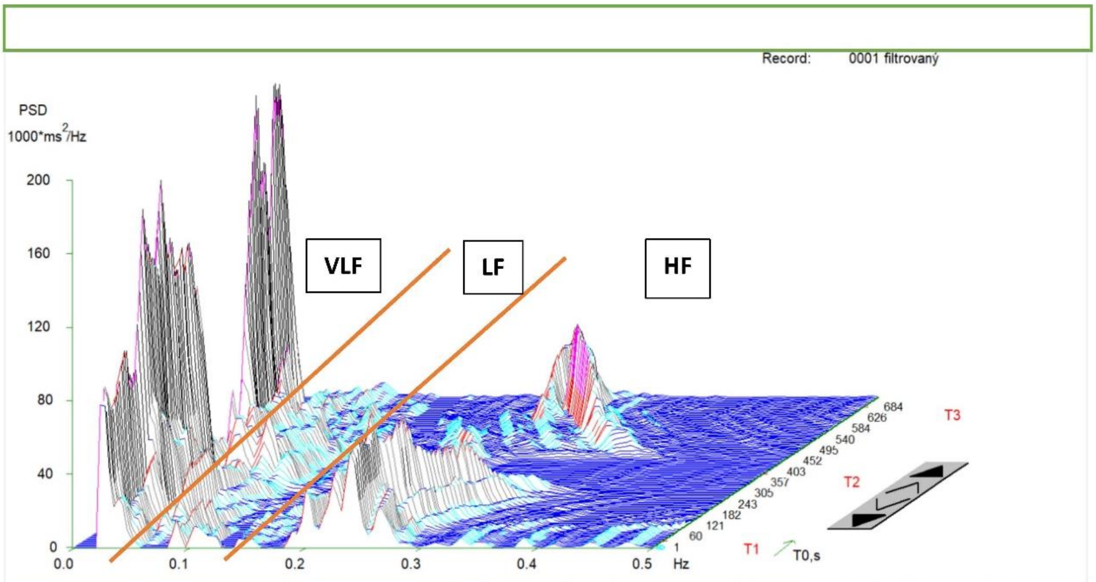


Figure 2. State during application of oblique body positions (measurement M2): T1 – oblique body position with head up +45°, T2 position with head down -45°, T3 dynamic changes of the body positions +- 45°, change interval 5 sec.

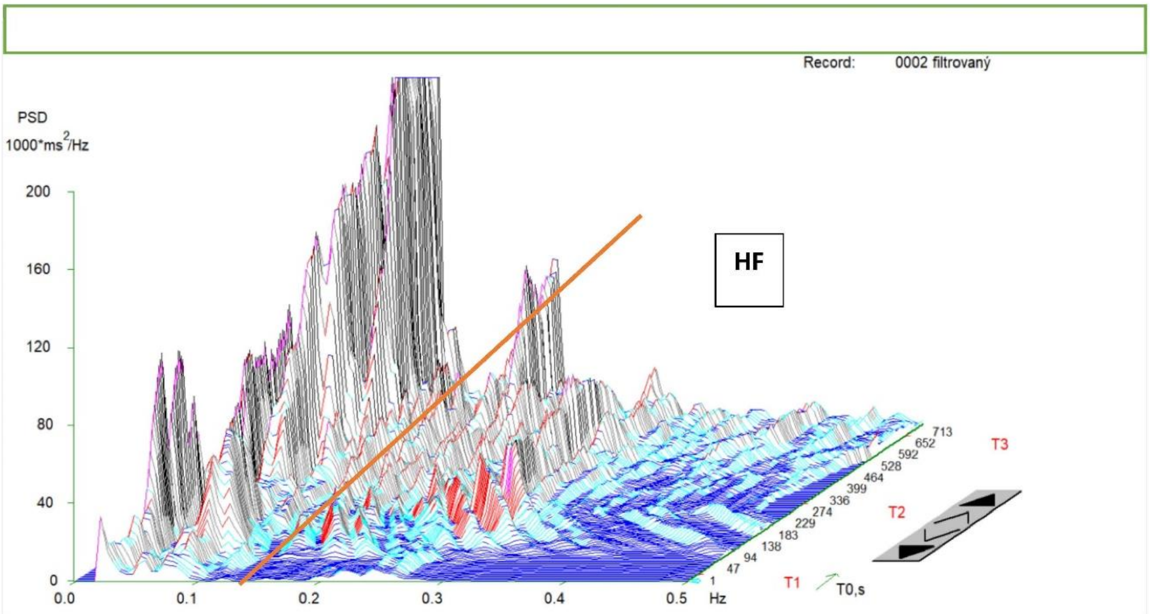
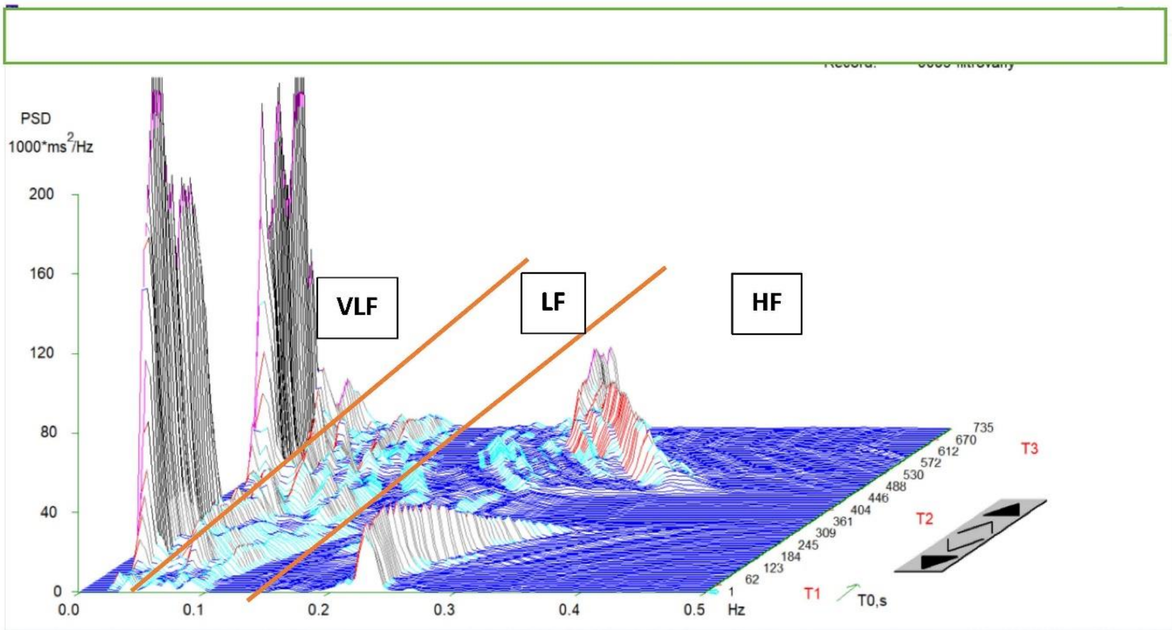


Figure 3 Status after application of oblique body positions (measurement M3): T1 supine position, T2 standing position, T3 2nd supine position.



Statistical output protocols of SAHRV (measurement M1, M2, M3)

Figure 4. Measurement M1 Status pre: 1- supine position, 2 - standing position, 3 - 2nd supine position

Statistics

Record: 0001 filtrovaný

Int	Value	Average	St.Dev.Rel. (CVr-r)	Rel.Power	MSSD[ms2] CCVvlf[%] CCVlf[%] CCVhf[%] Tot.Power
1	Power VLF	1085,4	3,9	28,0	
	Power LF	321,3	17,5	8,3	
	Power HF	2464,7	1,3	63,7	
	PSD VLF	83032,6	9,2		5682,2561
	PSD LF	14423,0	12,9		3,2332
	PSD HF	53206,0	5,0		1,7592
	Freq. VLF	26,7	3,4		4,8721
	Freq. LF	69,2	28,5		3871,4556
	Freq. HF	240,9	0,8		
	RatVLF/HF	0,4404	3,9951		
	Rat.LF/HF	0,1305	17,7660		
	RatVLF/LF	3,4562	13,9996		
	R-R Inter	1,0190	7,0670		
2	Power VLF	258,3	16,2	11,7	
	Power LF	1411,5	2,0	64,1	
	Power HF	533,6	3,3	24,2	
	PSD VLF	17491,7	10,5		903,3564
	PSD LF	36699,9	2,9		2,1526
	PSD HF	13968,8	9,4		5,0320
	Freq. VLF	24,4	10,6		3,0940
	Freq. LF	67,9	0,6		2203,4223
	Freq. HF	228,8	1,3		
	RatVLF/HF	0,4822	12,9252		
	Rat.LF/HF	2,6464	1,7268		
	RatVLF/LF	0,1826	14,4322		
	R-R Inter	0,7466	8,3616		

Power[ms2], PSD[ms2/Hz], Freq[mHz], R-R Inter[s], St.Dev.Rel[%], Rel.Power[%]

ISSN 1805-8787 actasalus@palestra.cz

Statistics

Record: 0001 filtrovaný

Int	Value	Average	St.Dev.Rel. (CVr-r)	Rel.Power	MSSD[ms2] CCVvlf[%] CCVlf[%]
3	Power VLF	107,2	12,5	9,7	CCVhf[%]
	Power LF	180,1	4,8	16,3	Tot.Power
	Power HF	819,2	5,4	74,0	
	PSD VLF	6839,7	12,3		2293,2457
	PSD LF	8438,3	8,1		1,0271
	PSD HF	31781,0	2,5		1,3315
	Freq. VLF	32,1	29,0		2,8398
	Freq. LF	69,9	0,3		1106,4847
	Freq. HF	240,2	0,6		
	RatVLF/HF	0,1304	7,5488		
	Rat.LF/HF	0,2210	10,2054		
	RatVLF/LF	0,5994	16,7741		
	R-R Inter	1,0079	4,3614		

Power[ms2], PSD[ms2/Hz], Freq[mHz], R-R Inter[s], St.Dev.Rel[%], Rel.Power[%]

Figure 5. Measurement M2: Obligue body positions 1 - static position +45°, 2 - static position -45° 3 - dynamic changes of oblique positions +-45°

Statistics

Record: 0002 filtrovaný

Int	Value	Average	St.Dev.Rel. (CVr-r)	Rel.Power	MSSD[ms2] CCVvlf[%] CCVlf[%]
1	Power VLF	318,0	9,8	30,0	CCVhf[%]
	Power LF	395,6	1,8	37,3	Tot.Power
	Power HF	345,7	5,3	32,6	
	PSD VLF	19429,2	12,7		561,7474
	PSD LF	18213,0	11,2		2,3585
	PSD HF	8286,8	7,3		2,6306
	Freq. VLF	30,9	0,4		2,4591
	Freq. LF	82,3	0,4		1059,1580
	Freq. HF	246,9	3,0		
	RatVLF/HF	0,9264	15,3526		
	Rat.LF/HF	1,1482	6,8390		
	RatVLF/LF	0,8029	8,0884		
	R-R Inter	0,7560	6,0835		
2	Power VLF	295,4	9,1	12,6	
	Power LF	465,4	19,1	19,8	
	Power HF	1593,0	1,5	67,7	
	PSD VLF	30960,0	16,3		5782,8374
	PSD LF	10724,2	18,7		1,6177
	PSD HF	38415,0	9,3		2,0304
	Freq. VLF	25,7	0,2		3,7565
	Freq. LF	102,9	22,5		2353,7523
	Freq. HF	268,3	0,2		
	RatVLF/HF	0,1854	8,6242		
	Rat.LF/HF	0,2917	18,1088		
	RatVLF/LF	0,6463	10,1538		
	R-R Inter	1,0625	6,4425		

Power[ms2], PSD[ms2/Hz], Freq[mHz], R-R Inter[s], St.Dev.Rel[%], Rel.Power[%]

Statistics

Record: 0002 filtrovaný

Int	Value	Average	St.Dev.Rel. (CVr-r)	Rel.Power	MSSD[ms2] CCVvlf[%] CCVlf[%] CCVhf[%] Tot.Power
3	Power VLF	37,2	36,7	0,4	
	Power LF	7263,3	5,8	68,5	
	Power HF	3304,8	4,6	31,2	
	PSD VLF	6686,8	30,8		12892,3149
	PSD LF	436186,5	8,2		0,6243
	PSD HF	74510,4	5,3		8,7209
	Freq. VLF	25,1	7,0		5,8826
	Freq. LF	96,5	1,4		10605,2640
	Freq. HF	195,7	0,6		
	RatVLF/HF	0,0113	36,1992		
	Rat.LF/HF	2,2071	9,8279		
	RatVLF/LF	0,0051	38,0182		
	R-R Inter	0,9772	12,7232		

Power[ms2], PSD[ms2/Hz], Freq[mHz], R-R Inter[s], St.Dev.Rel[%], Rel.Power[%]

Figure 6. Status after (measurement M3): 1 supine position, 2 standing position, 3 2nd supine position

Record: 0003 filtrovaný

Int	Value	Average	St.Dev.Rel. (CVr-r)	Rel.Power	MSSD[ms2] CCVvlf[%] CCVlf[%] CCVhf[%] Tot.Power
1	Power VLF	65,7	8,1	8,5	
	Power LF	146,7	5,2	19,0	
	Power HF	557,8	0,7	72,4	
	PSD VLF	4945,0	25,6		1243,5087
	PSD LF	5336,3	6,4		0,7884
	PSD HF	33022,8	2,9		1,1783
	Freq. VLF	28,2	25,2		2,2974
	Freq. LF	82,6	11,6		770,2435
	Freq. HF	223,9	0,3		
	RatVLF/HF	0,1178	8,3098		
	Rat.LF/HF	0,2630	5,2934		
	RatVLF/LF	0,4499	11,8483		
	R-R Inter	1,0281	3,8028		
2	Power VLF	244,9	6,1	19,6	
	Power LF	718,8	10,1	57,6	
	Power HF	284,5	3,4	22,8	
	PSD VLF	14912,4	13,8		413,4533
	PSD LF	19970,6	14,9		2,2475
	PSD HF	5556,2	4,8		3,8507
	Freq. VLF	35,0	7,1		2,4226
	Freq. LF	78,0	0,5		1248,1797
	Freq. HF	211,8	0,5		
	RatVLF/HF	0,8622	7,8769		
	Rat.LF/HF	2,5302	11,0377		
	RatVLF/LF	0,3446	13,2586		
	R-R Inter	0,6963	6,1199		

Power[ms2], PSD[ms2/Hz], Freq[mHz], R-R Inter[s], St.Dev.Rel[%], Rel.Power[%]

Record: 0003 filtrovaný

Int	Value	Average	St.Dev.Rel. (CVr-r)	Rel.Power	MSSD[ms2]
					CCVvlf[%]
					CCVlf[%]
3	Power VLF	137,0	10,2	10,9	CCVhf[%]
	Power LF	286,8	7,7	22,9	Tot.Power
	Power HF	830,0	5,7	66,2	
	PSD VLF	19793,1	15,1		2348,9446
	PSD LF	10027,5	5,0		1,0907
	PSD HF	42655,2	3,7		1,5781
	Freq. VLF	21,8	0,4		2,6846
	Freq. LF	83,6	11,3		1253,7885
	Freq. HF	225,4	0,4		
	RatVLF/HF	0,1655	11,5288		
	Rat.LF/HF	0,3459	7,1609		
	RatVLF/LF	0,4838	18,4085		
	R-R Inter	1,0731	4,7113		

Power[ms2], PSD[ms2/Hz], Freq[mHz], R-R Inter[s], St.Dev.Rel[%], Rel.Power[%]