Smoking Of Tobacco And Physiological Functional Skills

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Citation

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Abstract

Smoking of tobacco is a medical and social problem. This habit favours increases of the death rates from illnesses of the cardio-vascular system, respiratory and other systems. Stopping of smoking causes abstinence symptoms, which in turn are greater obstacles to others than to the smoker himself. The purpose of this study was the research of differences between non-smokers' group and smokers' group, to verify the influences that smoking causes in some physiological functional skills.
The research method of two groups was used: non-smokers' group (77 entities) and smokers' group (73 entities). The sub-maximal effort was conducted by Astrand's Test. Before, during and after the test, the frequency of heartbeats (Pulsi), blood saturation with oxygen ($SatO_2$), absolute and relative maximal oxygen uptake (VO_2max.abs. & rel.) were measured.
Whereas the basic statistical parameters show systematic differences between the two groups in all values, the T-test proved significant differences ($p<0.01$) between the two above-mentioned groups in the frequency of heartbeats while resting (HR. 0'), and in saturation of blood with oxygen in the period of rest, in the 5th minute of the test and in 1st and 2nd minute of recovery ($SatO_2$0', 5', 1'R, and
2'R). Through Canonical Discriminant Analysis significant differences were proved in the measured values.

INTRODUCTION

Tobacco smoking is the inhalation of smoke from burned dried or cured leaves of the tobacco plant (Nicotiana Tabacum), most often in the form of a cigarette. Tobacco smoke contains over 4000 chemicals, few of which are known causes of cancer [10,18,20]. These substances are divided in four groups: nicotina and its derivates, carbon monoxide, cianhidrik acid and irritative substances. Combination of these substances gives rise to addictive stimulant and euphoriant properties. The effect of nicotine in first time or irregular users is an increase in alertness and memory, and mild euphoria. Nicotine also disturbs metabolism and suppresses appetite [2,16,18,20,21].

People smoke for pleasure, to satisfy a nicotine addiction for ritualistic or social purposes, or for self-medication [2,3,9,11,20]. Several recent observational studies suggest that the apparent product placement of smoking in movies might encourage young people to start smoking [6].Medical research has determined that chronic tobacco smoking can lead to many health problems, particularly lung cancer, emphysema, and cardiovascular disease [1,4,5,8,9,10,11,12,21]. The WHO reported that in 20 th century tobacco smoking killed 100 million people, whereas, in 21 century could kill 1 billion people around the world [7,20].

The purpose of this study was to verify the influences that smoking causes in some physiological skills. Exploration of the differences in functional skills between non-smokers' group and smokers' group will help in realisation of this purpose.

MATERIAL AND METHODS

This research is the part of the project: “Influence of tobacco on some functional abilities” realized by the Institute of Sports Anthropology and Sports Medicine Center in Prishtina - Kosova. In this study was used the research method of two groups: non-smokers' group (77 entities, 25 years old) and smokers' group (73 entities, 26 years old). The treated entities were inhabitants of the Prishtina. The non-smokers' entities were chosen randomly, whereas the smokers' entities who smoked more than 10 cigarettes daily for longer than one year were chosen, but always respecting rule that their psycho-physic status were in normal. Entities of both treated groups were non sportsmen.

The sub-maximal effort was conducted by Astrand's test on an electrically braked ergocycle type Excalibur Sport (load 100W, 60/min). The measurements were carried out during rest, sub-maximal test and recovery. The measurements are done in the Centre of Sport Medicine and Rehabilitation in Prishtina, during the period 2000-2003, the measurer was

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The following variables were measured:

- Pulsi0' – Hart rate during rest;
- Pulsi1' – Hart rate in 1 st minute during the sub-maximal test;
- Pulsi2' – Hart rate in 2 nd minute during the sub-maximal test;
- Pulsi3' – Hart rate in 3 rd minute during the sub-maximal test;
- Pulsi4' – Hart rate in 4 th minute during the sub-maximal test;
- Pulsi5' – Hart rate in 5 th minute during the sub-maximal test;
- Pulsi1'R – Hart rate in 1 st minute of recuperation;
- Pulsi2'R – Hart rate in 2 nd minute of recuperation;
- VO2max.abs – Absolute maximal oxygen uptake;
- VO2max.rel – Relative maximal oxygen uptake;
- SatO20' – Blood saturation with oxygen during the rest;
- SatO23' – Blood saturation with oxygen in 3 rd minute during the sub-maximal test;
- SatO25' – Blood saturation with oxygen in 5 th minute during the sub-maximal test;
- SatO21'R – Blood saturation with oxygen in 1 st minute of recuperation;
- SatO22'R – Blood saturation with oxygen in 2 nd minute of recuperation.

The heart rate was measured by stethoscope on cord apex every last 15 th seconds of each minute during rest, sub-maximal test and recovery.

Blood saturation with oxygen was measured indirectly by pulse oxygen meter “Medilab-Nanox2”.

Absolute maximal oxygen uptake (VO_2max.abs.) was calculated by Dobeln formula:

Figure 1

$$VO2\ max\ abs = 1.29 \sqrt{\frac{L}{fh - 60}} e^{-0.00884\ T}$$

L=level of the load (kpm/min); fh=Hart rate in 5 th minute during the sub-maximal test; e=Coefficient 2.72; T=Years of the age;

The module for Absolute Maximal Oxygen Uptake is litter of oxygen uptakes per minute (l/min)

Relative maximal oxygen uptake was calculated by formula:

VO_2max.rel.=(VO_2max.abs.x1000)/body weight (kg)

The module for Relative Maximal Oxygen Uptake is millilitres of oxygen uptakes per minute per kg body weight (ml/min/kg).

RESULTS

All statistical procedure was based on the statistical package SPSS 15 for Windows.The findings of descriptive statistic for the measured variables in each treated group are shown in Table 1.

Figure 2

Table 1: Descriptive Statistics

	NON-SMOKERS		SMOKERS	
	X	SD	X	SD
Pulsi0'	73.14	12.12	78.99	12.38
$SatO_20'$	97.81	0.49	97.49	0.73
Pulsi1'	125.71	15.35	126.41	14.49
Pulsi2'	134.56	16.29	134.97	14.68
Pulsi3'	139.29	16.96	140.52	16.04
$SatO_23'$	97.57	0.68	97.51	0.65
Pulsi4'	143.27	17.72	144.67	16.97
Pulsi5'	147.27	17.87	148.12	17.03
VO_2max.abs.	2.75	0.28	2.71	0.28
VO_2max.rel.	38.91	6.14	37.43	6.52
$SatO_25'$	97.48	0.60	97.11	0.77
Pulsi1'r	143.70	14.03	143.92	13.87
$SatO_21'r$	97.27	0.66	96.90	0.75
Pulsi2'r	124.44	14.01	127.41	13.62
$SatO_22'r$	97.36	0.63	97.01	0.70

T-test for independent groups was applied to define the differences among the mean values for each variable for the two groups given in the Table 2.

Figure 3

Table 2: T-Test

Variables	t	df	p	Mean Difference	Std. Error Difference
Pulsi0'	**-2.920**	148	**0.004**	-5.84344	2.00127
$SatO_20'$	**3.096**	148	**0.002**	0.31204	0.10078
Pulsi1'	-0.285	148	0.776	-0.69667	2.44046
Pulsi2'	-0.163	148	0.871	-0.41416	2.53659
Pulsi3'	-0.458	148	0.648	-1.23483	2.69864
$SatO_23'$	0.596	148	0.552	0.06458	0.10835
Pulsi4'	-0.493	148	0.623	-1.39851	2.83578
Pulsi5'	-0.298	148	0.766	-0.85056	2.85301
SatO25'	**3.294**	148	**0.001**	0.37093	0.11262
VO_2max.abs.	1.008	148	0.315	0.04666	0.0463
VO_2max.rel.	1.433	148	0.154	1.48095	1.03377
Pulsi1'r	-0.095	148	0.924	-0.21651	2.2787
$SatO_21'r$	**3.200**	148	**0.002**	0.36862	0.1152
Pulsi2'r	-1.315	148	0.190	-2.9694	2.25783
$SatO_22'r$	**3.237**	148	**0.001**	0.34994	0.1081

Whereas the basic statistical parameters show systematic differences between the two groups in all values (Table 1), the T-test for independent groups (Table 2) proved significant differences in the frequency of heartbeats while resting ($t = -2.920$, $p = 0.004$) and in oxygen saturation of the blood in the period of rest ($t = 3.096$, $p = 0.002$), in the 5 th minute of the test ($t = 3.294$, $p = 0.001$) and in 1 st ($t = 3.2$, $p = 0.002$) and in 2 nd minute of recovery ($t = 3.237$, $p = 0.001$).

The significance of the differences between two above mentioned groups, in all measured variables, has been tested (explored) by the Canonical Discriminant Analyses (Table 3, 4 and 5). The purpose of the discriminant analysis is to show the variables that best discriminate the study groups. Because, we search for the differences between two independent groups, through this statistical method has been extracted one canonical discriminant function (Table 3) with eigenvalue of the discriminant equation ? = 0.285. The canonical correlation between canonical discriminant function and system of the measured variables, respectively the coefficient of the canonical discrimination is Rc = 0.471. The criterion of the discriminative force of the measured

physiological variables has been assisted by Wilks'? = 0.778, whereas the statistical significance of the discriminative equation has been tested by BartletX^2-test (X^2 = 35.27).

According to the significance value (p = 0.002), shown on Table 3, the differences between two above mentioned groups on the system of the measured variables are statistically valid.

Figure 4

Table 3: Summary Of Canonical Discriminant Functions

Function	λ	Rc	Wilks'λ	X^2	df	p
1	0.285	0.471	0.778	35.271	15	0.002

The results on Table 4 show structure of the canonical discriminant function, respectively correlations between measured variables and extracted canonical discriminant function.

Figure 5

Table 4: Structure Matrix

	Function
$SatO_2$5’	0.507
$SatO_2$2’r	0.498
$SatO_2$1’r	0.492
$SatO_2$0’	0.476
Pulsi0’	-0.449
VO_2max.rel.	0.22
Pulsi2’r	-0.202
VO_2max.abs.	0.155
$SatO_2$3’	0.092
Pulsi4’	-0.076
Pulsi3’	-0.07
Pulsi5’	-0.046
Pulsi1’	-0.044
Pulsi2’	-0.025
Pulsi1’r	-0.015

Arithmetic means of the discriminant values of the groups, respectively values of group centroids, are shown in Table 5.

Figure 6

Table 5

FUNCTIONS AT GROUP CENTROIDS

Groups	Function
Non-smokers	0.517
Smokers	-0.545

DISCUSSION

The obtained results are discussed in view of the performed statistical analysis. The results show systematic differences in mean value of each measured variable between two groups. Even these differences are in the favour of non-smokers' group, their statistical validity were tested by T-test for independent groups and Canonical Discriminant Analyses.

The evaluation of arithmetic mean for both population groups was made by T-test. By the results on the Table 2 we can conclude that differences between non-smokers' group and smokers' group are statistically significant ($p < 0.01$) in the frequency of heartbeats while resting (Pulsi0') [14,15,16,17,19,20], and in blood oxygen saturation in the period of rest, in the 5 th minute of the test and in 1 st and 2 nd minute of recovery ($SatO_2$0', 5', 1'R, 2'R) [4,10,13,17].

The discriminant analysis was made to identify the variables that best differentiate the two study groups. The results of the discriminant analysis completely agree with those obtained by the classical method of arithmetic differences for all measured variables in both population groups.

Through discriminative analysis significant differences were proved in the measured values (Table 3), whereas based on the structure matrix (projections of the discriminate variables on the discriminative function–Table 4) and group centroids (Table 5) we can demonstrate the characteristics for each treated group and the variables which discriminate these groups.

As can be seen from Tables 4 and 5, the more important variables which discriminate non-smokers' group from smokers' group are the variables which inform for blood oxygen saturation [13,17] and the frequency of heartbeats while resting [14,15,16,17,19].

The non-smokers group is distinguished with higher saturation of blood with oxygen, with lower frequency of heartbeats and with higher values of absolute and relative maximal oxygen uptake, in comparison with the smokers' group. These differences can be explained with the function of composition of smoke in terminal bronchioles, in increase of bronchial secretion, in oedema of epithelial cells, in paralysis of cilia in the surface of epithelial cells, as well as in the forming of carboxyhemoglobinemia [13,14,15,16,17,18].

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