117 - BENEFITS OF ADAPTATION OF PEOPLE - UNDER HYPERTENSIVE DRUG THERAPY - IN THE WATER IN HORIZONTAL POSITION

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INTRODUCTION

Hypertension is a disease that has caught the attention of doctors and a large number of people, including those with no knowledge of their causes. In Brazil an estimated number of 25 million people are hypertensive, among them, it is estimated that around 08 million do not know they have it (LUCCHESE, 2006).

Thus, hypertension can be classified as primary when caused by genetic factors: heredity, gender, race and age, or by environmental factors: obesity, excessive sodium intake, alcohol consumption, smoking, stress and sedentary lifestyle, being a problem without a specific source.

There is also a secondary hypertension category, which has more specific evidences, and may be related to some kind of pathology in the brain, aorta, kidney or glands of the body (LUCCHESE, 2006), (LUNA, 1989).

These diseases involve an increase in peripheral resistance, causing stress on the vascular system, stimulating the underlying cause of elevated blood pressure (BRUNNER and SUDDARTH, 1998). Hypertension is characterized by systolic blood pressures higher than or equal to 140 mmHg and diastolic pressures higher than or equal to 90 mmHg (IV BRAZILIAN GUIDELINES ON HYPERTENSION, 2010).

Doctors from the area of cardiology increasingly recommend non-medication treatment, or changes in lifestyle (LIPP and ROCHA, 1996), because awareness is the main factor in controlling hypertension, often more than the healing itself (BRUNNER and SUDDARTH, 1998).

Currently, physical activity has been gaining a lot of people, due to its benefits to body and health, such as: the hypotensive effect, the reduction in heart rate and general well-being, then being recommended for hypertensive people (FARINATTI, 2002); (MCARDLE, 2003); (FOSS and KETEYIAN, 2000).

A sport that is attracting the attention is swimming, because it is an aerobic activity, and also because the way it operates and the body position in which it is executed are great advantages.

The regular position in swimming is horizontal, which facilitates the circulation of the body to be parallel to the level of the heart, improving cardiac output (FOSS and KETEYIAN, 2000); (MCARDLE, 2003).

The body immersed in water is surrounded by different physical principles such as balance, turbulence, friction, hydrostatic pressure, speed, body temperature and density, the latter varies with age, 0.86 for children, adolescents and 0.97 young adults and decreases again in older adults, and the relative density of water at approximately 1, every body, not exceeding this density can fluctuate (VELASCO, 1994).

The sport of swimming can reduce 5 mmHg to 10 mmHg in systolic and diastolic pressures after training, these reductions are influenced by the hydrostatic pressure generated by physical exercise in immersion, providing a 60% increase in central blood volume (CANDELORO and CAROMANO, 2008); (BOOKSPAN, 2000); (CAROMANO et al., 2003), stimulating changes in renal and sympathetic nervous system (ARCA et al., 2004) and aided by bradycardia which tends to increase with decreasing water temperature (GRAEF and KRUEL, 2006).

The aim of this study is to analyze the behavior of blood pressure in hypertensive individuals, in a horizontal position in the aquatic environment through the practice of swimming, differing from most studies that seek to upright immersion.

MATERIAL AND METHODS

For this study we used a sample of 09 individuals diagnosed with hypertension for an average of 10 ± 5.92 years, of which 08 are female and 01 male, aged 56 to 75 years, and average of 65.2 ± 6.52 years, all practicing aerobic exercise for seniors, such as walking and gym located on average 4.3 ± 3.97 years ago, in the city of São Paulo-SP.

The sample selection procedure was open to all ages, excluding those who practiced any kind or aquatic exercise and possessed a level of severe hypertension, verified by individual questionnaires. After selection, all had to have medical allowance to practice swimming and were informed that during the study they should keep the normal use of the referred drugs.

Information about the protocol for data collection was provided in writing, along with the invitation to participate in the study and the term of consent, signed by all.

For the blood pressure and heart rate taking of individuals analyzed, we used a single machine digital pressure gauge pulse, brand Visomat Handy IV (approved by the Brazilian Society of Cardiology and Inmetro) and to check the water temperature it was used a chemical marker floating thermometer mercury Incoterm brand with a resolution of 1.0 ° C.

This study was conducted on the facilities of Project Swim Gym, located in São Paulo - SP. The pool consists of the following measures: 12.5 m long, 6 m wide and deep slope, ranging from 0.90 cm in the shallow end to 1.50 m in the deepest part, indoors and heated water.

The program was held twice a week, on Tuesdays and Thursdays. They were divided according to two periods of time, at 07:50 and at 10:40. For the first period there were 05 people and for the second a total of 04 people, who for eight weeks, participated of 16 sessions, lasting 50 minutes each.

The results were recorded on individual forms, containing the following information: name, telephone number, address, age, weight, height and water temperature maintained at 29°C throughout the study, collection and recording of the systolic and diastolic blood pressures and heart rate in four stages:

1st time after five minutes of rest sitting on a chair outside the pool.

2nd time after two minutes in a supine position in the pool water (floating).

3rd time, after doing the exercises related to swimming.

4th time after five minutes of rest sitting on a chair outside the pool.

In order to get the program started it was necessary to obtain an average baseline BP and HR of each individual pre-study, one week before starting the program, with two blood pressure takings on different days, joining a third taking carried out on

the first day of the program, these being related only to a description of the moment one.

The exercises related to swimming in the 3rd time were executed gradually over the eight weeks, so low aerobic intensity, lasting 20 minutes non-stop, starting from the basic movements such as underwater exhalation, slide on the surface of water board, propulsion legs in ventral and dorsal using spaghetti and advancing posteriorly to propel the unification of the legs, arms and breath for the outcome of the proposed objective: learning the swim (dog) – a modality of survival - and backstroke.

STATISTICAL ANALYSIS

In this study the average pre-study and post-study were used for the formulation of the null hypothesis (H0 = equal means) and the alternative hypothesis (H1 = different means).

With the degree of freedom equal to 8 and a significance level of 5%, we find the value of T- critic (2.306) in the distribution of the t-student applied to a bilateral test, where T is compared to the respective sample of average SBP, DBP blood pressure and HR.

It is concluded that there was a difference of averages between SBP and DBP and an equality in HR of α = 5%.

RESULTS AND DISCUSSION

Of the 09 selected individuals all of them completed the proposed activities. But at the beginning it was found that 05 individuals were diagnosed to have blood pressure at normal levels <130 x 85 (55.5%) and 04 presented levels close to the borderline 130-139 x 85-89 (44.5%) (Rev. Bras. hyperthyroidism., 2010), results that were supposedly caused by the use of antihypertensive medications (LIPP and ROCHA, 1996) being taken for 10.8 years.

Table 1 shows the comparison of the average time 1 (initial rest) with the average at the fourth time (final resting place) of each individual after 16 sessions. Generating a final average non-significant reduction in systolic blood pressure (SBP) and of -0.3 mmHg, an increase of 1.22 mmHg in diastolic blood pressure (DBP) and an increase of 4.44 bpm in heart rate (HR).

Table 1. Comparison of the means of each individual at rest with rest initial final post-study

	Average Initial rest			Average Final resting			Average General and final		
Individual	SBP	DBP	HR	SBP	DBP	HR	SBP	DBP	HR
1	114	70	81	109	68	83	-5	-2	2
2	94	61	62	87	57	66	-7	-4	4
3	107	65	74	100	62	80	-7	-3	6
4	128	75	79	133	82	76	5	7	-3
5	120	74	88	117	73	90	-3	-1	2
6	99	61	75	97	60	78	-2	-1	3
7	127	79	75	132	85	81	5	6	6
8	114	67	69	127	76	67	13	9	-2
9	115	69	64	113	70	85	-2	1	21
						Result	-0	1	4

*SBP= systolic blood pressure -*DBP= Diastolic Blood Pressure
*FC = Frequency

Differently, table 2 shows the average BP and HR of each individual pre-study, ie the first three takings, compared to the average final post-study of initial rest.

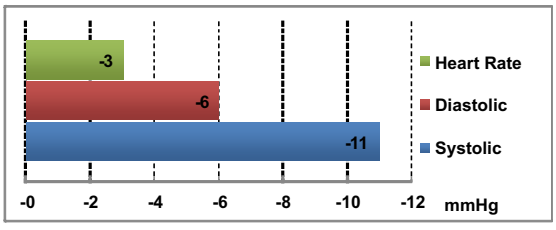
Table 2. Pre-study values, compared to average BP at rest after the initial study of 09 individuals

Individuals	SBP Average Pre-study	SBP Average Post-study	DBP Average Pre-study	DBP Average Post-study	HR Average Pre-study	HR Average Post-study	Age
1	132	114	78	70	87	81	56
2	118	94	79	61	73	62	60
3	119	107	70	65	82	74	61
4	137	128	85	75	87	79	72
5	133	120	78	74	92	88	71
6	112	99	71	61	67	75	60
7	133	127	74	79	75	75	75
8	112	114	69	67	64	69	63
9	120	115	72	69	66	64	67

* SBP = Systolic blood pressure - * DBP = Diastolic Blood Pressure
* HR = Heart Rate

The result of the comparisons of the average post-study - SBP, DBP and HR - to the average pre-study, resulted in significant reductions of 11 mmHg in average resting SBP of 6 mmHg in average DBP at rest and 3 bpm in average HR at rest, this did not generate significant value, as explained in Figure 1.

Figure 1.Average reduction when compared with the post-study in 09 individuals of initial rest



* SBP = systolic blood pressure - * DBP = Diastolic Blood Pressure
* HR = Heart Rate

In Figure 2 it is shown the increase in SBP and DBP and HR balance during the fluctuation in the supine position.

Figure 2. Comparison of the average BP at rest in initial position to the average BP at rest in the supine position (floating)

	Average Initial rest			Average Floating rest			Average General and final		
Individual	SBP	DBP	HR	SBP	DBP	HR	SBP	DBP	HR
1	114	70	81	134	80	76	20	10	-5
2	94	61	62	100	65	64	6	4	2
3	107	65	74	117	71	68	10	6	-6
4	128	75	79	144	84	73	16	9	-6
5	120	74	88	122	73	83	2	-1	-5
6	99	61	75	104	62	75	5	1	0
7	127	79	75	144	92	72	17	13	-3
8	114	67	69	131	76	70	17	9	1
9	115	69	64	110	65	85	-5	-4	21
						Result	10	5	0

* SBP = systolic blood pressure - * DBP = Diastolic Blood Pressure
* HR = Heart Rate

The increases provided in the BP and consequently the balance of HR seen in Figure 2, are directly related to physical factors of water, which other authors have demonstrated in their studies, such as hydrostatic pressure, body position and immersion and water temperature (BOOKSPAN , 2000); (CAROMANO et al., 2003); (FOSS and KETEYIAN, 2000); (MCARDLE, 2003) and (GRAEF and KRUEL, 2006).

Studies by Bookspan (2000) and Caromano et al. (2003) show that immediately after immersion of the body in an upright position, 700 ml of blood is displaced from the lower limbs to the thoracic region, this shift generated by the action of hydrostatic pressure.

Graef and Kruel (2006) reported that heart rate is lower at lower temperatures and higher at higher temperatures, due to cooling of the skin, and heart rate at 18 ° was lower than 8 in 26 bpm and 15 bpm lower than at 34 ° C, providing the direction of blood from the periphery to the central region.

Supposedly these studies explain the rise in blood pressure and the balance of the heart rate at rest in the supine position.

But no significant results obtained by comparing the blood pressure at rest to the initial final resting, seen in Table 1, are probably related to a horizontal position practiced in swimming.

This position facilitates the circulation of the body to be parallel to the level of the heart, thereby generating a greater ventricular filling during the diastolic terminal phase it stretches the myocardial fibers and increases its power stroke during contraction, slowing the effect hypotensive for some time (FOSS and KETEYIAN, 2000); (MCARDLE, 2003).

The significant results obtained with the current study, seen in Table 2 and Chart 1 show that these changes are beneficial to the hypertensive response, when understood in relation to post exercise.

Thus, with the increase in cardiac output, the kidneys have the function of increasing the urine volume quantity by diuresis (excretion of water) and natriuresis (excretion of salt) in an attempt to reduce the altered blood pressure and make it more balanced, helping the anti-hypertensive drugs, called diuretics (GUYTON, 1993); (CAROMANO et al., 2003); (ARCA et al., 2004) and (BOOKSPAN, 2000).

Another aspect is related to attenuation of sympathetic tone in heart, for physical exercise normalizes sympathetic nerve activity, which is increased in the presence of hypertension, seeking to normalize cardiac output (NEGRÃO and RONDON, 2001).

Suddaeth and Brunner (1998) say that aquatic exercise, because they are anti-gravity, assist the non-formation of venous stasis - which appears in hypertensive subjects, due to the difficulty of blood circulation, generating a better continuous flow.

Thus, this study showed significant reductions in arterial blood pressure if compared to other studies in which exercises were done with body immersed in a vertical position.

Piazza et al. (2008) aimed to evaluate a program of aquatic exercise on cardiorespiratory fitness and blood pressure in 10 hypertensive women, aerobic exercise for strengthening, stretching and relaxation. In this program, the pressure was taken at rest 10, 20, 30 minutes after exercise in each session, and it was held twice a week for seven weeks. The results in the post-exercise when compared to pre-exercise values, showed an average reduction of 6.43 mmHg in systolic and 3.08 mmHg for average arterial pressure at 30 minutes post-exercise. Diastolic blood pressure showed no statistically significant results.

Arca et al. (2004) found the effects of an aquatic therapy program in 20 hypertensive women, which did not exercise. The sample consisted of aerobic activities with an intensity of 60% of heart rate and there were significant differences in pre and post-treatment, resulting in reduction of 5 mmHg in systolic and 10 mmHg in diastolic blood pressure, the authors admit these reductions related to changes that occur in the sympathetic nervous system and kidney.

However, the current study showed positive results if compared to the exercises practiced in the vertical position, even though the level of demand used was low and the movements were performed smoothly, as it was told by the participants.

An important finding reported by three participants were signs of weakness after the 5th week, which were probably caused by the exercise of swimming and the influence of water, the use of concomitant medications, leading to lowering blood pressure. These signs may indicate potential drug decreases over time.

However, further studies would be needed, suggesting intensity levels higher than those adopted and a longer duration, allowing for further analysis.

FINAL

From the results obtained in this study, we can conclude that the tendency of the program of adaptation to the aquatic environment in the horizontal position provides reductions in systolic and diastolic blood pressure post-session, even using

antihypertensive medications, the drug could generate reductions over time. This result is allegedly attributed to physiological changes provided by swimming exercise and physical properties of water, even if the exercises are performed with low intensity and rudimentary swimming.

So, swimming is a sport that seems to be beneficial to people with hypertension, or a safe alternative, with little impact that is mainly convenient for the elderly, offering them an opportunity to learn to swim and eliminate fears or lack of motivation.

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BENEFITS OF ADAPTATION OF PEOPLE - UNDER HYPERTENSIVE DRUG THERAPY - IN THE WATER IN HORIZONTAL POSITION

ABSTRACT

Based on the literature on this topic, it is observed that most studies associate the benefits of antihypertensive drugs only to the practice of aquatic exercise in an upright position, and few use the horizontal position as a basis for treatment. Thus, the current study aimed to analyze the adaptation of hypertensive reactions to the aquatic environment, by learning survival swimming (dog) and backstroke. Nine individuals participated on this program, aged between 56 to 75 years diagnosed with mild hypertension, no history of water activities and without interruption of drug therapy during the program. The study lasted 8 weeks, totaling 16 sessions, each session was of 50 minutes, held twice a week. Each session consisted of four stages: 1 - Blood pressure (BP) and heart rate (HR) taken after five minutes of initial rest. 2 - taking BP and HR in supine floating after two minutes of rest. 3 - taking BP and HR after doing the exercises related to swimming and 4 - taking BP and HR after five minutes, in final resting. The initial averages BP and HR - related to moment one - of each individual were carried out one week before the program on two different days, adding up to a third pressure taking carried out on the first day of the program, generating an average pre-study. Comparing the averages of SBP (Systolic Blood Pressure) and DBP (Diastolic Blood Pressure) of each individual pre-study of initial rest, with the final at the same time post-study, there were significant reductions of 11 mmHg on SBP average and 6 mmHg on diastolic average. We conclude that after the analysis of the results, the study showed benefits for the sample studied by the observation of reduced levels of blood pressure after exercise.

KEYWORDS: Swimming; hypertension; horizontal position.

AVANTAGES DE L'ADAPTATION DES HYPERTENDUES - SOUS PHARMACOTHÉRAPIE - DANS LE MILIEU AQUATIQUE EN POSITION HORIZONTALE

RÉSUMÉ

Basé sur la littérature sur ce sujet, il est observé que la plupart des études sur les avantages antihypertenseurs de la pratique des exercices dans l'eau emploie la position verticale; la position horizontale est rarement citée. Par conséquent, le but

de cette l'étude était analyser les réactions d'adaptation des patients hypertendus dans le milieu aquatique, par l'apprentissage de la nage de survie (ou nage du petit chien) et nage sur le dos. Les participants de ce programme étaient neuf individus, âgés de 56 à 75 ans avec un diagnostic d'hypertension légère, pas d'histoire d'activités aquatiques et sans interruption de la pharmacothérapie pendant le programme. L'étude a duré 8 semaines, totalisant 16 sessions, chaque session de 50 minutes, deux fois par semaine. Chaque session se composait de quatre étapes: 1 - La pression artérielle (PA) et de fréquence cardiaque (FC) après cinq minutes de repos initiale. 2 - Evaluation des PA et des FC en décubitus dorsal flottant au bout de deux minutes de repos. 3 - Mesure de PA et de FC après avoir fait les exercices liés à la natation et 4 - la mesure de PA et FC après cinq minutes, en dernier repos. Les moyennes initiales de PA et de FC – relative à la étape 1 - de chaque individu ont été effectués une semaine avant le programme sur deux jours différents; en ajoutant jusqu'à une troisième mesure effectuée sur le premier jour du programme, générant une moyenne de pré-étude. En comparant les moyenne de PAS (pression artérielle systolique) et de PAD (pression artérielle diastolique) de chaque individu pré-étude en repos initiale, avec la finale dans le même temps post-étude, nous avons trouvé des réductions significatives de PAS moyenne 11 mmHg et 6 mmHg en diastolique moyenne. Nous concluons que, après l'analyse des résultats, l'étude a montré un bénéfice pour l'échantillon étudié par l'observation des niveaux réduits de la pression art érielle après l'exercice.

MOTS-CLÉS: natation, hypertension, en position horizontale.

BENEFICIOS DE LA ADAPTACIÓN DE HIPERTENSOS - EN TERAPIA MEDICAMENTOSA - A MEDIO ACUÁTICO EN POSICIÓN HORIZONTAL

RESUMEN

Basándose en la literatura relacionada a este tema, se observa que la mayoría de los estudios asocia los beneficios antihipertensivos sólo a la práctica de ejercicios acuáticos en posición vertical y pocos utilizan la posición horizontal como tratamiento. Así, este estudio tuvo como objetivo analizar las reacciones de adaptación de hipertensos al medio acuático, por medio del aprendizaje de la natación de supervivencia (perrito) y de espalda. Participaron del presente programa 9 individuos, con edades entre 56 y 75 años con diagnóstico de hipertensión arterial leve, sin historial de actividades acuáticas, y sin interrupción la terapia medicamentosa durante el programa. La duración del estudio fue de 8 semanas, totalizando 16 sesiones, cada una con 50 minutos, realizadas dos veces por semana. Cada sesión consistió en cuatro momentos: 1 – medición de la presión arterial (PA) y frecuencia cardíaca (FC), tras cinco minutos en reposo inicial. 2 – medición de la PA y de la FC en flotación en decúbito dorsal, tras dos minutos de reposo. 3 – medición de la PA y de la FC, justo después de la práctica de los ejercicios relacionados a la natación. 4 – medición de la PA y de la FC, tras cinco minutos en reposo final. Los promedios iniciales de la PA y de la FC – relacionados al momento 1 – fueron realizados una semana antes del programa en dos días distintos, sumándose a una tercera medición realizada en el primer día del programa, generando el promedio pre-estudio. Comparándose los promedios de las PAS (presión arterial sistólica) y de las PAD (presión arterial diastólica) de cada individuo pre-estudio en reposo inicial, con el promedio final en el mismo momento pos-estudio, se verificaron reducciones significativas de 11mmhg en el promedio de la PAS y 6mmhg en el promedio de la PAD. Tras el análisis de los resultados obtenidos, se pudo concluir que el estudio demuestra el beneficio para la muestra estudiada, por medio de la observación de la reducción de los niveles de presión arterial pos-ejercicio.

PALABRAS-LLAVE: natación; hipertensión; posición horizontal.

BENEFÍCIOS DA ADAPTAÇÃO DE HIPERTENSOS - EM TERAPIA MEDICAMENTOSA - AO MEIO AQUÁTICO EM POSIÇÃO HORIZONTAL

RESUMO

Com base na literatura relacionada a este tema, observa-se que a maioria dos estudos associa os benefícios anti-hipertensivos somente à prática de exercícios aquáticos em posição vertical e poucos utilizam a posição horizontal como tratamento. Com isso o atual estudo objetivou a análise das reações da adaptação de hipertensos ao meio aquático, por meio da aprendizagem do nado de sobrevivência (cachorrinho) e do nado de costas. Participaram do presente programa 9 indivíduos, com idades entre 56 a 75 anos com diagnóstico de hipertensão arterial leve, sem histórico de atividades aquáticas e sem interrupção da terapia medicamentosa durante o programa. A duração do estudo foi de 8 semanas, totalizando 16 sessões, tendo cada sessão 50 minutos, realizadas duas vezes por semana. Cada sessão constou de quatro momentos: 1- aferição da pressão arterial (PA) e frequência cardíaca (FC) após cinco minutos em repouso inicial. 2- aferição da PA e FC em flutuação em decúbito dorsal após dois minutos de repouso. 3- aferição da PA e FC logo após a prática dos exercícios relacionados à natação e 4- aferição da PA e FC após cinco minutos, em repouso final. As médias iniciais da PA e FC - relacionadas ao momento 1- de cada indivíduo foram realizadas uma semana antes do programa em dois dias diferentes, somando-se a uma terceira aferição realizada no primeiro dia do programa, gerando a média pré-estudo. Comparando-se as médias das PAS (pressão arterial sistólica) e PAD (pressão arterial diastólica) de cada indivíduo pré-estudo em repouso inicial, com a média final no mesmo momento pós-estudo, verificaram-se reduções significativas de 11 mmHg na média da PAS e 6 mmHg na média da PAD. Conclui-se que após as análises dos resultados obtidos, que o estudo demonstrou beneficio para a amostra estudada, mediante a observação de redução dos níveis de pressão arterial pós-exercício.

PALAVRAS-CHAVE: Natação; hipertensão; posição horizontal.