# 114 - THE ANALYSIS OF THE EFFECTIVENESS OF THE REALIZATION OF THEREPAUTIC WEIGHT TRAINING IN A SEDENTARY INDIVIDUAL: A CASE STUDY

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## 1 INTRODUTION

With the appearance of the machinery in the 18th Century, there was a reduction of the need of human efforts in the realization of work activities (SHARKEY, 1997). The utilization of computers and other gadgets made to help workers in their functions provided the maintenance of some postures, favor the increase of physical inactivity.

As said by World Health Organization (2002), the prevalence of physical inactivity among adult population is 17% and the level of activity considered insufficient (lower then 2,5 hours of moderate activity in a week) is between 31% and 51%.

For the companies, the sedentary way of life, adopted by the majority of its collaborators, make high spend of money, as a result of the reduction of productivity produced by the large number of work offs through medical appointments (DEVIDE, 1998).

According to Devide (1998), the utilization of an exercises program in a company provides: improvements in employees appearance, increase of satisfaction in the development of working activities with increase of productivity, decrease of absenteeism in the work, decrease of accidents in the work e decrease of the cost of medical services.

Although knowing the importance of physical activity in the promotion of health and life quality of sedentary individuals, there isn't a consensus about what is the better physical activity is better indicated (SANTAREM *apud* LUCAS, 2003).

By the previously explained facts, the objective of this study was to investigate the efficacy during thirty sections of therapeutic weight training (method that SE VALE by the continual monitoring of the heart frequency) in the improvement of the quality of life of a sedentary employee of a high school institution of Cascavel - PR.

## 2 THEORETICAL REASONING

One of the great world problems of health is sedentarism (DOMINGUES *et al*, 2004; GLANER, 2002), as a result of the modern life style, in which the human being, because of the advance of technology needs a little or any physical effort to acquire ways resources needed for the maintenance of life.

Sedentarism is considered responsible of the significant increase of not transmissible degenerative diseases (cardiovascular diseases, diabetes, and obesity, and substantially increase the risk of colon cancer, hypertension, osteoporosis, depression and anxiety and consequently the costs of treatment (FIGUEIRA, 2004).

It is important to noted that the data of World Health Organization (WHO) reveals that more than two million of deaths each year could be awarded to physical inactivity and between 60% and 85% of adults aren't just active enough to benefits it's own health.

The sedentary way of life associated to a long permanence in certain posture during the period of work leads to a continuous tension of the muscles and generates circulatory and metabolic disturbances, therefore it cause muscle pain or discomfort (FOX; MATHEWS, 1989).

Employees with lack of physical fitness are less productive, show a high level of time off from work, and are less loyal, substantially increased turnover in the framework of staff (SHARKEY, 1997). Statistics indicate that approximately four million Brazilians are subjected to treatment according to pains caused by the work (CONFEF, 2004).

Described as an action or series of body actions in order to develop physical fitness, directed and regular as a means of gaining strength, swiftly, agility or universal capability in some kind of activity, physical exercises through morphological and functional changes, appears as a factor of preserving and improving health and quality of life (ACSM, 1996; CARVALHO *et al*, 1996).

Exercise leads to increased values of bone mass, muscle mass, metabolic rate, energy spent, anabolic hormones, strength, power, endurance, flexibility, dexterity, maximum $VO_2$, anaerobic threshold, sensitivity to insulin, HDL cholesterol and levels of endorphin and the reduction of values of fat mass, adrenergic sensitivity, LDL and VLDL cholesterol, triglycerides and levels of cortisol (FOSS; KETEYIAN, 2000).

The increase in physical activity of a population contributes decisively to public health, with a strong impact on reducing the costs of treatment, including hospital (CARVALHO *et al*, 1996). The physical activity improves the welfare of the individual and the degree of satisfaction in the work (GHORAYEB; BARROS, 1999).

The programs of exercises offered by companies not only serve to increase the welfare of the employee, but also to decrease the absenteeism, reduce spending on health and possible increases in productivity (DEVIDE, 1998).

In this context, the weight training therapy (STS - Strength Training Strategies) is a method of prophylaxis, treatment and rehabilitation of diseases and deformities, promotion of suitability for activities of daily life, work, leisure and sport, in addition to stimulating the body aesthetics and the psychological happiness, achieved through standard exercises and constantly monitored (SANTAREM *apud* LUCAS, 2003).

The method was developed over 1990, the CEBRAF - Centro Brasileiro de Fisioterapia, under coordination of the physiotherapist Ricardo Wallace of Chagas Lucas, in the city of Curitiba, State of Paraná.

The continuous monitoring of the heart rate while the patient performs patterns of functional exercises, not allowing the heart rate is below or above the range of treatment (60% to 85% of their maximum heart rate) is what characterizes the therapeutic weight training method (LUCAS, 2003).

There are patterns of upper and lower members with abdominal exercises. These patterns are not fixed, they can increase or decrease the degree of difficulty. They are executed in a sequential and progressive form, where the maximum heart rate achieved by the subsequent pattern is greater than the previous (LUCAS, 2003).

Again according Lucas (2003), the external load used in the method through freedom halteres and weight anklets, it is no more than five kilograms.

## 3 METHOD

The study was conducted in the laboratory of physiology of exercise of a sports gymnasium of the Faculdade Assis Gurgacz (FAG), between September of 2006 and July of 2007, involving sedentary employees of a private institution of higher

education of the city of Cascavel - Pr.

There were 523 individuals in the board of staff of the private institution of higher education. After authorization of the Committee of Ethics in Research, one hundred and fifth received the Informed and Free Consent Term (IFCT) and the International Questionnaire of Physical Activity (IQPA), which classifies into very active, active, irregularly active and sedentary, while that seventy two were returned, resulting in 52% of loss.

Of the employees who responded IQPA it was observed that fifth four are female and eighteen are male. That act as teachers of the institution representing 47.2% and 52.8% in the technical/administrative sector. The sedentary represented 42.9% or thirty employees came in that classification.

With the return of the questionnaires and the IFCT those classified as sedentary were invited to participate in an anthropometric-functional evaluation, where nine employees attended, all female, with an average age of 29 years, being one teacher (10%) and eight of the technical/administrative sector (90%).

For physical evaluation it was used a Filizola digital weight scale, a Seca wall stadiometer, a Sanny measure tape, a Lange compass, a bank of Wells, a exercise mat and a stopwatch to obtaining the following values of the following variables: body mass, stature, circles body, skin folds, flexibility, abdominal strength and strength of senior members (TRITSCHLER, 2003).

The heart rate at rest (FCRep) was obtained before the start of the anthropometric-functional evaluation after five minutes that the evaluated have remained lying without perform movements.

Using a prediction formula based on the age, FC = 220 - age, the maximum heart rate (MHF) has been estimated.

The target area of training, between 60% and 85%, was established through the formulas:

-Upper Limit: (FCM-FCRep)x (85%) + FCRep

-Lower Limit: (FCM-FCRep)x (60%) + FCRep

Also it was applied the WHO questionnaire for the evaluation of the quality of life of the WHOQOL bref (questionnaire consisting of twenty six questions, divided into four areas: physical, psychological, social and environmental).

The evaluation system was standardized and always conducted by the same evaluator and equipment has been previously assessed.

Three of the employees who passed the physical assessment began the classes, however, one participated of five sessions, the other of three and only one ended the thirty sessions, that occurred three times a week (Monday, Wednesday and Friday), alternating itself upper and lower members, lasting approximately fourth minutes.

Using a Polar model A1 frequencimeter, the heart rate of the employee was tracked to remain in the target area of training and values were recorded in the own method spreadsheet.

All sessions began with a heating up, between five and ten minutes, in a electric treadmill or a fitness bike, followed the movement patterns of the method of weight training therapy with the aid of weight anklets and halteres ranged between 0.5 kg and 2 kg (depending on the type of exercise and the individual). Specific flexibility exercises were made at the end of the sessions.

At the end of the thirty sessions the employee was subjected to an anthropometric-functional reassessment and to a new evaluation by WHOQOL bref.

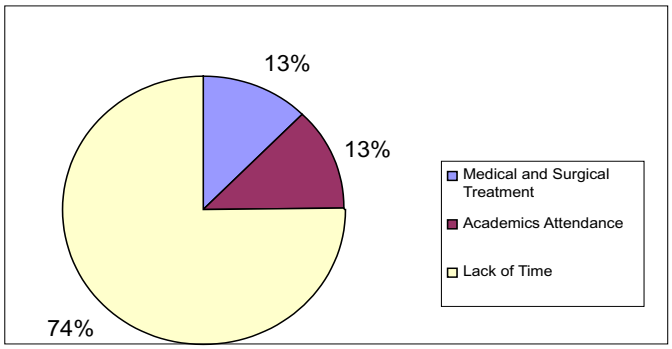
The data obtained by anthropometric-functional assessments were analyzed by the program Physical Test 6.1.

The results of the WHOQOL were analyzed as statistical model, getting the raw score (EB).

**4 RESULTS**

The reasons for the withdrawal, after initial assessment were: hours of academics attendance, medical and surgical treatment and lack of time, as shown in figure 01.

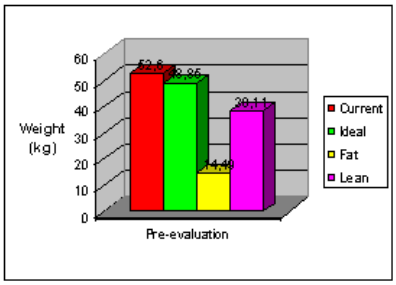
Figure 01: Reason for withdrawal of the participation of classes in the weight training therapy.

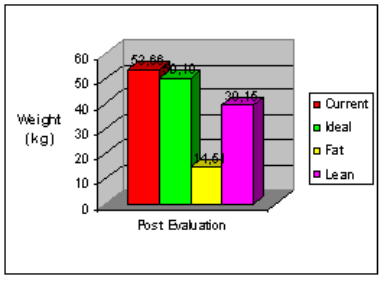



In examining the variable body mass, comparing the results collected before and after the completion of weight training therapy sessions, it was found that it rose from 52.60Kg to 53.66Kg.

As for body composition, the percentage of body fat (using the Pollock protocol) decreased from 27.56% to 27.05%, the fat weight changed from 14.49 kg to 14.51 kg and the lean weight from 38.11 kg to 39.15 kg, values presented by the figure 02.

Figure 02: Comparison of body composition pre and post weight training therapy




About flexibility, the maximum range seated remained 29cm (considered regular) in the two assessments.

In the analysis of the abdominal strength the evaluated person failed to achieve any complete movement in a minute during the assessments being classified as weak. The analysis of the strength of upper members showed that the person

performed 15 repetitions in a minute during the first evaluation which is considered good and 30 repetitions in the second evaluation considered excellent.

The comparative values for the body circumferences are expressed in table 01.

Table 01: Comparison of the values of body circumferences (McArdle protocol)

| CIRCUNFERENCE | PRE EVALUATION | POST EVALUATION |
|---|---|---|
| Waist | 92cm | 91cm |
| Abdomen | 80cm | 80cm |
| Hip | 98cm | 99cm |
| Arm (right) | 18,50cm | 20cm |
| Forearm (right) | 25cm | 24cm |
| Tight (right) | 54,50cm | 53cm |

For the weight training therapy sessions, the employee started doing three sets of ten repetitions with 1kg for upper members and without additional weight to the lower members. During the classes has held three sets of twelve repetitions with 2Kg to upper members and 1kg for the lower members.

The WHOQOL bref questionnaire indicates the perception of the individual in relation to their quality of life. For each field maximum and minimum values are assigned. Analyzing the raw score obtained there is verified that a high values calculated basically represents a high quality of life. The results of the WHOQOL bref are represented in table 02.

Table 02: Comparison of the raw scores obtained during the initial and final assessment with the WHOQOL bref

| FIELD | INTERVAL | INITIAL EVALUATION (EB) | FINAL EVALUATION (EB) |
|---|---|---|---|
| QUESTIONS 1 e 2 | 2 - 10 | 7 | 6 |
| PHYSICAL | 7 - 35 | 19 | 30 |
| PSYCHOLOGICAL | 6 - 30 | 23 | 25 |
| SOCIAL | 4 - 20 | 13 | 14 |
| ENVIRONMENTAL | 8 - 40 | 21 | 29 |

**5 CONCLUSIONS**

From the analysis of obtained results, it is concluded that despite the increase in the value of total body mass, this increase primarily relates to the increase in lean mass in voluntary evaluated.

The value of body circumferences suffered minor change, while the flexibility and abdominal muscle strength remained unchanged.

The largest difference was seen with respect strength of upper members, the voluntary doubled the number of repetitions, changing the classification of good to excellent.

The perception of the quality of life of physical and environmental fields were those who suffered greater increases in their scores, accounting for the improvement of the quality of life of the employee in relation to their physical condition and the environment in which it lives.

It is suggested to develop the program of weight training therapy with a greater number of sessions, in order to obtain more expressive results, therefore, raising the quality of life of people considered sedentary.

It follows that the achievement of a program with weight training therapy had a positive effect mainly in relation to the decrease in the percentage of fat (increase in lean mass) while also emphasizing the necessity of carrying out campaigns focusing the awareness of the importance of physical exercise for staff that act in institutions of higher education.

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**THE ANALYSIS OF THE EFFECTIVENESS OF THE REALIZATION OF THEREPAUTIC WEIGHT TRAINING IN A SEDENTARY INDIVIDUAL: A CASE STUDY**

**ABSTRACT**

Since Industrial Revolution, with the adoption of equipments to help human work, there was a reduction of the need of human efforts in the realization of work activities, providing the creation of addictions that provided physical inactivity. For the companies, the sedentary way of life, adopted by the majority of its staff, make high spend of money, as a result of the reduction of productivity produced by the large number of work offs through medical appointments and health issues. In this context, the objective of this study was to analyze possible improvements in the quality of life of sedentary individuals, employees of a private institution of higher education, through the use of therapeutic weight training. The project was realized between September of 2006 and July of 2007, where there were realized 30 sections of therapeutic weight training with a volunteer. The same person was get through an initial functional anthropometric evaluation and after the ending of the application of the method. The results showed that the utilized variables suffered little alterations, what means the necessity of maintaining the program of physical exercises for a longer time.

KEY WORDS: life quality, sedentarism, therapeutic weight training.

**ANALYSE DE L'EFFICACITÉ DE LA RÉALISATION DE LA MUSCULATION THÉRAPEUTIQUE DANS UNE PERSONNE SÉDENTAIRE : UNE ÉTUDE DE CAS**

**RÉSUMÉ**

À partir de la révolution industrielle, avec l'adoption d'équipements pour assister le travail humain, Il y a eu une réduction dans la nécessité de l'effort humain dans la réalisation des activités ouvrières, rendant propice la création de vices qui favorisent l'inactivité physique. Pour les sociétés, le style de vie sédentaire, adopté par la majorité de leurs collaborateurs, produit des dépenses élevées, par la diminution de la productivité causée par le grand nombre d'éloignements dans fonction de consultations médicales et de problèmes de santé. Dans ce contexte l'objectif de cette étude a été analyser possibles améliorations dans la qualité de vie de personnes sédentaires, employéees d'une institution particulière d'enseignement supérieur, à travers l'utilisation de la musculation thérapeutique. Le projet a été réalisé dans la période entre les mois de septembre 2006 à juillet 2007, où ont été réalisées 30 sessions de musculation thérapeutique, avec une volontaire. La même a passé par une évaluation anthropométrique fonctionnelle initiale et après la conclusion de l'application de la méthode. Les résultats ont indiqué que les variables utilisées ont souffert petites modifications ce qui indique la nécessité de la manutention du programme d'exercice physique par un temps plus prolongé.

MOTS CLE : qualité de vie, séddentarité, musculation thérapeutique

**EL ANÁLISIS DE LA EFICACIA DE LA REALIZACIÓN DEL MUSCULACIÓN TERAPÉUTICAEN UN INDIVIDUO SEDENTARIO: UN ESTUDIO DE CASO**

**RESUMEN**

A partir de la Revolución Industrial, con la adopción de equipos para el auxilio del trabajo humano, hubo una reducción en la necesidad de esfuerzo humano en la realización de las actividades laborales. Dando oportunidad a la creación de los vicios que favorecen la inatividad física. Para las empresas, el estilo de vida sedentario adoptado por la mayoría de sus colaboradores, genera altos gastos, por la disminución de la productividad ocasionada por el grande número de alejamientos en función de consultas médicas y de problemas de salud. En este contexto, el objetivo de este estudio fue hacer un análisis de las posibles mejoras en la calidad de vida de personas sedentarias, funcionarias de una institución particular de enseñanza superior, a través del uso de la musculación terapéutica. El proyecto fue realizado en el período entre los meses de septiembre de 2006 hacia julio de 2007 donde se realizaron 30 secciones de musculación terapéutica, con una voluntaria. La misma pasó por una evaluación antropométrica funcional inicial y tras la finalización de la aplicación del método. Los resultados indicaron que las variables utilizadas sufrieron pequeñas alteraciones lo que indica la necesidad de la manutención del programa de ejercicio físico por un tiempo más largo.

PALABRAS CLAVE: Calidad de vida, sedentarismo, musculación terapéutica.

**ANÁLISE DA EFICÁCIA DA REALIZAÇÃO DA MUSCULAÇÃO TERAPÊUTICA EM UM INDIVÍDUO SEDENTÁRIO: UM ESTUDO DE CASO**

**RESUMO**

A partir da revolução industrial, com a adoção de equipamentos para auxiliar o trabalho humano, houve uma redução na necessidade de esforço humano na realização das atividades laborais, propiciando a criação de vícios que favorecem a inatividade física. Para as empresas, o estilo de vida sedentário, adotado pela maioria dos seus colaboradores, gera gastos elevados, pela diminuição da produtividade ocasionada pelo grande número de afastamentos em função consultas médicas e de problemas de saúde. Nesse contexto o objetivo deste estudo foi analisar possíveis melhoras na qualidade de vida de indivíduos sedentários, funcionários de uma instituição particular de ensino superior, através do uso da musculação terapêutica O projeto foi realizado no período entre os meses de setembro de 2006 a julho de 2007, onde foram realizadas 30 sessões de musculação terapêutica, com uma voluntária. A mesma passou por uma avaliação antropométrica funcional inicial e após a finalização da aplicação do método. Os resultados indicaram que as variáveis utilizadas sofreram pequenas alterações o que indica a necessidade da manutenção do programa de exercício físico por um tempo mais prolongado.

PALAVRAS CHAVE: qualidade de vida, sedentarismo, musculação terapêutica.