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Physical Activity and Physical Exercise as Therapy to Reduce Blood Pressure and Heart Rate for Better Quality of Life

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Abstract

We evaluated 114 male subjects aged 35-55 years, mean age 46 years, using a questionnaire containing name, weight, height, blood pressure, heart rate, power, sedentary lifestyle, chronic diseases and other issues. After answering the questionnaire, followed by data tabulation, we found that there were 37 men with similar responses, including lifestyle habits. They were proposed a program of moderate physical activity three times a week, an hour each class, totaling three hours per week. It was also suggested that they looked for other activities outside the program. The prescription of physical activity was walking, stretching exercises and a series of breathing exercises on Mondays; free dance movements individual and double on Wednesdays, and physical activities and guided free exercises on Thursdays, for a period of six months. After six months, they were reevaluated considering the same variables. The results: There was a reduction of blood pressure and resting heart rate, reduction in anthropometric measurements and in body mass index of the subjects studied; there was a change in eating habits and reduction in deleterious habits for health, promoting better quality of life.

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Conclusion: the recommended physical activity in this study favored important influencing behavioral changes in quality of life of the subjects studied.

Keywords: Systolic and Diastolic Blood Pressure, Heart Rate, Physical Activity, Eating Habits.

1 Introduction

The Physical Activity walks for health in relation to disease prevention and wellness and sedentary lifestyle compromises the health of the individual to the disease. Both go together, depends on the choice of the subject. The physical activity is considered one of the greatest technological innovations to human health in the last 10 years [1, 2].For “centuries” health it was just for a technological innovation process as revolutionary as in recent years discussing the efficiency and effectiveness of physical activity "AS HEALTH FACTOR", especially towards chronic non-communicable diseases. Physical inactivity causes damage our health, scientifically proven [1].

Chile, Mexico and Argentina are the Latin American countries with the most sedentary population. Lack of physical activity is one of the biggest barriers that exist in Latin America to lead an active and healthy life. According to the [3], physical inactivity is the fourth leading risk factor for death worldwide and nearly 3.2 million people die each year as a result.

Physical inactivity is the disease of the century, is the major reason for the change of profile of the world's population in number of obese and overweight people, in addition to diseases acquired mainly by bad lifestyle habits. A sedentary body malfunctions and supercharges every organ. Finally, it can be said that currently the sedentary lifestyle is a major cause of premature death worldwide [3]. Studies at Harvard University showed that physical inactivity is responsible for indirect deaths of 5.3 million people worldwide each year, staying ahead of obesity, diabetes and smoking [4].

Physical activity has been shown to be beneficial in reducing several risk factors, providing, for example, metabolism improvement of fats and carbohydrates, weight and high blood pressure control. It also contributes to the maintenance of bones, muscles and healthier joints, decreasing symptoms of depression and anxiety, and it is associated with prevention of diseases such as diabetes mellitus, cardiovascular diseases, osteoporosis and some forms of cancer, such as colon and breast. Thus, physical activity, besides contributing to individuals’ quality of life improvement, reduces costs with medical treatments [5]. In Brazil, physical inactivity during leisure time is more prevalent among women, the elderly and individuals with less socioeconomic level however regional population-based research is still scarce in Brazil [6,7].

Physical exercise is an activity performed with a systematic repetition of oriented movements, with consequent increase in oxygen consumption due to muscular demand, creating effort [8]. The exercise is a physical activity subgroup, planned to keep physical conditioning [9]. Physical exercise causes a series of physiological responses in the body systems and, in particular, in the cardiovascular system in order to maintain cellular homeostasis, in the face of increased metabolic demands, some mechanisms are triggered [10].

[11] Stated that the beneficial effects of physical exercise should be used in the initial treatment of hypertensive individuals, aiming to prevent the use or to reduce the number of medications and their doses. In sedentary and in hypertensive individuals, clinically significant reductions in blood pressure can be achieved with relatively modest increase in physical activity above the sedentary levels; in addition, the amount of exercise required to lower blood pressure may be relatively small, possible to be achieved even for sedentary individuals.

Exercise effects on physical fitness, endothelial function, autonomic modulation, and on the emotional sphere (anxiety, depression, self-esteem etc.) reveal the broad spectrum of actions that demonstrate its importance in the treatment of cardiovascular and metabolic diseases [12].

As for the risk factors in Brazil, leisure physical activity levels in the adult population are low (15%) and only 18.2%. Consume five servings of fruits and vegetables on five or more days a week, 34% consume high fat foods and 28% drink soft drinks five or more days per week contributing to the increasing prevalence of overweight and obesity, which reach 48% and 14% of adults, respectively [13].

Cardiovascular diseases (CVD) are the leading causes of death in men and women in Brazil. They account for about 20% of all deaths in individuals over 30 years. According to the Ministry of Health, there were 962.931 deaths in individuals over 30 years in 2009. Ischemic heart diseases (IHD) accounted 95.449 deaths and cerebrovascular diseases (CVD) were responsible for 97.860 deaths. Cardiovascular causes attributable to atherosclerosis were responsible for 193.309 deaths [14, 1].

Individuals in physically active occupations have from 2 to 3 times less risk to heart attacks than individuals working in sedentary activities. Moreover, the probabilities of surviving a heart attack increase substantially for those with an activity or a lifestyle that impose high physical demands. Physical activity also favorably modifies some of the most important risk factors for Coronary Heart Disease – CHD [15]. Regular aerobic exercise lowers high blood pressure, reduces excessive body fat and enhances blood lipids profile. Blood clotting mechanism can be normalized by physical exercise training on a rough surface of a coronary artery. Regular physical exercise can also enhance myocardial blood flow and slow the progression of heart disease, or at least maintain an adequate blood supply to the heart muscle, compensating the coronary arteries narrowed by fatty

deposits within their walls [16,17].

High blood pressure is the major risk factor for preventable early death in the world. The World Health Organization considers high blood pressure, even before smoking, as a preventable cardiovascular risk factor and estimates that 25% of the worldwide adult population, that is, about 1.25 billion people, should have high blood pressure by 2025, being responsible for approximately 13% of global mortality [18].

[19] (Survey of Risk Factors Surveillance for Chronic Diseases and Protection by Telephone Survey), high blood pressure reaches 22.7% of the Brazilian adult population. Diagnosis in women (25.4%) is more common than among men (19.5%). The highest frequency of diagnosis in women occurs in all age groups. The survey also points out that the level of education has a strong influence in the disease diagnosis among women. While 34.4% of women with up to eight years of schooling reported having been diagnosed with high blood pressure, the percentage is lower - 14.2% - among women with higher education.

2 Objectives

Use physical activity and exercise in a therapeutic way to lower blood pressure and heart rate to a better quality of life in hypertensive subjects;

Verify that the requirements of physical activity and exercise shown to be effective in lowering blood pressure;

Check where the implementation of physical activities scheduled three times a week for a period of six months was effective in lowering blood pressure at rest;

Check where the implementation of physical activities scheduled three times a week for a period of six months was effective in decreasing the heart rate levels at rest;

Study whether the practices of physical activities and physical exercises were effective to reduce the body mass index;

Study whether the practices of physical and exercise activities were effective in decreasing body weight.

3 Material and Method

3.1 Population

We evaluated 114 male subjects aged 35-55 years, mean age 46 years, using a questionnaire with name, weight, height, blood pressure, heart rate, food intake, sedentary lifestyle, non-transmissible chronic diseases and other issues. The subjects belong to the University of Campinas community (employees, teachers, graduate students, and others). After answering the questionnaire, we performed data tabulation and found 37 men with similar responses, including lifestyle habits. We separated the 37 questionnaires, which caught our attention due to the results, especially regarding blood pressure and lifestyle habits. Then, we began a differentiated work with this group. The other 77 subjects were followed to the normal schedule of the *Mexa-se Unicamp* Program.

The study was conducted by the University of Campinas with the *Mexa-se Unicamp* Program - Development of Public Policy of Health Promotion at the University of Campinas. All subjects signed a Free and Clarified Consent Term. This project was approved by the Unicamp Ethics Committee, nº431/2012.

3.2 Study development

We evaluated 114 male subjects aged 35-55 years, mean age 46 years, using a questionnaire with name, weight, height, blood pressure, heart rate, food intake, sedentary lifestyle, non-transmissible chronic diseases and other issues. After answering the questionnaire, we performed data tabulation and we found that 37 subjects had similar responses, including lifestyle habits. We separated the 37 questionnaires, which caught our attention due to the results. We requested their presence, then we showed the results and our concerns, especially regarding blood pressure, we asked them to seek the Cardiology Service at Unicamp and from there we began the work with this group. They were proposed a physical activity program three times a week, an hour each class, totaling three hours per week. It was also suggested that they look for other activities outside the program. The prescription of physical activity was walking, stretching exercises and a series of breathing exercises on Mondays; free dance movements individual and double on Wednesdays, and physical activities and guided free exercises on Thursdays, for a period of six months. Physical activities were monitored with measurements of heart rate and blood pressure. To measure blood pressure we used a Semi-Automatic Digital Blood Pressure Device G-Tech BPA50 which has digital blood pressure measuring devices, to be used in the upper arm, which allows rapid and reliable measurements by a noninvasive method. To measure heart rate we used a Heart Rate Monitor (Geratherm) - chest and pulse strap. The scholarship students who taught the classes prepared that monitor. The measurements were recorded on individual records. Before we began physical activities, we held the "FREE TALKING WHEEL". It was distributed educational folders covering

important topics (food intake, obesity, consequences of habits considered harmful to health, the importance of leisure and others). In addition, all subjects had the opportunity to talk and solve possible doubts. During the activities, we sought to maintain maximum heart rate between 60-75% (102-127). We also measured the level of satisfaction regarding the physical activity program and what activity they liked the most. After six months, they were reassessed, considering the same variables.

4 Results

Table 1 - Distribution of overall averages of the 37 male subjects related to cardiac events and anthropometry before and after performing physical activities for a period of six months.

Variables	1st Evaluation-before	2nd Evaluation-after
1-SBPR	157,7	132,1
2-DBPR	100.5	87.9
3-RHR	102	84
4-Age average	48.5	48.8
5-Weight	92.6	87.2
6-Height	172.7	172.7
7-BMI	31.7-Obesity level I	28.2-Overweight

Systolic Blood Pressure at Rest (SBPR); Diastolic Blood Pressure at Rest (DBPR); Resting Heart Rate (RHR); Body Mass Index (BMI). Source: the author 2013.

Table 2 - Distribution of overall averages of the 37 male subjects with respect to eating habits and habits considered harmful to health before and after performing physical activities for a period of six months.

Did you know you were hypertensive?	Only 20% knew they were hypertensive because they took antihypertensive	100% of the subjects were informed they had hypertension and its health consequences;

	medication; 80% did not know and neither took antihypertensive medication	18% was used to take antihypertensive medication
Red meat consumption	100%	100%
Days in a week	7 days	4 days
How many times a day	2 times	2 times
Do you consider yourself Stressed?	Yes 95% No 5%	Yes 68% No 32%
Do you consider yourself Intolerant?	Yes 92.5% No 7.5%	Yes 38% No 62%
Alcohol consumption	Yes 97.5% No 2.5%	Yes 63% No 37%
How many times a week	6.8	4
How many times a day	45% had one beer at dinner 50% had sugar cane brandy at dinner and 5% had beer and sugar cane brandy at dinner	22% still drink one beer at dinner; 30% still drink a dose of sugar cane brandy at dinner and 3% still drink a dose of sugar cane brandy and beer at dinner and 45% stopped drinking alcohol at dinner
Take antihypertensive medication	Yes 20% No 80%	Yes 12% No 88%
Other medication	Yes 100% Medicine for headache,	Yes 49% Medicine for headache,

	muscle pain, poor digestion and sleeping pill	muscle pain and poor digestion
Physical activities	100% did not practice physical activities	100% practice physical activities
How many individuals had activities outside the program		78% sought physical activities outside the program
Smoking	100% smoke	70% smoke
How many per day	20.9 cigarettes on average per day	10.9 cigarettes on average per day
How many hours per day in the traffic	2.5 hours	2.5 hours
How many hours using mobile phone per day	1.30 hours	1.45 hours
Education level	20% had higher education ,70% secondary education and 10% fundamental education	20% had higher education, 70% secondary education and 10% fundamental education
Activities during free time	32% slept; 38% went shopping; 22% had barbecue and 8% other.	12% sleep; 53% physical activities; 16% go shopping; 19% other (barbecue, chat with friends, ride with the family, etc.)
Among the given activities, which one did		45% individual and double dance; 25%

you like best?		walking, stretching and exercises; 30% physical activities and oriented physical exercises
What is the level of satisfaction regarding the physical activity program, on a 0-10 scale?		85% gave a 10 and 15% gave a 9

Source: the author 2013

The evaluation data (the 1st before the physical activity program and the 2nd after six months of constant physical activity in Table 1) BMI, Height, Weight, Average age, Resting Heart Rate, Systolic blood pressure at rest, Diastolic blood pressure at rest were statistically analyzed using ANOVA Test. The statistical values are in the Table below.

4.1 Statistical Data

Table 3 - Statistical data distribution the 1st evaluation before the physical activity program and the 2nd evaluation after six months of constant physical activities in Table 1 related to Systolic blood pressure at rest, Diastolic blood pressure at rest, Resting Heart Rate, Average Age, Weight, Height, and BMI.

SOURCES OF VARIATION	**GL**	**SQ**	**QM**
treatments	1	136.4064	136.406
blocks	6	33358.414	5559.736
errors	6	135.849	22.641
F (treatments) =		6.0246	
p (treatments) =		0.0483	
F (blocks) =		245.5559	
p (blocks) =		< 0.0001	
Average (treatments):			
Average (Column 1) =		80.8143	
Average (Column 2) =		74.5714	
Tukey		Q	(p)
Average (1 a 2) =		3.4712	< 0.05

Average (blocks):			
Average (line 1) = 15.4500			
Average (line 2) = 94.2000			
Average (line 3) = 93.0000			
Average (line 4) = 48.6500			
Average (line 5) = 89.9000			
Average (line 6) = 172.7000			
Average (line 7) = 29.9500			
Tukey		Q	(p)
Average (1 a 2) =	23.4053	< 0.01	1-SBPR/2-DBPR
Average (1 a 3) =	23.0486	< 0.01	1-SBPR/3-RHR
Average (1 a 4) =	9.8674	< 0.01	1-SBPR/4-Age average
Average (1 a 5) =	22.1273	< 0.01	1-SBPR/5-Weight
Average (1 a 6) =	46.7362	< 0.01	1-SBPR/6-Height
Average (1 a 7) =	4.3095	ns	1-SBPR/7-BMI
Average (2 a 3) =	0.3567	ns	2-DBPR/3-RHR
Average (2 a 4) =	13.5379	< 0.01	2-DBPR/4-Age average
Average (2 a 5) =	1.2780	ns	2-DBPR/5-Weight
Average (2 a 6) =	23.3310	< 0.01	2-DBPR/6-Height
Average (2 a 7) =	19.0957	< 0.01	2-DBPR/7-BMI
Average (3 a 4) =	13.1813	< 0.01	3-RHR/4-Age average
Average (3 a 5) =	0.9214	ns	3-RHR/5-Weight
Average (3 a 6) =	23.6876	< 0.01	3-RHR/6-Height
Average (3 a 7) =	18.7391	< 0.01	3-RHR/7-BMI
Average (4 a 5) =	12.2599	<0.01	4-Age average/5-Weight
Average (4 a 6) =	36.8689	< 0.01	4-Age average/6-Height
Average (4 a 7) =	5.5578	ns	4-Age average/7-BMI
Average (5 a 6) =	24.6090	< 0.01	5-Weight/6-Height
Average (5 a 7) =	17.8177	< 0.01	5-Weight/7-BMI
Average (6 a 7) =	42.4267	< 0.01	6-Height/7-BMI

1-SBPR- Systolic blood pressure at rest; 2- DBPR-Diastolic blood pressure at rest; 3-RHR-Resting heart rate; 4-Age average; 5-Weight; 6-Height; 7-BMI- Body Mass Index. Source: the author 2013.

Table 3 shows results obtained by statistical analysis using ANOVA Test. We used Tukey's test $p<0.05$ and $p<0.01$. These analyzes refer to the values of the 1st and 2nd evaluation (before and after physical activities for a period of six months), in Table 1: seven variables column 1 and column 2. We noted that in the first

treatment it sought the blocks average, that is, columns 1 and 2, rows from 1 to 7, being significant $p<0.05$. In the second treatment, still in the same Table, it also sought the averages of both columns and the 7 rows. Analyzing and crossing the averages between them we found results showing the significance levels, which were suitable for the study. We suggest that Table 3 and Table 1 are read together so that the data from their crossing can be understood. We found that the following were not significant: SBPR with BMI; DBPR with HR; DBPR with Weight; Average age with BMI. The other results were significant $p<0.01$

4.2 Results analysis

Considering analysis of blood pressure at rest, we verified that in the first evaluation the results were worrying as high blood pressure was characterized with high levels at rest (157,7-SBPR, 100.5 DBP) and heart rate at 102 bpm. Physiologically, an individual has high blood pressure when measured values are equal or higher than 140 mmHg for systolic and/or 90 mmHg for diastolic; therefore, these subjects were hypertensive and only 20% knew they were, because they ingested medication, 80 % did not know the disease and described symptoms (fatigue, headache and dizziness). After entering the physical activity program all subjects were aware on high blood pressure through educational folders and all sought the Cardiology Service with accompaniment. As for medication consumption, 12% continued taking antihypertensive medication. In the second evaluation, blood pressure levels fell to 132,1 -SBP and 87.9-DBP. Resting heart rate in the first evaluation was 102 bpm and in the second evaluation, it reduced to 84 bpm. Resting heart rate (RHR) is the number of heartbeats for one minute in a resting situation, noting that the average heartbeat rate per minute is considered normal from 60 to 80; less than 60 bpm (slow-bradycardia), higher than 100 bpm (fast-tachycardia), 100-150 bpm (emergency) and above 150 bpm (high risk factor) [20].

As for BMI in the first evaluation, the overall average showed that the subjects had obesity level I (31.7) and in the second evaluation they were overweight (28.26), which we considered satisfactory, although not yet desired.

As for lifestyle habits, in relation to food, we achieved a major reduction in red meat consumption levels in relation to days of the week: 1st evaluation seven days a week and 2nd evaluation four days a week. We could not make them to reduce the frequency they eat red meat per day. The subjects kept consuming it twice a day. A great gain in the study was the percentage in relation to stress and intolerance before and after offering the physical activity program, that is, they have become less stressed and more tolerant.

As for deleterious habits to health (alcohol and smoking), we also considered the results good, there was a reduction in consumption levels. In the FREE TALKING WHEEL the subjects expressed their difficulties of leaving the addictions, as well as how to reduce them; 30% quit smoking and 45% stopped drinking alcohol at

dinner. Those who continued smoking reduced the amount of cigarettes. In addition, there was a gain in relation to the decreasing consumption of other medicines, and sleeping pill did not appear in the 2nd evaluation.

An important question in the questionnaire was about how many hours on average they talked on the phone every day. In the 2nd evaluation time talking on the phone increased. As free time there was a significant gain, according to the data 53% sought physical activities outside the program offered.

Considering the overall averages indicated in Tables 1 and 2, we achieved very favorable rates with the studied and monitored subjects in the physical activities. They considered themselves to be ill and at dissatisfaction limits with day-to-day at work and at home. They recognized that they needed radical changes to achieve the objectives of healthy living to better relate with family, people at work, in the traffic, when shopping and anywhere else. As for statistical analysis, in Table 3, using the ANOVA Test: two criteria, we verified that significant results ($p<0.01$) appear in most of the calculated averages, showing that the given physical activity program provided great gains in quality of life for the population studied.

5 Discussion

The data in the 1st and 2nd evaluation show that the therapeutic and beneficial effects of physical activities and/or physical exercises on high blood pressure can be considered potent non-invasive medication to the human. Among the physical activities worked with the group, dancing was the activity, which provided better results to participants in relation to blood pressure and heart rate. [12] Describes that ballroom dancing has been used as a means of physical conditioning, with the adoption of varied rhythms (*forró*, *bolero*, *samba*, *merengue*, waltz, rock and roll and *salsa*). More than steps technical education, which would require frequent interruptions, we aimed to keep patients active as long as possible in order to maintain the heart rate target while exercising. Through this systematic we sustained greater adherence results, with better chronotropic response and blood pressure control, factors widely associated with sexual dysfunction and cardiovascular outcomes. It is a very cheap investment, which demonstrates excellent results; however, it was accompanied by health education (FREE TALKING WHEEL and folders distribution). These effects are noted by several researchers who report that physical activity also favorably modifies some of the most important risk factors for CHD. Regular aerobic exercise lowers high blood pressure, reduces excessive body fat and enhances blood lipids profile. Blood clotting mechanism can be normalized by the physical exercise training on a rough surface of a coronary artery. Regular physical exercise can also enhance

myocardial blood flow and slow the progression of heart disease, or at least maintain an adequate blood supply to the heart muscle, compensating the coronary arteries narrowed by fatty deposits within their walls [21, 16, 22, 14]. Even with information and efforts by the Public Health Services, specifically the Ministry of Health Programs in relation to non-transmissible chronic diseases, they still cannot reach much of the population. The study showed that 80% did not know they were hypertensive. If we consider the level of education where: 20% had higher education, 70% secondary education and 10% fundamental education, and work in a University, everyone should have known about the disease. Speaking to them, the majority informed us that they measured blood pressure when they went to the doctor. They also reported feeling "strange" symptoms, however did not seek medical assistance and self-medicated. It seems that in Brazil, these issues undergo a cultural process in health/disease relations, specifically among males, that is, they only seek a physician when they are feeling really bad, denying the whole prevention process and health promotion, thus causing, severe consequences, totally different from females [23,24].

According to [19] (Survey of Risk Factors Surveillance for Chronic Diseases and Protection by Telephone Survey), high blood pressure reaches 22.7% of the Brazilian adult population. The diagnosis in women (25.4%) is more common than among men (19.5%). The frequency of the disease progresses over the years. If between 18 and 24 years, only 5.4% of the population reported having been diagnosed as hypertensive, at 55 the proportion is 10 times higher, reaching more than half the population (50.5%) studied. From the 65, the same condition is observed in 59.7% of the Brazilian population. The highest frequency of diagnosis in women occurs in all age groups [23, 24,25].

6 Conclusion

Based on the results we believe we can draw the following conclusions:

- Physical activities and physical exercises can be therapeutic, reducing blood pressure and heart rate,
- Anthropometric measurements and body mass index reduced in the subjects studied,
- It seems that education level has no influence on the information on high blood pressure existence in the subjects studied,
- There has been change in eating habits and reduction of habits considered harmful to health, promoting better quality of life,
- There have been changes in the cultural process as to what to do during free time, promoting better quality of life.

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