72 - PELVIC TILT DIFFERENCE BETWEEN MALE AND FEMALE

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Abstract

The purpose of this study was to determine whether men e women have similar pelvic tilt angle in three different postures. Twelve men and eighteen women with mean age of 22,8 2,51 e 23,4 1.82 years, height of 174,3 4.7 e 163,6 7,6 cm, and body mass of 70,4 8,7 e 54,4 9.4 Kg, respectively, were volunter at this study. They were instructed to stand in the standard posture equipment (IAP) and pelvic tilt were measured within neutral, anterior and posterior pelvic tilt, with an instrument called Palpation Meter. Groups were compared through independent-samples t-test. No gender diference were found in pelvic tilt for studied postures.

Keywords: pelvic tilt, gender, pelvis.

Introduction

Kendall (1990), Tyler et al. (1996) and Youdas et al. (1996) believe that strength and length of the muscles inserted in the pelvis could influence its position. According to Levine and Whittle (1996) and Vaz et al. (2002), this change in pelvic position could alter the lumbar lordorsis. Based on this anatomic relationship, procedures that could strength or length the muscle would affect the pelvic and lumbar position and therefore modify the posture. Kendall (1990) stated: "The pelvic position is the key to good or bad posture alignment". In that case, the pelvic would influence other joints position (MAGEE, 1997), as shown by Harrison et al. (2002), which verified that anterior-posterior translation of the thoracic cage affected lumbar spine curvature and pelvic tilt angle. These results could explain the therapeutic procedures that focus in the pelvic tilt as a treatment for low back pain (NOURBAKHSH e ARAB, 2002). In order to understand the muscle influence over the pelvic tilt, it is necessary to comprehend the consequences of anatomic differences. Kapandji (1987) and Magee (1997) have shown that women have widther pelvis, while male pelvis has a bigger height. Bruzek (2002) studied a technique to identify skeleton gender through the pelvis and found a high reliability. Sacral inclination angle and pelvic dynamic during walking have been reported as gender difference by Tague (2000) and CHO et al. (2004). Therefore, the assessment of pelvic tilt of both gender with a noninvasive method could contribute to a better understanding of the influence of pelvic tilt in postural balance.

The purpose of this study was to determine whether men and women have similar pelvic tilt angle in three different postures.

Methods

Subjects

Volunteered for this study 12 male and 18 female (n=30), with a mean age of 22,8 2,5 and 23,4 1,8 years, height of 174,3 4,7 and 163,6 7,6 cm and body mass 70,4 8,7 and 54,4 9,4 Kg, respectively. The subjects were recruited by the authors in two universities at Minas Gerais state. The admission criterion for this study were: 1) absence of low back pain, 2) no recent surgery, 3) absence of traumatic injury followed by hospitalization, 4) hamstring flexibility inferior to 180 assessed by modified Knee Extension test (TEJ-m). Subjects were informed about the procedures and the aim of the study, and signed an informed written consent.

Instruments

The pelvic tilt angle was measured with the Palpation Meter (PALM) always in the right side. This instrument combines the features of a caliper and an inclinometer, which allows to measure the distance between the anterior superior iliac spine (ASIS) and posterior superior iliac spine (PSIS) and the angle of the straight line that passes through both iliac spines. The height difference between the iliac spines is calculated with a monogram called PALM Calculator. Afterward the pelvic tilt angle was calculated using the iliac spine height difference and inclination.

The standard posture equipment (IAP), developed by Chagas et al. (2003), was used to standardize the subjects position during the research procedures.

Procedures

All measures were obtained by the same examiner. Previously, the examiner practiced taking measures with the PALM and IAP and collected pilot data. The intra-examiner realibility of pelvic tilt was 0.80, 0.74 and 0.74 for neutral, anterior pelvic tilt position and anterior range of motion (RASO et al., 2003).

The study was accomplished in two day. In the first day subjects learn the procedures and in the second day the pelvic tilt was measured. The subjects were positioned in the IAP, with feet in a comfortable position and heels touching the posterior platform of the instrument. A stripe fixed to the IAP was adjusted over the tibial tuberosity, minimizing the knee flexion. Afterwards, vertical and horizontal stipes were align to the shoulder which maintain and standardize thoracic position. During the measures the subject remained still in a stand position, with upper extremities relaxed and looking forward. The examiner stands at the right side of the subject, finds and marks the ASIS and PSIS with a skin appropriated pencil. The pelvic tilt was measured with the PALM and all marks removed. Posteriorly, the procedure was repeated for both anterior and posterior pelvic tilt. The natural relaxed standing position was classified as a neural pelvic tilt. The examiner asked the subject to tilt the pelvis anteriorly, as practiced in the day before. At this position the pelvic tilt was measured. The subject was then asked to perform a posterior pelvic tilt and it was measured. All measures were performed in the right side of the subjects.

Data analysis

A descriptive analysis was calculated for the 3 pelvic tilt positions. Afterward, a paired-samples t-test was used to compare the mean values of neutral anterior and posterior pelvic tilt. To compare each posture between gender a independent t-test was performed. The significance level accepted in this study was p 0.05.

Results

The descriptive analysis of the measures of the neutral, anterior and posterior pelvic tilt position is presented in table 1.

Table 1
Descriptive analysis of the measured neutral, anterior and posterior pelvic tilt position for each gender.

	N	Neutral		Anterior Tilt		Posterior Tilt	
		Mean [º]	sd	Mean [º]	sd	Mean [º]	sd
Male	12	7.20	2.77	21.25	4.15	2.34	2.20
Female	18	8.33	4.17	21.79	3.82	3.88	2.35

The paired-sample t-test showed significant difference between all three pelvic positions studied (Figure 1).

Independent t-test was used to compare gender difference for the three pelvic positions studied, and no significant difference was found (Figure 2).

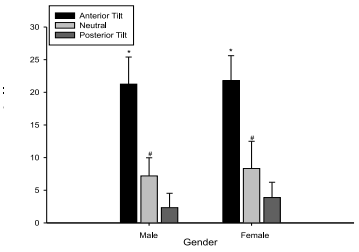

Figure 1 – Change in pelvic tilt angle. * p<0,05 neutral and anterior tilt, # p<0,05 posterior tilt.

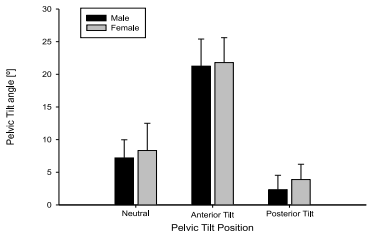

Figure 2 – Comparison between the mean value of the three pelvic positions.

Discussion

The pelvic have been considered a primordial structure for posture, because it can influence the low back position which is one of the most frequently injured segments (LEVINE and WHITTLE, 1996; VAZ et al., 2002; LEGAYE et al., 1998; DAY et al., 1984). The muscles inserted to the pelvis can voluntarily alter its position (KENDALL, 1990; KAPANDJI, 1987), but its importance to low spine still unknown.

The reliability and validity of the method presented in this study to measure the neutral, anterior and posterior pelvic tilt were published by Chagas et al. (2003) and Raso et al. (2003). Base on Chagas et al. (2003), the validity of PALM when compared to the antropometric method proposed by Sanders and Stavrakas (1981) have shown a Pearson correlation of 0.87 for neutral pelvic position, 0.88 for anterior pelvic position and 0.71 for anterior ROM. The intra-tester reliability the method used in the study showed a 0.80, 0.74 and 0.74 for neutral, anterior and posterior pelvic tilt position, respectively (RASO et al., 2003). Petrone et al. (2003) researched the validity and reliability of the PALM for the pelvic crest height difference comparing PALM measures with X-ray values. The results showed that PALM is valid for measuring crest height difference (the intraclass coefficient was 0.90-0.92), and its intra-tester reliability was 0.97-0.98 and intra-tester reliability was 0.88.

The comparison between the pelvic angle in each pelvic position studied showed significant difference. These results supports study of Levine and Whittle (1996). However, no significant difference for the pelvic position studied was found between gender, which supports the results of Vaz et al. (2002).

The lack of angle difference between gender for the pelvic positions studied could be explain by several elements. The standardization of the subjects for the measures could be one of the reasons. The IAP used to standardize the subjects postures, stabilized the thoracic movements while performing the anterior and posterior tilt and kept the knee joint in an extended position. The knee position fixed the tibia at 90º from the horizontal base, which may have altered the natural individual knee extension in standing position. According to Magee (1997) one joint position change can influence all the others.

Another explanation for the similarity between genders is the fact that the posture is influence by multiple variables. Functional differences based on muscle strength, flexibility and body perception could result in a similar posture.

All these results show that the anatomic disparity between genders is not enough to assure a different pelvic tilt position.

Conclusion

Based on the results presented in this study, it is possible to conclude that there is no difference in pelvic angle between gender for standing position, anterior and posterior pelvic tilt.

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PELVIC TILT DIFFERENCES BETWEEN MALE AND FEMALE

Abstract

The purpose of this study was to determine whether men e women have similar pelvic tilt angle in three different postures. Twelve men and eighteen women with mean age of 22,8 2,51 e 23,4 1.82 years, height of 174,3 4.7 e 163,6 7,6 cm, and body mass of 70,4 8,7 e 54,4 9.4 Kg, respectively, were volunter at this study. They were instructed to stand in the standard posture equipment (IAP) and pelvic tilt were measured within neutral, anterior and posterior pelvic tilt, with an instrument called Palpation Meter. Groups were compared through independent-samples t-test. No gender diference were found in pelvic tilt for studied postures. Keywords: pelvic tilt, gender, pelvis.

DIFFERENCES DANS L'INCLINATION PELVIENNE ENTRE LES HOMMES ET LES FEMME

Résumé

L'objectif du présente étude est évaluer s'il y a des différences dans l'inclination pelvienne, dans le plan sagittal, entre les hommes et les femmes dans trois différentes positions. Ont participé de l'étude 12 hommes et 18 femmes avec moyenne d'âge de 22,8 2,51 e 23,4 1.82 ans, stature de 174,3 4.7 e 163,6 7,6 cm et masse corporelle de 70,4 8,7 e 54,4 9.4 kg, respectivement. Les volontaires ont été placés dans l'Instrument pour aide de la normalisation (IAP), et l'inclination pelvienne dans la position orthostatique détendue, avec inclination pelvienne précédente et Inclination pelvienne postérieure ont été mesurées avec l'utilisation du Palpation Meter. Les groupes ont été comparés dans les trois positions moyenant le teste-t pour échantillons indépendants. Le résultat a montré qu'il n'y a pas des différences significatives entre les genre dans les trois positions étudiées. Mots Clé : Inclination pelvienne, genre, pelvis

DIFERENCIAS EN LA INCLINACION PELVICA ENTRE EL HOMBRE Y LA MUJER

Resumen

El objetivo del presente estudio es evaluar la existencia de diferencias en la inclinacion pelvica en el plano sagital, entre el hombre y la mujer en tres posiciones distintas. Participaron del estudo 12 hombres y 18 mujeres con una edad de 22,8 2,51 e 23,4 1.82 años, una estatura de 174,3 4.7 e 163,6 7,6 cm y una masa corporal 70,4 8,7 e 54,4 9.4 Kg, respectivamente. Los vonluntários eran colocados en un instrumento para el auxilio de la padronización (IAP). La inclinación pelvica en la postura ortostática relajada, con anteversión e retroversión pelvica fueron medidas con el Palpation Meter. Los grupos fueron comparados en tres posiciones en el teste-t para amostras independientes. Los resultados demonstraran que no hay diferencia significativa entre los generos en las 3 posiciones estudiadas. Palavras Claves: Inclinación pelvica, gênero, pélvis.

DIFERENÇA NA INCLINAÇÃO PÉLVICA ENTRE HOMENS E MULHERES

Resumo

O objetivo do presente estudo é avaliar se existe diferença na inclinação pélvica, no plano sagital, entre homens e mulheres em três diferentes posturas. Participaram do estudo 12 homens e 18 mulheres com média de idade de 22,8 2,51 e 23,4 1.82 anos, estatura de 174,3 4.7 e 163,6 7,6 cm e massa corporal de 70,4 8,7 e 54,4 9.4 Kg, respectivamente. Os voluntários foram posicionados no Instrumento para auxílio da padronização (IAP), e a inclinação pélvica na postura ortostática relaxada, com báscula anterior e báscula posterior foram medidas com o uso do Palpation Meter. Os grupos foram comparados nas três posturas através do teste-t para amostras independentes. O resultado mostrou que não existe diferença significativa entre os gêneros nas três posturas estudadas. Palavras Chave: Inclinação pélvica, gênero, pelve.

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