92 - ANALYSIS OF THE BALANCE IN INDIVIDUALS WITH FREE BASE OF SUSTENTATION PRE-ESTABILESHED

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INTRODUCTION

Through the evolution, the human beings had assumed a erect position and this position continuously is defied by the force of the gravity to keep the balance of the body on the small base of sustentations represented by the feet.[1-2-3] Therefore the center of gravity of the human body cannot be a fixed point, it depends on the relative position of the different segments and it varies each instant.[1] Currently, studies describe the human body as being a suspended inverted pendulum on a base that oscillates constantly due to the control of the balance and posture.[2-3] These oscillations are recurrent of the difficulty in keeping the many corporal segments lined up between itself on a restricted base of support using the muscular system that produces forces that vary in the time line.[3] Being this way, the man stabilizes in its environment through a complex task that involves an relationship of sensorial information on the relative position of the corporal segments and on the internal and external forces that acts in these segments. All of these sensorial information are used and anticipate the forces that act in the body and, combined with appropriate muscular activity produces or keeps the corporal position desired and being these not constant forces, the body is not total immovable, the body oscillates from side to side and anterior to posterior.[1-3]

The analysis of the balance in the erect position can be carried through by the stabilometer. It is an objective and quantitative exam of evaluation that analyzes the corporal oscillations on a composed platform by sensors that aim in such way to measure and to compare the displacements developed in the different points of the plantar region in the static erect position or marching, making the exam trustful.[2-3]

Therefore, the goal of this research was to carry through a comparative study between the anteroposterior balance of the individual with free base of sustentation and base of sustentation pre-established, using the stabilometer as evaluation form, registering its continuous oscillations of the human body.[1-3-4].

MATERIALS AND METHODS

The analyzed individuals had participated in a voluntary and clarified way of the present research through an assent term. This study was made according to lines of direction and norms of resolution 190 of 10 of October of 1996, of the National Advice of Health. The data had been gotten through a stabilometric evaluation, carried through in the Instituto do Joelho e Traumatologia, located in Londrina-PR. The exam was made by two examiners, a both qualified operate the manuscript of the equipment and the study, being in the room only one examiner, the patient and a person to handle the computer.

The sample was composed by a population of 32 individuals (n = 32), being 14 of the masculine sex and 18 of the feminine sex, the average of age of the individuals was of 23 years and the deviation standard line of 4 years, the weight average was of 68Kg and the deviation standard line 12,5 kg, the stature with average of 172cm and deviation standard line of 11 cm and the footwear with average of size 39, with deviation standard line of 2,5. The acute patients with complaint of physical discomfort or injuries had been excluded from the study. The identification of the patients was made through an evaluation form where it was registered: full name, age, weight (kg), stature (cm) and size of shoe (French system). The individuals had been guided to step on a electronic platform of plain force that contains piezoelectric sensors, that register the oscillations of the body (displacement length) during the erect position, a measure instrument on which the individuals were bare-footed, standing, static and relaxed, located with the arms along the body and guided to remain immovable with the fixed look in a point located to a meter and half of distance and with a half-opened mouth. The duration of the register was of 30 (thirty) seconds. The program used for this study was FootChecker 3,1, installed in a computer with Pentium processor 800Hz, memory of 128 ram and 30 hard disk of mock-up bytes. All the individuals had been submitted to two stabilometric evaluations. Being that the first one was with the feet in a free position, or either, the position of comfort for the patient searching the best spontaneous balance. The second stabilometric evaluation was carried through with the position of the feet in a pre-established position in the following way: the distance between the heels was 2cm, being lined up in the posterior part or a chock, the forefoot was located with a chock in wedge of 30o separating to the feet.[2] In this research used the T test for the data, observing the oscillations anteroposterior of the body, with the level of significance of the $p < 0,05$, characterized it research for being comparative exploratory, where the interest characteristics had been analyzed the results through tables leading in account.

RESULTS

In table 1, are described the averages of the oscillations anteroposterior of the body in the individuals with the free and pre-established base of sustentation. These measures have a direct relation with the weight, stature, size of shoe and also for the type of foot. Applying test T for the data, it was observed in the measuring of the average of the body oscillations anteroposterior in the individuals with the free base of sustentation was of 6,8 mm (deviation standard line of 2,8), while the average of the oscillations anteroposterior in the individuals with the base of pre-established sustentation was of 7,4 mm (standard deviation of 5,6), not reaching probability statistics with p=0,610.

Table 1: Average of the oscillations of the body in the free and pre-established positions.

Média da oscilação antero-posterior do corpo	Oscilação antero -posterior do corpo	DP (desvio padrão)
Base Livre	6,8 mm	2,8
Base Pré-Estabelecida	7,4 mm	5,6

DISCUSSION

The present work searched to analyze the behavior of the deriving measures of the oscillations anteroposterior of the body, through a stabilometric examination, where the individuals had been guided to stand in a position with the free base of sustentation and later in a position with a pre-established base of sustentation. (FIGURE 1 and FIGURE 2)

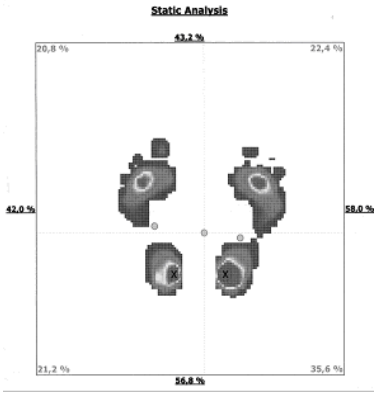

Figure 1: Examination in the stabilometric platform with the individual with free base of sustentation.

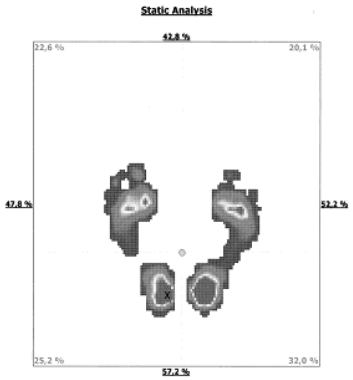

Figure 2: Examination in the stabilometric platform with individual with a pre-established base of sustentation.

The stabilometric findings had evidenced in table 1, which change in the oscillations occurred anteroposterior when the individuals had been located with the pre-established sustentation. These imposed positions of the feet, they can induce tactics of corporal adjustment and that it does not consider the particular problems of definitive individuals, are criticized. Therefore the standardization tends not to consider the particular problems of the individuals that can affect ours static.[1-3-4] If the examination is not standardized, the gotten results could not be compared with another examination, therefore many factors can intervene with the positioning of the individual, that can end up with a position with closed or opened base of sustentation in a second examination, making the position different compared with the first exam, therefore the postural oscillation diminishes or increases the strategy of postural adjustment.

CONCLUSION

This study demonstrated that there is variation between the measures of the balance of the individuals with the free base of sustentation and the pre-established one. Confirming that the imposed position of the feet can induce tactics of different corporal adjustment of the individual when he is with the free base of sustentation, it also demonstrated to be relevant the influence of the feet in the position. Therefore according with the presented results the examination needs to be standardized; because the individual will always have the same positioning and behavior, being able to have parameters that are more trustful to compare exams, making the results trustworthy.

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ANALYSIS OF THE BALANCE IN INDIVIDUALS WITH FREE BASE OF SUSTENTATION PRE-ESTABILESHED

For the individual to have a good position the gravity center must be situated in the polygon of sustentation represented for the sole of the foot. The feet examination in the erect position can be carried through by the electronic stabilometer that makes possible to analyze the continuous oscillations of the human body, aspects that are visually not noticed. This study had as objective to carry through the comparative analysis registering the oscillations anteroposterior of the body of individuals with free base of sustentation and pre-established base of sustentation. The study concluded that the imposed position of the feet can induce tactics of different corporal adjustment of the individual with free sustentation base, increasing the anteroposterior oscillations. Being thus, the presented data demonstrate that the sole of the foot intervenes with the balance position and that the examination needs to be standardized; therefore the individual will always have the same positioning and behavior, making the results trustworthy.

Key-words: Feet, balance, posture.

ANALYSE DE L'ÉQUILIBRE DANS LES INDIVIDUS AVEC LA BASE DE SUSTENTATION LIBRE E PRÉ ETABLIE

Pour avoir une bonne posture lê centre de gravite de l'individu doit se localizer dans la base de sustentation representé pour les deux pieds. L 'examen des pieds dans la posture debout peut etre evaluer par une plataforme de posture eletronique, laquelle peut analiser les oscilations constantes du corps humain , que avec notre vue nous ne pouvons pas aprecier. Cet etude a eu comme but de realiser une analise comparative verifiant les oscilations antero-posterieures du corps des individus avec la base de sustentation libre e pré etablie. Cet etude a eu comme conclusion que avec la base des pieds fixes e libre, a une diference d'adaptation du corps par des strategies de posture, augmentation des oscilations antero-posterieures . Nous croyons que les données presentés ont demontré de cette maniére ,que les pieds peuvent influencier l'equilibre et la posture et que l 'examen doit etre sous protocole , parce que l'etre humain va avoir la meme posture et comportement, debouchant a des resultats plus fidéles et confiables.

Mot-clef: Pied, équilibre, posture

EI ANÁLISIS DEL EQUILIBRIO EN INDIVIDUOS CON LA BASE LIBRE DE LA SUSTENTACIÓN PRE-ESTABILESHED

Para que el individuo tenga una buena posición el centro de la gravedad se debe situar en el polígono de la sustentación representado para la planta del pie del pie. La examinación de los pies en la posición erguida se puede llevar a través por el stabilometer electrónico que hace posible analizar las oscilaciones continuas del cuerpo humano, los aspectos que no se notan visualmente. Este estudio tenía como objetivo a llevar con el análisis comparativo que colocaba las oscilaciones anteroposteriores del cuerpo de individuos con la base libre de la sustentación y la base preestablecida de la sustentación. El estudio concluyó que la posición impuesta de los pies puede inducir táctica de diverso ajuste corporal del individuo con la base libre de la sustentación, aumentando las oscilaciones anteroposteriores. Siendo así, los actuales datos demuestran que la planta del pie del pie interviene con la posición de balance y que la examinación necesita ser estandardizada; por lo tanto el individuo tendrá siempre la misma colocación y comportamiento, haciendo los resultados dignos de confianza.

Palabras claves: Pies, balance, postura.

ANÁLISE DO EQUILÍBRIO EM INDIVÍDUOS COM A BASE DE SUSTENTAÇÃO LIVRE E PRÉ-ESTABELECIDA

Para o indivíduo ter uma boa postura o centro de gravidade deve se localizar no polígono de sustentação representado pela planta dos pés. O exame dos pés na postura ereta pode ser realizado pela estabilometria eletrônica, que possibilita analisar as contínuas oscilações do corpo humano, aspectos que visualmente não são notados. Este estudo teve como objetivo realizar um analise comparativa registrando as oscilações antero-posterior do corpo de indivíduos com base de sustentação livre e base de sustentação pré-estabelecida. O estudo concluiu que a posição imposta dos pés pode induzir uma tática de ajuste corporal diferente a do indivíduo com a base de sustentação livre, aumentando as oscilações antero-posterior. Sendo assim, os dados apresentados demonstram que a planta dos pés interferem no equilíbrio postura e que o exame necessita ser padronizado, pois o indivíduo vai ter sempre o mesmo posicionamento e comportamento, tornando os resultados mais fidedigno e confiável.

Palavras-chave: Pés, equilíbrio, postura.