POSTURAL EVALUATION OF MEN AGED BETWEEN 60 AND 65 YEARS OLD OF PORTO ALEGRE-RS BASED ON SHADOW MOIRÉ TECHNIQUE

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This is a population-based study and it is part of the Multidimensional Study of the Elderly population of Porto Alegre-RS. The aim was to evaluate the posture of men aged between 60 and 65 years using the Shadow Moiré Technique. The variables analyzed were: the mean angular variation of posture deviations evaluated, considering the cervical-thoracic column (CTC) and thoracic-lumbar column (TLC); hyperkyphosis, misalignment of the scapulas and its correlation with lateral deviation of the column. Results showed that 44.4% of the tested population presented Very Low deviations of the CCT and 74% had Very Low and Low deviations of the TLC. The findings of this study failed to prove the correlation between the misalignment of the scapulas and column deviations. Fifty-two % presented hyperkyphosis.

KEY WORDS: Shadow Moiré Technique**,** postural deviations, aging, population-based study.

INTRODUCTION:

According to Matsudo (2004), physical evaluations aim to determine physical fitness and to develop adequate and effective fitness programs.
Equipments used to analyze human movements have been improved in the last few years. This new technology allows studies to be conducted in shorter periods of time, optimizing data collection and later analysis (Frontera, Dawson & Slovick, 2001). Therefore, motor activities are better evaluated and understood, since the instrumentation used to measure different variables have a better quality (Ávila *et al.,* 2002). The gold-standard method for the evaluation of the alignment of the column is the x-ray, which always exposes the patient to a certain degree of radiation. The x-ray method can be substituted or associated to magnetic resonance and computerized tomography in many cases, but it increases the cost of the exams (Yeras, 2003). Alternative low-cost and non-hazardous methods can be employed and results studied to evaluate posture. According to Years (2003), optical techniques such as Moire are useful tools, since they are cost-effective, can be applied to large populations, and impose no risk to patients.
The Shadow Moiré Technique was first used to determine the topography of objects that had irregular surfaces. It was later applied to study the human body and posture, which can also be considered an object with an irregular surface (Lino, 2002).
This is a population-based study and it is part of the Multidimensional Study of the Elderly population of Porto Alegre-RS. The aim of this study was to evaluate the erect or standing posture of elderly men aged between 60 and 65 years old who live in Porto Alegre-RS by means of the Shadow Moiré Technique.

METHOD:

Data Collection: The project was approved by the Research Ethical Committee of PUCRS and each volunteer signed the consent form prior to the beginning of the experiment.
Twenty-seven volunteers aged 60 to 65 years participated in this study. They were chosen randomly among the Porto Alegre-RS male population.
The test was conducted in a pre-prepared dark environment. The equipment of the Shadow Moire Technique was developed and previously validated by Hertz and colleagues (Hertz, 2005; Hertz et al., 2005) and it was based on the technique proposed by Takasaki (1970). It consists of a grid of nylon wires fixed in a squared wood frame and separated from each

other by a 1mm. A light source of 100W and a digital camera (Dimage, 5,0 MG, Minolta ®, 7x optic zoom) were also used.
During the test, the volunteer was asked to have his torso free of any clothing and was instructed to stay still in the standing position with his back towards the equipment. The squared wood frame was then positioned between the volunteer torso and the digital camera. The light source was placed closed to the digital camera and its light illuminated the nylon wires obliquely producing therefore the Moiré fringes on the volunteer's nude torso. Two pictures were taken per volunteer.
The mean angular variation of posture deviations were evaluated, considering the cervical-thoracic column (CTC) and thoracic-lumbar column (TLC); hyperkyphosis, misalignment of the scapulas and its correlation with lateral deviation of the column.
Posture changes were classified as very low, low, moderate, high and very high.
Hyperkyphosis was considered when the subject had more than 7 Moiré fringes, which implies a distance of 4.942 mm per fringe in the antero-posterior direction from the central line of the body (Hertz, 2005).

Data Analysis: Trained and highly skilled professionals evaluated the high quality printed photos obtained (Printer HP Deskjet, model 3820), using a ruler and a transfer device. Postural changes were given in degrees in relation to the central line of the body.
Statistical analysis used: frequency distribution, class interval and Pearson correlation, with a significance level of $p<0.05$, using Microsoft Excel 2003.

RESULTS:

Figures 1 and 2 show the mean angular variation of lateral deviation of the cervical-thoracic and thoracic-lumbar columns.

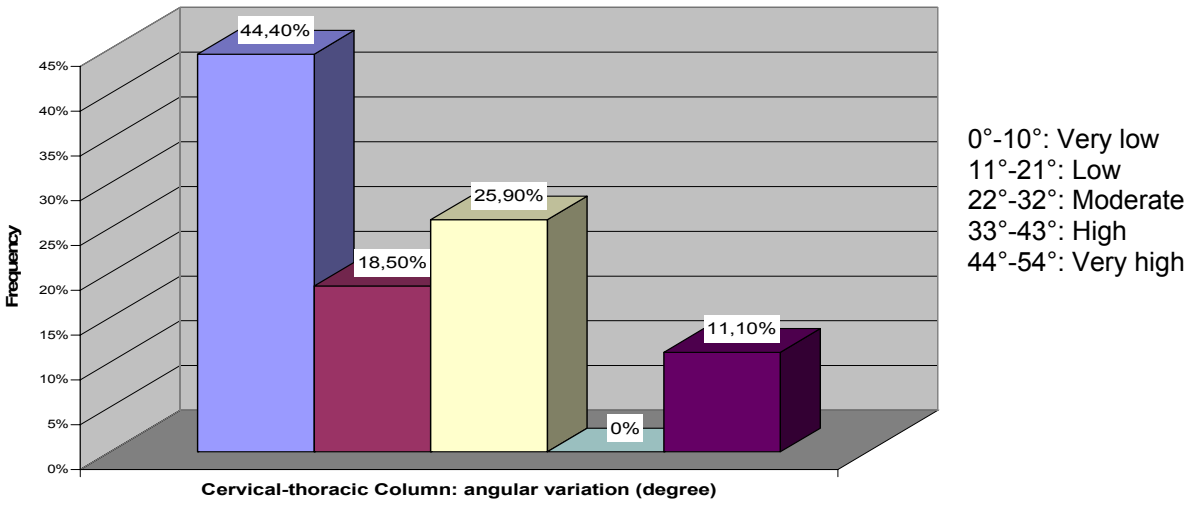
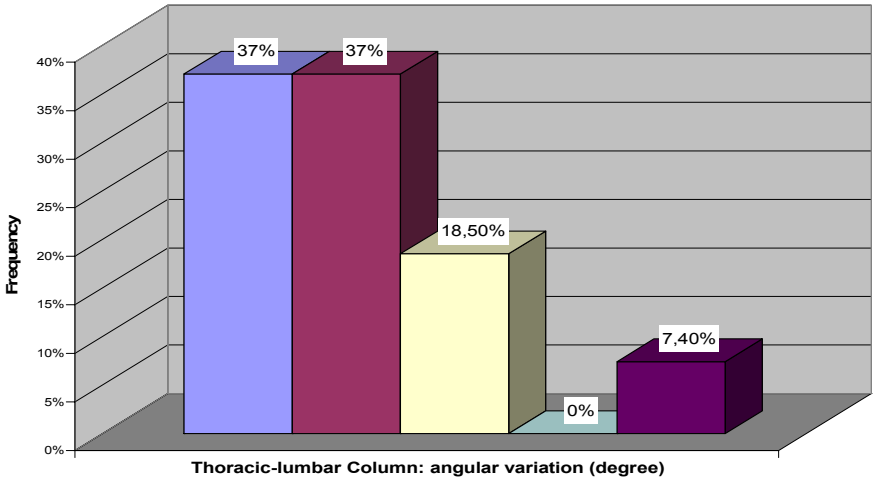


Figure 1: Mean angular variation of cervical-thoracic column deviation.



3°-11°: Very low
12°-20°: Low
21°-29°: Moderate
30°-38°: High
39°-47°: Very high

Figure 2: Mean angular variation of thoracic-lumbar column deviation.

Figure 3 shows the degree of misalignment of the scapulas.

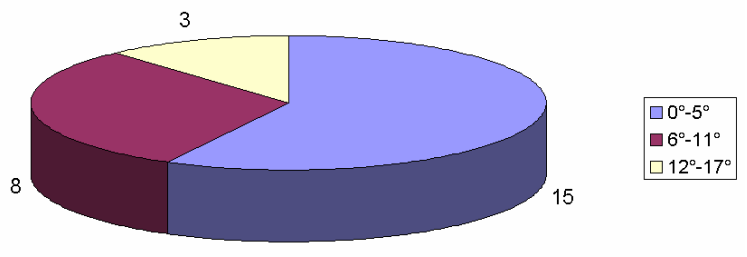


Figure 3: Misalignment of the scapulas in degrees.

The hyperkyphosis incidence and the correlation between misalignment of the scapulas and column deviations are shown in Table 1.

Table 1: Hyperkyphosis incidence and the correlation between misalignment of the scapulas and column deviations.

	Correlation	
Hyperkyphosis incidence	Misalignment of the scapulas x CTC deviations	Misalignment of the scapulas x TLC deviations
52%	0,1	-0,13

DISCUSSION:

Aging is a complex phenomenon. It compromises the quality of life and the independency of old people (Carvalhães Neto, 2005). The most prominent causes are alterations of the musculoskeletal system and diseases that affect the nervous system (Hough, Barry & Eathorne, 1997). It is well known that the elderly population is increasing worldwide. Therefore, studies dedicated to evaluate old people are very important for the elaboration of public politics for the third-aged population. The utilization of reliable and user-friendly methods are extremely important for population studies because they optimize time, human resource and data analyses.

Studies employing the Shadow Moiré Technique on posture are not common. However, around 20 year ago, some states in the US used this technique to diagnose scoliosis amongst the school student population, as can be seen in the study conducted by Adler et al. (1984) that evaluated the posture of female students of a public school in California.

In this study, 44,4% had lateral deviation of the CTC between 0° and 10°, which was considered Very Low. However, more than 25% of the volunteers evaluated presented the same deviation between 22° and 32° (moderate, Figure 1).
Thirty-seven % had Very Low or Low deviations of the TLC and almost 20% had deviations between 21° and 29° (moderate, figure 2). These results might indicate that an incipient scoliosis is already present in the population tested. It can be a limiting factor of motor activity later on (Aebi, 2005).
This study failed to prove that the misalignment of the scapulas could be an indicator of column deviation, especially scoliosis (Table 1).
The high incidence of hyperkyphosis (more than 50%) (Table 1) is a concerning finding of this study. According to Sinaki et al. (2004) the hyperkyphosis caused by osteoporosis can enhance the chance of body instability resulting in greater risk of patients falling.

CONCLUSION:

The Shadow Moiré Technique has not been commonly applied in Brazil. However, it is a cost-effective and reliable technique.
The results of this study can contribute for a better evaluation of degenerative diseases that affect the elderly population imposing discomfort, pain and lack of quality of life.
The elderly Brazilian population has been increasing every year, according to IBGE (2005). Studies, such as this, are essential for a better understanding of the old population profile in Brazil. These studies will be a milestone for the development of new and more effective public politics, as well as being useful indicators for the areas most in need of financial and human resources.

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