157 - COMPARATIVE ANALYSIS OF HEART HATE DURING A WATER EXERCISE CLASSES DONE IN CHLORINATED AND IONIZED WATER SWIMMING POOL.

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INTRODUCTION: The water exercise is a relatively new modality of physical activity in the aquatic way, however, the aquatic activities date of remote times in the history of the humanity. In accordance with Skinner & Thomson (1985) in 460-375 B.C., Hipócrates used water in the treatment of illnesses and the Romans used the banns with curatives and recreational purposes. The Aquatic Activities had been always practiced in the whole world. In England, century XVII, the walked ones in the water were common exercises. In the Hungria, for 1830 return, the banns in sulphureous waters with exercises had appeared of callisthenic exercises. Later in the United States, it appears to the hydrotherapy where the rehabilitation exercises were done in water. Does not know to certain as it initiated the practical one of the water exercise however, Di Masi (2000) says that the beginning of the Water exercise related with the sprouting of the therapeutically aquatic activities, together with the walked ones in the water. In the decade of 60 the ACM (Christian Association of Young men) the first programs of aquatic exercises directed toward the third age had been created. According to Di Masi (2000), citing Bonachela (1994), the Water exercise appeared in Germany with a similar work to the one of the ACM having for objective to use aquatic exercises in the vertical position, more not aiming at to the whitewashing and yes the physical conditioning. The Water exercise had its ascension in Brazil and the world in the beginning of the decade of 80 had to the raised number of injuries provoked by the practical one of the aerobic gymnastics of high impact. In 1991, Peggy Buchanan, brought to Brazil its method of training in the water in the convention M2000 in São Paulo, the Aqua motion call, having as proposal a physical activity that would eliminate the risks of injuries, working the aerobic conditioning with the same efficiency of Aerobic Gymnastics, Race or Swimming; the movements were similar the proper Aerobic Gymnastics, choreographies or not. In middle of years 90, some scholars, as an example, Dr. Luiz Fernando Kruel, coordinator of a Group of Research in Aquatic Activity in URGS, had developed excellent works in flat waters in such a way (Shallow-water), as in deep waters (Deep-water), spreading out in all Brazil this activity. Such research had served and serves, currently, as parameter for programs of aquatic training with diverse objectives. From this moment, in Brazil, diverse variations of Water exercise are being created for ends of cardio-respiratory conditioning, loose weight, muscular resistance and flexibility. Water exercise consists in a program of practiced aquatic exercises in flat swimming pool (Shallow-water) or establishes (Deep-water), with the feet supported in the soil or fluctuation, being composed of rhythmic movements, choreographed or not, using the physical properties of the liquid, with or without aid of accessories, as work overload, and has for objective to improve the cardiovascular conditioning and respiratory, aiming at the located muscular resistance as well as it works flexibility and motor coordination inside reducing the risks of injuries in the joints for being a developed activity of the water. According to Di Masi citing Skinner and Thomson (1985), the physical properties of the water are: mass, weight, density and relative density, fluctuation, hydrostatic pressure, superficial tension, refraction and viscosity. Mass is the amount of substance contained in a body. The relative density of the pure water is one, being thus, all body or objects that to possess bigger relative density that one sinks, equal minor that one floats and to one floats soon below of the surface. The fluctuation concept is based on the principle of Archimedes who says: "when a body is complete or partially immersed in one l eliminate in rest, it suffers a push for above equal to the weight the dislocated liquid". According to Paschal Law of the hydrostatic pressure is the pressure of the liquid exerted equally on all the areas of the surface of an immersed body in rest, to one given depth. Aboarrage (2003) affirms that this property of the water is responsible for the beneficial effect on the sanguine circulation and the inspiration capacity. Di Masi, citing Skinner and Thomson (1985 - p.15) says "the superficial tension of the water is the exerted force enters molecules of the surface of a liquid". This attractive power between molecules forms a species of "film" in the surface of the water that generates a light resistance. Refraction is the deflation of a light ray when the same one passes of a way for another one with different density; this principle explains because the swimming pools make look like to be flatter of the one than they are. Viscosity is the attrition enters molecules of a liquid thus causing a resistance. When human beings are immersed in water, physiological alterations in the systems cardio-respiratory and renal they are perceived in such a way in rest how much in exercise; these alterations are resultant mainly of the action of the hydrostatic pressure. The cardiovascular system is a vascular circuit continues, formed for a bomb, a circuit of high-pressure distribution, canals of exchange and a circuit of collection and return of low pressure (MCARDLE, KATCH, KATCH, 1991). Venus return is the return of the blood for the heart. This return is made with difficulty, therefore the pressure of the venous blood is relatively low. This problem is decided through valves which are distributed in small intervals inside of the vein, thus allowing a unidirectional flow of return to the heart. For having a pressure low the venous blood even though receives aid from the muscle that serves as propeller bomb and or for the alterations from the pressure inside from the thoracic socket during the act from breath. The cardiac muscle carries through involuntary and fast movements (automatic and rhythmic contractions). According to Mcardle, Katch, Katch (1991), if the heart will be left with its inherent rhythmic, it will beat uninterruptedly between 70 and 80 times per minute. However, nerves that go directly to the heart, as well as chemical substances that circulate in the blood, can modify the heart hate quickly. According to Avelline, Chapiro, Pandolfi (1983) the carried through physical exercise in the water produces different reactions physiological when comparative the land. One of the more important physiological answers during the immersion is the alteration of the heart hate, since he is one of the methods of control of the intensity of the effort (MCARDLE, KATCH and KATCH, 1991); taking itself in consideration that the heart hate is one of the parameters simpler than it supplies cardiovascular information (WILLMORE, 2001), its scientific recital becomes essential. Research carried through for diverse authors in such a way suggests a reduction of the heart hate in immersion in the rest how much in effort (MCARDLE, LESMES, PECHAN and MAGEL, 1976; TOWN and BRADLEY, 1991; RITCHIE and HOPKINS, 1991; SVEDENHAG and SEGER, 1992; KRUEL, 1994; BAUM, 2000 and SCARTONI, 2002). In accordance with Kruel (1994), Bates and Hanson (1998), Scartoni (2000) and Quedezes, Santos (2003), the position of the individual, the intensity of the carried through work, the temperature of the water, the density of the water and the movements of the arms can increase or diminish the effect of the immersion on the functional factors with the heart hate. Hall and col (1998) had independently carried through a study that compared exercises in deep water 36°C and 28°C the walked ones in the mat and had observed a bigger overload to the cardiovascular system when had been carried through walked in the water 36°C, of the speed of execution of the exercises. Already Choukroun, Varene (1990), had investigated physiological answers with immersion until the line of the shoulders in temperatures of water 25°C, 34°C and 40°C, finding bigger l debit cardiac in the immersion 40°C. Another factor that modifies the magnitude of the changes found in the water seems to be the immersion degree. Kruel (1994) analyzed the behavior of the heart hate in 54 individuals, in the vertical position in rest, diverse depths of immersion. The difference less enters the joined heart hate with the water in the height of knees (two bpm) and water in the line of the shoulders (less 16 bpm) demonstrates how much it can in accordance with grant the heart hate the depth that if carries through the immersion. The difference measured enters the heart hate in the water and in the land for one same intensity of effort also is controversy. Specific books of exercises in the water in vertical position suggest a reduction of the heart hate around 17 bpm (BEAT and HANSON, 1998; IT MARRIES, 1998), until a reduction of 25 bpm (BAUM, 2000). As Mcardle and col (1998) in swimming 13 average values of bpm to less in relation to the

race are found; while other studies had resulted in lower the 11 heart hate of 8 bpm (SVEDENHAG and SEGER, 1992); already Anderson, Schagatay (1998) had found heart hates 13.6% minors when in the immersion of the face in the water in relation to the heart hate in rest in the land. Other factors that influence the heart hate in immersion are the physical properties of the water, hydrostatic pressure, fluctuation and density. The fluctuation according to Skinner, Thomson (1985), is tried force as push for top that acts in opposing direction the action of the gravity. In the Water exercise, the effect of the fluctuation are perceived mainly by the reduction of the forces in the sustentation of the weight, what it facilitates the execution of exercises and it diminishes stresses it to articulate (ROUTI; TROUP; BERGER, 1994; ACSM, 2000). The buoyancy is one of the theories that try to explain the bradicardia in the aquatic way, therefore according to AEA (2001) with the fluctuation the effect of the gravity more is perceived, facilitating to the venous return, characteristic pertinent also the hydrostatic pressure, "pressure of the liquid exerted equally on all the areas of the surface of an immersed body in rest, to one determined depth" (SKINNER and THONSON, 1985). Sufficiently common in the ionizers France, swimming pools, they had appeared in Brazil has three years approximately. The water of the swimming pool, previously salty with three or four gram for liter, passes for a device that produces hypochlorite of sodium that disinfects and destroys bacteria, seaweed and microorganisms that if develop in the swimming pool. After that, the hypochlorite of sodium again agrees with the salt conferring a new cycle, thus allowing that the water constantly is treated, without chlorine excess in the environment. The ionized water is free of substances as caustic soda water, common whitewash and nickel in products with Chlorine, being thus, swimming pools with ionized water diminish the risks to contract respiratory illnesses as reunite, bronchitis among others; it does not dehydrate as the chlorinated water. The chlorinated swimming pool consists of using chemical substances among others, the chlorine in order to disinfect and destroys any microorganisms. The chlorine, for being very unstable, wastes with easiness, demanding a more intense maintenance. The chlorinated swimming pool for possessing chemical substances facilitates to the sprouting or manifestation of respiratory illnesses.

OBJECTIVE: The aim of the present study was to compare the heart hate responses during a water exercise classes done in a chlorinated water swimming pool, and later in ionized water.

METHODOLOGY: The present study was comparative as Thomas and Nelson (2002), with exploratory characteristics. The study was carried out on seven women volunteers, apparently healthful, according to ACSM (2000), with the average of age of 21,71 years. The individual was submitted to a questionnaire PAR-Q to make sure that those people had a normal habit according to anamnese to detect criteria of exclusion of the same one, guided regarding the hours of necessary sleep and feeding to the fid dignity of the research, and informed on the objectives of the same one. The experiment was carried through during a Water exercise classes, using a heart hate monitor (BLITZ®), model FOCUS, being this given at two moments, the first one in a chlorinated water swimming pool, and as in a ionized water swimming pool. The classes had been carried through in different days, however respecting the same period of the day.

RESULTS: In the direction to compare the calculated average values of heart hate surveyed in rest and exercise in the ionized and chlorinated water swimming pool, considering the same group of individuals, the Student t test was used for comparison of the different types of water was used observing itself a critical level of significance $p < 0,05$.

The heart hate was measured on land in rest condition to. The medium result is present below.

Table 1. Average, shunting line minimum and maximum standard, values of the rest and exercise heart hate in ionized and chlorinated water

Applying test t of Student, the following results had been gotten:

Cenário	Sig.p	Resultado	Compara
Repouso Terra	0,8731	Iguais	S = C
Repouso Água	0,4189	Iguais	S = C
Exercício	0,0234	Diferentes	S > C

For the comment of the gotten and demonstrated results above it can be verified higher averages of heart hate in rest and in exercise in ionized way. To facilitate the understanding of the results, the same ones are located in figure 1 and figure 2

Figure1. Graph Corresponding the rest heart hate in two types of water

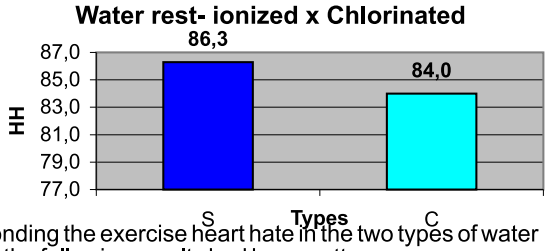
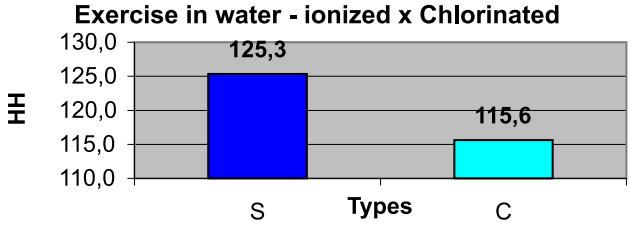


Figure 2. Graph corresponding the exercise heart hate in the two types of water

Applying test t of Student, the following results had been gotten:



	Ionize Rest land	Chlorinated Rest land	Ionize Rest water	Chlorinated Rest water	Ionize exercise	Chlorinated exercise
n	7	7	7	7	7	7
Avarage	88,9	89,1	86,3	84,0	125,3	115,6
D.P	11,4	11,8	8,3	9,5	16,1	11,6
Minimum	76,0	79,0	78,0	75,0	105,1	102,6
Máximum	108,0	108,0	101,0	98,0	146,0	135,3

The results above denote that the HEART HATE in rest, in the two scenes land and water, according to different types of treatments of the half liquid, ionized water and chlorinated water, had not presented significant differences between its

respective average values (sig.p 0,05). On the other hand, when compared the average values of the HEART HATE in uncurling of the activity physical and surveyed in the same scene but differentiated by the form of treatment, ionized and chlorinated, one observed significant differences between the respective average values, being that, the HEART HATE in ionized water (125,3? 16,1) presented superior average the calculated one for the HEART HATE in chlorinated water (115,6? 11,6), in a level of significance p = 0,0234

CONCLUSIONS: respecting the limitations imposed for the method and the restrictions observed in function of the used sample size, these studies have been concluded that the ionized water provides greate resistance to the movement. This affirmation corroborates with the AEA (2001) witch have a direct proportionality enters the density of the water and the resistance of the movement. A time that the salty water (1024Kg/m3) is denser than the pure water (1000Kg/m3) the overload imposed to the exercise for the ionized water is bigger providing to the cardiovascular system a more intense work when compared with the chlorinated water. Aiming at one better applicability of this study and in view of the lack of scientific material on chlorinated waters and ionizes, sends regards that other research is carried through of longitudinal form with intention to verify the effect mentioned in this study in long stated period, a time that this type of research is extremely important for the improvement of the activity. As the present study abided the alterations of an only physiological variable (heart hate), it also sends regards that other studies are carried through similar to verify the behavior of other physiological variable in immersion, with intention to corroborate or not with carried through research already.

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COMPARATIVE ANALYSIS OF HEART HATE DURING A WATER EXERCISE CLASSES DONE IN CHLORINATED AND IONIZED WATER SWIMMING POOL.

ABSTRACT:

The carried through physical activities in the aquatic environment had been adhered by a good part of the world-wide population, perhaps for consequence of this fact, let us can evidence a good number of academies specialized in aquatic exercises, and still the presence of this modality composing the structure of activities of the majority of the academies. In the current times, the traditional chlorinated water swimming pool comes losing the space for a new method of water treatment, the ionization. As this method is very new, a few researches is observed on the behavior of our body when immersed in this way. **Objective**: In view of the presented facts previously, the aim of the present study was to compare the behavior of the physiological variable (Heart hate) during a water exercise classes, done in chlorinated and ionized water swimming pools. **Methodology:** The present study was comparative as Thomas and Nelson (2002), with exploratory characteristics. Carried out on seven women volunteers, apparently healthful, according to ACSM (2000), with the average of age of 21,71 years. The instrument using for gauging was a heart hate monitor (BLITZ®), model FOCUS. **Results:** The gotten data had received treatment statistical the end to compare the average values of the surveyed of heart hate, as much in rest how much in exercise, in the two types of swimming pool, using the test t of Student to compare the two different types of water. It was gotten then as final results, significant difference (sig.p 0,005) only for the average values of the heart hate in exercise. **Conclusion:** The result found take us to conclude, respecting the limitations of the study, that the half liquid when treated by the ionized method, provides to a bigger resistance to the movement, increasing then the intensity of the exercise, for the direct relation of the intensity and density of the water, corroborating with the AEA (2001).

Key Words: Physical activities, Heart hate, Water exercise.

ANÁLISIS COMPARATIVO DEL ODIO DEL CORAZÓN DURANTE LAS CLASES DE UN EJERCICIO DEL AGUA HECHAS EN PISCINA TRATADA CON CLORO E IONIZADA DEL AGUA.

EXTRACTO: Llevado con actividades físicas en el ambiente acuático había sido adherido por una buena parte de la población mundial, quizás para la consecuencia de este hecho, déjenos puede evidenciar un buen número de las academias especializadas en ejercicios acuáticos, y aún la presencia de esta modalidad que compone la estructura de las actividades de la mayoría de las academias. En los tiempos actuales, la piscina tratada con cloro tradicional del agua viene perdiendo el espacio para un nuevo método de tratamiento de aguas, la ionización. Pues este método es muy nuevo, algunos investigan se observan en el comportamiento de nuestro cuerpo cuando están sumergida en esta manera. **Objetivo**: En la vista de los actuales hechos previamente, la puntería del actual estudio era comparar el comportamiento de la variable fisiológica (odio del corazón) durante las clases de un ejercicio del agua, hechas en piscinas tratadas con cloro e ionizadas del agua**. Metodología**: El actual estudio era comparativo como Thomas y Nelson (2002), con características exploratorias. Realizado en siete voluntarios de las mujeres, al parecer saludables, según ACSM (2000), con el promedio de la edad de 21.71 años. El instrumento que usaba para calibrar era un monitor del odio del corazón (BOMBARDEO), FOCO modelo. **Resultados**: Los datos conseguidos habían recibido el tratamiento estadístico el extremo para comparar los valores medios del examinado del odio del corazón, tanto en resto cuánto en ejercicio, en los dos tipos de piscina, usando la prueba t del estudiante para comparar los dos diversos tipos de agua. Entonces fue conseguida como resultados finales, diferencia significativa (sig.p 0.005) solamente para los valores medios del odio del corazón en ejercicio. **Conclusión**: El resultado encontró para tomarnos para concluir, respetando las limitaciones del estudio, que el medio líquido cuando era tratado por el método ionizado, proporciona a una resistencia más grande al movimiento, entonces aumentando la intensidad del ejercicio, para la relación directa de la intensidad y de la densidad del agua, corroborando del AEA (2001).

Palabras claves: Actividades físicas, odio del corazón, ejercicio del agua.

ANALYSE COMPARATIVE DE HAINE DE COEUR PENDANT LES CLASSES D'UN EXERCICE DE L'EAU FAITES DANS LA PISCINE CHLORÉE ET IONISÉE DE L'EAU

ABRÉGÉ: Réalisé des activités physiques dans l'environnement aquatique avait été adhéré par une bonne partie de la population mondiale, peut-être pour la conséquence de ce fait, laissez-nous peut démontrer un bon nombre d'académies spécialisées dans des exercices aquatiques, et toujours la présence de cette modalité composant la structure d'activités de la majorité des académies. Dans les temps courants, la piscine chlorée traditionnelle de l'eau vient perdant l'espace pour une nouvelle méthode de traitement à l'eau, l'ionisation. Car cette méthode est très nouvelle, quelques uns recherche est observées sur le comportement de notre corps une fois immergées de cette façon. **Objectif :** En raison des faits présentés précédemment, le but de la présente étude était de comparer le comportement de la variable physiologique (haine de coeur) pendant les classes d'un exercice de l'eau, faites dans les piscines chlorées et ionisées de l'eau.

Méthodologie : La présente étude était comparative comme Thomas et le Nelson (2002), avec des caractéristiques exploratoires. Effectué sur sept volontaires de femmes, apparent salubres, selon ACSM (2000), avec la moyenne de l'âge de 21.71 ans. L'instrument employant pour mesurer était un moniteur de haine de coeur (BLITZ®), FOYER modèle. **Résultats** : Les données obtenues avaient reçu le traitement statistique l'extrémité pour comparer les valeurs moyennes du examiné de la haine de coeur, autant dans le repos combien dans l'exercice, dans les deux types de piscine, en utilisant l'essai t de l'étudiant pour comparer les deux types différents d'eau. Elle a été obtenue alors en tant que résultats finals, la différence significative (sig.p 0.005) seulement pour les valeurs moyennes de la haine de coeur dans l'exercice. **Conclusion :** Le résultat a trouvé pour nous prendre pour conclure, respectant les limitations de l'étude, que demi de liquide une fois traité par la méthode ionisée, fournit à une plus grande résistance au mouvement, augmentant alors l'intensité de l'exercice, pour la relation directe de l'intensité et de la densité de l'eau, corroborant en AEA (2001).

Mots clés : Activités physiques, haine de coeur, exercice de l'eau.

ANÁLISE COMPARATIVA DA FREQUÊNCIA CARDÍACA EM UMA AULA DE HIDROGINÁTICA MINISTRADA EM PISCINA DE ÁGUA CLORADA E OUTRA SALINIZADA

RESUMO:

As atividades físicas realizadas no ambiente aquático foram aderidas por uma boa parte da população mundial, talvez por conseqüência deste fato, possamos constatar um bom número de academias especializadas em exercícios aquáticos no mercado, e ainda a presença desta modalidade compondo a estrutura de atividades da maioria das academias. Nos tempos atuais, a tradicional piscina de água clorada, vem perdendo o espaço para um novo método de tratamento de água, a salinização. Como este método ainda é muito novo, observa-se uma escassez de pesquisas sobre o comportamento do nosso organismo quando imerso neste meio. **Objetivo:** Tendo em vista os fatos apresentados anteriormente, o estudo teve como objetivo comparar o comportamento da variável fisiológica freqüência cardíaca, durante uma aula de hidroginástica, ministrada em piscinas de água clorada e salinizada. **Metodologia:** O estudo foi comparativo e exploratório, a amostra foi composta por sete indivíduos, do gênero feminino, com a média de idade de 21,71 anos. O instrumento para aferição foi um freqüêncímetro da marca Blitz e modelo Focus. **Resultados:** Os dados obtidos receberam tratamento estatístico a fim comparar os valores médios das freqüências cardíacas aferidas, tanto em repouso quanto em exercício, nos dois tipos de piscina, utilizando então o teste t de Student pelo método pareado para comparar os dois tipos diferentes de tratamento da água. Obteve-se então como resultado final, diferença significativa (sig.p > 0,005) apenas para os valores médios da freqüência cardíaca em exercício. **Conclusão:** O resultado encontrado nos leva a concluir, respeitando as limitações do estudo, que o meio líquido quando tratado pelo método salinizado, proporciona uma maior resistência ao movimento, aumentando então a intensidade do exercício, pela relação direta da intensidade e densidade da água, corroborando com a AEA (2001).

Palavras- chave: Atividade Física, Freqüência Cardíaca e Hidroginástica.