8 - INFLUENCE OF BODY POSITION ON CARDIAC OVERWEIGHT IN SUPINE EXERCISES

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INTRODUCTION

According to the Brazilian Society of Cardiology (2005), the muscular strength is fundamental to health, to the functional capacity maintenance and to achieve a satisfactory quality of life. In the past years, the resistance complementary training has taken part of the cardiac rehabilitation program, helping to improve the strength and muscular endurance, the cardiovascular function, the metabolism and body weight control, all of them coronary risk factors, as well as the general well-being.

Nevertheless, the maintenance or thin bodily mass increase obtained through weight lifting work, is an important variance on energetic balance maintenance during the whole life. The strength is important to achieve daily activities with comfort and safety (POWERS & HOWLEY, 2000), being this physical fitness component an imperative element in making any movement.

Several cardiologic alterations occur during the exercise, specifically in the resisted exercise. These alterations may happen in the cardiac frequency level, arterial pressure, ejection volume, cardiac debit among other. All these alterations lead to a cardiac overweight that can be perceived through the double product evaluation, being this a relatively simple method which informs indirectly the cardiac work condition. (WILMORE & COSTILL, 2001; POWERS & HOWLEY, 2000; GARRET JR & KIRKENDALL, 2003).

According to Araújo (1981), mentioned by Andrade and Barbosa Junior (2002), the double product (DP) shows a correlation of 0,88 with myocardium oxygen consumption, and it is, however, its best indirect preditor.

Thus, the DP is considered by the American College of Sports Medicine (ACSM, 2000) as a good parameter to mark out the cardiac overweight associated with weight training programs.

It would be convenient use this parameter as a reference in assigning a physical activity with safety, since it allows to check in which activity the cardiovascular system gets more effort charge and, thus, greater risks, considering that the greatest amount of the overstrung populations don't know that belong to this group.

Last but not least, there is a shortage of information about the relation between double product and resisted exercises of several natures. Most of the researches, compare results to static and aerobic exercises, in groups of athletes and coronary diseases bearers. On the other hand, the knowledge of the cardiac overweight profile, imposed by different exercises could help in the choice of those with lesser impact, mainly when it deals with risk populations (LEITE and FARINATTI, 2003).

The literature points out as a consensus that body-building is an important exercise in the prophylaxis of several degenerative diseases or their rehabilitation, however, the exercises and training methods choice are unquestionable, mainly because they can bring greater risks than benefits to the practitioners which belong to the risk populations.

Eventually, the present study has the purpose to analyze the overweight imposed to the heart, through the answer of the double product between the drop-set series, in the straight supine, inclined supine and downward inclined supine and if there are differences among these techniques concerning the cardiac overweight, considering that these exercises are part of the most bodybuilding programs. Indiscriminately, the focus will be on the male public, that clearly demonstrates their preference for this kind of exercises, and to provide data and information to the practitioner of the physical activity chooses the safer way to work with the population with arterial pressure alterations.

MATERIAL AND METHODS

This study has a descriptive feature, in which the observed variances were the systolic arterial pressure (mmHg), the cardiac frequency (heat/min) and the double product.

The population consisted of steady bodybuilders, practicing 3 times a week for at least one year. From these, 21 volunteer men, with average age of 23 years (±2 years), average body mass of 84,5 kilograms (±6 kilograms) and average height of 176 cm (±5 cm) were analyzed. It was adopted as exclusion criteria for the sample formation, the individuals which declared to use medicaments, the ones with some cardiovascular or respiratory problems and the ones which stated to be users of anabolic steroids.

For data collecting, a POLAR frequency measurer was used for monitoring the cardiac frequency. An aneroid measurer of arterial pressure and a stethoscope, both from MORE FITNESS trademark, were used for measuring the systolic and diastolic arterial pressure at the end of each supine exercises series.

The measured exercises were the straight supine, inclined supine and downward inclined supine using the bar on which the person lies down on the supine bank (straight, inclined or downward inclined) with the gluteous touching the bank, feet stood on the floor or hold to a bearer. The movement consists in the person to inbreathe and go down the bar, controlling the movement, until the chest, then, develop, expiring at the end of the effort (DELAVIER, 2002).

The evaluated didn't make physical exercises before the data collecting. The initial measurements of the systolic cardiac frequency in rest were collected with the measured people sat down and rested. After, the body mass and the height were checked. Then, they made only a stretching of the pectoral muscles and specific warm up in the device in which they were going to be evaluated, in other words, a series of about 20-25 reps. In the end, a test was made with the maximum charge of the device, what was overall easy due to the knowledge of charge that the measured showed. Being aware of the maximum charge, the test was started with 85% of 1 RM, were the measured made 8 - 10 reps and immediately two assistants took of 30% of the weight and the measured kept on his series until the voluntary concentric failure. The series time was also measured.

For cardiac frequency and arterial pressure measuring, it was taken into consideration that the peak answers usually happen during the last reps of a series or even until the voluntary concentric failure, and are bigger during the series with the sub-maximum charges than with the ones of 1 RM according to Fleck and Kraemer (1999). In this way, the data collecting happened at the end of the last two reps of the exercise.

In order to avoid the hypotensive effect, which can last some minutes or some hours, subsequently to the end of the exercise, and searching the most accurate measured result, each exercise was made in different days, at the same time of the former experiment, and with enough time for total recovering of the muscular group, aiming that there is no interference from tiredness. The training of the muscular group involved was suspended on the tests days.

The descriptive statistics was made (average and standart deviation). For hemodynamic variances comparison between the different kinds of exercises, it was used a variance analysis of a factor with post-hoc of tuckey, with a significance level of p=0,05.

The results were processed with the help of a software called Statistics 5.0 and Office 2000 Excel and the results are shown in the work through tables and graphics.

RESULTS AND DISCUSSION

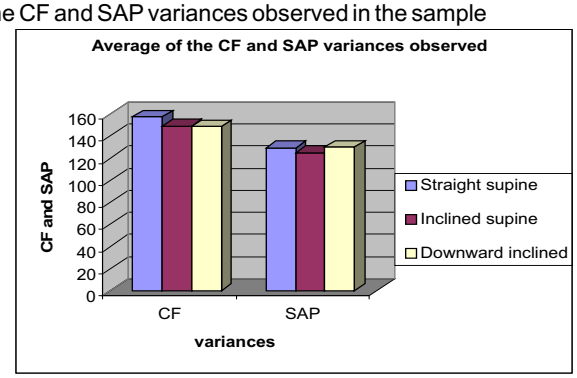
Literature stands for physiologic factors regarding the strength training. The cardiac frequency increases substantially during the dynamic training. However it can happen cardiac frequency peaks of 170 beats per minute. On the other hand, the systolic arterial pressure can show peaks of 320 mmHg, depending on the activity imposed to the myocardium. The typical values for the double product varies from 6.000 in rest to 40.000 or more, depending on the intensity and exercise modality (FLECK & KRAMER, 1999; SILVA, 2005). The descriptive statistics for the sample is on table 2.

Table 2. Cardiac frequency, systolic arterial pressure and double product showed on the sample.

EXERCISE	Straight supine	Inclined supine	Downward inclined supine
Average CF	157,47	149,47	148,47
Standard deviation	25,35	20,31	20,01
variation	642,86	412,76	400,46
Average SAP	129,52	125,23	130
Standard deviation	8,04	9,8	11,4
variation	64,76	96,19	130
Average DP	20463,33	18771,42	19387,14
Standard deviation	3877	3407,34	3679,449
variation	15031193	11609982	13538341

It can be observed that in general terms, the straight supine exercise, shows the majority of the most increased values, however, on its standard deviation it is also high. That shows the heterogeneity of the sample, in other words, there was a variation inside and among the sample in the three exercises. This difference could be better observed through the graphic below.

Graphic 1. Average of the CF and SAP variances observed in the sample



In this graphic, it can be observed a comparison between the cardiac frequency and the systolic arterial pressure of the exercises.

The cardiac frequency data show superior values on straight supine in relation to the other two exercises. And in systolic arterial pressure there were practically equivalent values between straight supine and slant downward supine.

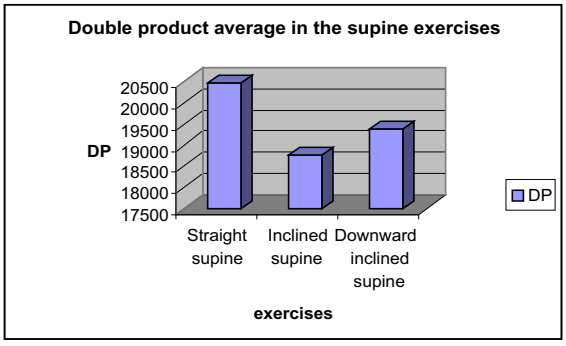
According to Bompa and Cornacchia (2000), eletromiographically the declined supine with active bar XXXXX a higher percentage of fibers of the greater pectoral. However, we observed in the sample that the supported charge on the straight supine was superior than the one in the downward inclined supine, as well as, the average time of the series was of 60 seconds, this could have generated this higher increase in the cardiac frequency and the practical equivalence on systolic arterial pressure, even considering the downward inclined body position in the other exercise.

The inclined supine, in this way, has got the lower values of supported charges and the series time was equivalent to the inclined supine of 55 seconds. It could be concluded that the difference of values in relation to the other two exercises is due to these facts.

However, analyzing statistically the variance inside and outside the sample, the values demonstrated to be too high and the desirable significance level, p=0,05 was not achieved. This fact can lead to the null hypothesis that there is no statistical difference among the exercises, neither concerning the average cardiac frequency nor concerning the systolic arterial pressure.

Analyzing the cardiac overcharge in the exercises, the found result was the same, since this is a result of the previously exposed. It can be observed in the graphic the following data.

Graphic 2. Double product average in the supine exercises



Once more, the straight supine has overcome the others. Considering the double product the result of the cardiac frequency versus systolic arterial pressure and the first most significant variable, which stood out as superior in relation to the downward inclined supine, and keeping the systolic arterial pressure equivalent, we could deduce that the cardiac frequency is the main responsible for the increase on the myorcardium imposed work, since it reflects the amount of work that the heart must perform to satisfy the body increased demand during the activity.

On the other hand, the inclined supine, once more showed the smallest values, because its independent variables were smaller.

Nevertheless, it should again be considered the null hypothesis, since there were no statistical difference among the observed averages.

CONCLUSIONS

The American College of Sports Medicine (ACSM), states that physical activities prescribed should give priority to the ones which provide improvements on aerobic conditions and muscular strength. Even for the normotense individuals, the control and / or reduction of pressure levels, is an important factor for minimizing cardiac disease risk.

One in each three people will have an abnormally high blood pressure in any time of their lives; this disease is prevalent among the American black people. (McARDLE & KATCH, KATCH, 1998).

In this way, the exercises prescription should be a science to be practiced by responsible professionals whose aim is to make peoples' lives better. So, the studies on this field should be expanded and divulged to everyone who is part of this industry.

According to the facts observed during the present study, it can be concluded that the work imposed to the myocardium during the supine exercises, the straight supine was the one that showed the greatest values of hemodynamic variances. Thus, it is the exercise with the greatest cardiac overweight in this work.

However, the results don't show statistical differences themselves. Furthermore, it is necessary to take another study with a more numerous and homogeneous sample to identify more precisely the data presented. It should also be considered other kinds of exercises and training methods in order to really act with safety on physical activities prescription.

The physical training should, among other things, prepare people to live in a healthier way. The strength exercises, besides helping to conquer this objective, have enormous cardiovascular safety to the hypertense individuals, since they are well controlled and oriented. There are great evidences that the physical activity, more specifically the work with weights, contribute to the diminishing or even in the prophylaxis on this kinds of diseases, making life of lots of people better, in terms of psychological health and socially speaking.

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INFLUENCE OF BODY POSITION ON CARDIAC OVERWEIGHT IN SUPINE EXERCISES
ABSTRACT

According to the Brazilian Society of Cardiology (2005), the muscular strength is fundamental to health, for maintenance of a good functional capacity and to achieve satisfactory quality of life. Several cardiovascular alterations occur during the exercise, specifically on the resisted exercise and this one leads to cardiac overweight, that can be seen through the double product. Then, this study aimed to analyze possible differences on the cardiac overweight related to the body position through the double product on the supine exercises, straight, inclined and downward inclined ones. Therefore, 21 individuals with an average age of 23 years old (±2 years), body mass of 85,4 kilograms (±6 kilograms) and middle height of 176,3 cm (±5 cm) were analyzed. The observed variances were the systolic arterial pressure (mmHg) and the cardiac frequency (beats/min). For data collecting, it was used a POLAR frequency measurer, as well as an aneroid arterial pressure measurer and a stethoscope from MORE FITNESS for systolic and diastolic arterial pressure at the end of a series of supine exercises. At the hemodynamic variables observed, the straight supine was the one which presented the greatest values in comparison to the other exercises, however, the results doesn't show statistical differences among themselves, being necessary a new study with a greater and homogeneous sample to identify the presented data more precisely as well as other kinds of exercises and training methods, in order to act with safety on the physical activities prescription.

Key Words: Double Product, Cardiac Frequency and Arterial Pressure.

INFLUENCE DE PLACE DU CORPS SUR EXCÈS DE POIDS CARDIAQUE DANS LES EXERCICES SUR LE DOS
RÉSUMÉ

D'après la Société brésilienne de Cardiologie (2005), la force musclée est fondamentale à santé, pour entretien d'une bonne capacité utilitaire et accomplir qualité satisfaisante de vie. Plusieurs modifications cardio-vasculaires se produisent pendant l'exercice, spécifiquement sur l'exercice résisté et celui-ci mène à excès de poids cardiaque qui peut être vu à travers le produit double. Alors, cette étude eue l'intention d'analyser des différences possibles sur l'excès de poids cardiaque a été en rapport avec la place du corps à travers le produit double sur les exercices sur le dos, droit, enclin et vers le bas enclins. Par conséquent, 21 individus avec un âge moyen de 23 ans (±2 années), masse du corps de 85,4 kilogrammes (±6 kilogrammes) et hauteur centrale de 176,3 centimètre (±5 centimètre) été analysé. Les désaccords observés étaient la pression artérielle systolique (mmHg) et la fréquence cardiaque (pulsation/min.). Pour donnée rassembler, il a été utilisé un mètre de la fréquence POLAR, aussi bien qu'un measurer de la pression artériel anéroïde et un stéthoscope de MORE FITNESS pour pression artérielle systolique et diastolique à la fin d'une série d'exercices sur le dos. Aux variables de l'hemodynamic observées, la ligne droite sur le dos était celui qui a présenté les plus grandes valeurs par rapport aux autres exercices, cependant, les résultats ne montrent pas de différences statistiques parmi eux-mêmes, en étant nécessaire une nouvelle étude avec un plus grand et homogène échantillon pour identifier les données présentées plus précisément aussi bien qu'autres genres d'exercices et former des méthodes pour agir avec sécurité sur la prescription des activités physique.

Mots de la clef: Produit double, Fréquence Cardiaque et Pression Artérielle.

LA INFLUENCIA DE POSICIÓN DEL CUERPO EN EL SOBREPESO CARDÍACO EN LOS EJERCICIOS SUPINOS
EL LO ABSTRACTO

Según la Sociedad brasileña de Cardiología (2005), la fuerza muscular es fundamental a la salud, para el mantenimiento de una capacidad funcional buena y para lograr calidad satisfactoria de vida. Varias alteraciones cardiovasculares ocurren durante el ejercicio, específicamente en el ejercicio resistido y este uno lleva a sobrepeso cardíaco que puede verse a través del producto doble. Entonces, este estudio apuntado para analizar las posibles diferencias en el sobrepeso cardíaco relacionó a la posición del cuerpo a través del producto doble en los ejercicios supinos, recto, inclinado y que se extiende hacia abajo inclinado. Por consiguiente, 21 individuos con una media edad de 23 años viejo (±2 años), masa del cuerpo de 85,4 kilogramos (±6 kilogramos) y media altura de 176,3 centímetro (±5 centímetro) se analizó. Las variaciones observadas eran la presión arterial sistólica (el mmHg) y la frecuencia cardíaca (el pulso/min.). Por el datos coleccionar, se usó un medidor de frecuencia POLAR, así como un medidor de presión arterial aneroide y un estetoscopio de MORE FITNESS para sistólico y diastolico la presión arterial al final de una serie de ejercicios supinos. A las variables hemodinámicas observadas, la recta supino era el que presentó los más grandes valores comparado con los otros ejercicios, sin embargo, los resultados no muestran las diferencias estadísticas entre ellos, mientras siendo necesario un nuevo estudio con una muestra mayor y homogénea identificar los datos presentados más precisamente así como otros tipos de ejercicios y entrenando los métodos para actuar con la seguridad en la prescripción de actividades física.

Las Palabras de la llave: El Producto doble, Frecuencia Cardíaca y Presión Arterial.

INFLUÊNCIA DA POSIÇÃO CORPORAL NA SOBRECARGA CARDÍACA NOS EXERCÍCIOS DE SUPINO
RESUMO

De acordo com a Sociedade Brasileira de Cardiologia (2005), a força muscular é fundamental para a saúde, para a manutenção de boa capacidade funcional e para atingir qualidade de vida satisfatória. Ocorrem várias alterações cardiovasculares durante o exercício, especificamente no exercício resistido e essas alterações induzem a uma sobrecarga cardíaca que pode ser percebida através da avaliação do duplo produto. Assim sendo, este estudo objetivou analisar possíveis diferenças na sobrecarga cardíaca relacionadas à posição corporal através do duplo produto nos exercícios de supino reto, inclinado e declinado. Para tanto, foram analisados 21 sujeitos com idade média 23 anos (±2 anos), massa corporal de 85,4 quilos (±6 quilos) e estatura média de 176,3 cm (±5 cm). As variáveis observadas foram os valores de pressão arterial sistólica (mmHg) e a freqüência cardíaca (bat/min). Para a coleta de dados foi utilizado um freqüencímetro da marca POLAR, bem como um esfigmomanômetro aneróide e um estetoscópio da marca MORE FITNESS para a mensuração da pressão arterial sistólica e diastólica ao final de cada série dos exercícios de supino. Nas variáveis hemodinâmicas observadas, o exercício de supino reto foi o que apresentou maiores valores em detrimento dos outros exercícios, porém, os resultados não apresentam diferença estatística entre si, sendo necessário um novo estudo com uma amostra mais numerosa e homogênea para identificar com maior precisão os dados apresentados, bem como outros tipos de exercícios e métodos de treinamento, para que realmente possamos agir com segurança na prescrição das atividades físicas.

Palavras - Chave: Duplo Produto, Freqüência Cardíaca e Pressão Arterial.