ANALYSIS OF SELECTED ANTHROPOMETRIC PARAMETERS OF ELDERLY WOMEN

ANA MARIA VASILESCU[1], DANA CORINA DESELNICU[2], MIRELA PANTAZI[1], AURA MIHAI[3], MARIANA COSTEA[3], BOGDAN SÂRGHIE[3], IOAN PRADA[4], DESPINA GHERMAN[4], CONSTANTIN ŞTEFAN PETRESCU[5]

[1]*INCDTP - Division Leather and Footwear Research Institute, 93 Ion Minulescu St., sector 3, Bucharest, Romania, icpi@icpi.ro*

[2]*Politehnica University of Bucharest*

[3]*"Gheorghe Asachi" Technical University of Iasi, Faculty of Textile, Leather and Industrial Management*

[4]*"Carol Davila" University of Medicine and Pharmacy, Bucharest, Romania*

[5]*KFP PROD IMPEX SRL*

This study was conducted to establish a set of major causal factors that influence foot pathologies and deformities for the elderly, analyzing variables such as weight and height of subjects. The study included 100 elderly female volunteers weighing between 50 and 112 kg and measuring between 148 and 184 cm in height. The sampling method used was the non-probabilistic one, based on a mixture of Henry's sampling types, using the questionnaire, and testing was conducted using measurement and observation instruments. Subjects participated in biomechanical measurements using AMTI's AccuGait System force platform, performed in Bucharest for a period of three weeks. The results show a strong correlation among the tested variables. Weight proves to be one of the most important causative factors, as there were statistically significant correlations between it and most biomechanical parameters measured. Thus, it can be concluded that as the elderly grow in weight, they undergo significant changes in biomechanical parameters, reflected in foot deformities and pathologies.

Keywords: elderly, anthropometric parameters, weight, height

INTRODUCTION

Walking is a complex motor activity, that is a physiological response to sensory information from the external environment, integrated at all levels of the nervous system.

Gait and postural balance disorders are common in geriatric clinical practice. As with any other aspect of elderly care, the boundary between the deterioration of locomotor functions caused by senescence processes and pathological processes, to which the elderly are most vulnerable by definition, is often difficult to establish. According to the literature, most gait and postural balance disorders are due to identifiable medical causes and are not only physiological consequences of aging (Jahn *et al.*, 2010; Salzman, 2010). Senescence is an independent risk factor for gait and balance postural dysfunctions. The assertion is reinforced by the high prevalence of these disorders in the geriatric population. The importance of the phenomenon results from its association with increased risk of falls, immobilization, increasing dependency and decreased quality of life (Jahn *et al.*, 2010; Stolze *et al.*, 2004).

Gait deficiencies and impaired postural balance are common in the elderly both in the physiological processes of senescence, and as a result of specific diseases. Clinical studies show that 14% of people over 65 have gait disabilities, in the age group up to 80 around 20% of individuals claim difficulties in walking and maintaining balance while

walking, and after the age of 80, the percentage of people with postural and walk abnormalities reaches 50% (Martin and O'Neill, 2004; Sanders *et al.*, 2010).

RESEARCH METHODOLOGY

The study was conceived as a quantitative approach, mainly exploratory and descriptive. The research employed the following methods: biomechanical gait measurement for ground reaction force, the questionnaire-based survey, and observation (Vasilescu *et al*., 2015; Mihai *et al.*, 2016; Gherman *et al.*, 2016, Sarghie *et al.*, 2013, Costea *et al.*, 2014).

Data Collection

The data was collected in Bucharest over a period of three weeks. The ground reaction force was measured using a platform - AMTI´s AccuGait System (www.amti.biz). The respondents were also given a short questionnaire consisting of questions referring to anthropometric and demographic data, mainly enquiring about the respondents' age, height, weight and medical conditions.

Research Sample

The sample was composed of 100 elderly persons, all female. The method used for sampling was the non-probabilistic one, based on a mixture of Henry's types (1990) - convenience, typical cases, critical cases, “snowball”. The female volunteers weighed between 50 and 112 kg and measured between 148 and 184 cm in height.

The participants’ age was a very important criterion in the analysis. The sample structure by age distribution is described in Figure 1. The majority of tested elderly women were aged over 71 (34%), followed by those in the 60-64 age group (27%) and those aged 55-59 (26%). The 65-70 age group consisted in only 13% (Deselnicu *et al.*, 2016).

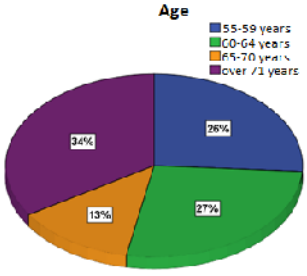

Figure 1. Sample structure by age (Source: SPSS software)

In order to have a more complete characterization of the sample, it was determined that the average height of the subjects was 161.75 cm, the average weight was 73 kg and the average age was 67.

Data Analysis and Interpretation

The sample was divided based on age groups of the elderly females, in order to emphasize the significant differences between them (Table 1).

Table 1. Statistic indicators of the variation of height and weight over age groups

Age groups (years) / Statistic indicators			Height (cm)	Weight (kg)
55-62 years	N	Valid	41	41
		Missing	0	0
	Mean		**161.54**	**71.71**
	Median		163.00	70.00
	Mode		165	62
	Std. Deviation		5.840	9.185
	Minimum		150	56
	Maximum		174	93
63-70 years	N	Valid	26	26
		Missing	0	0
	Mean		**162.19**	**75.92**
	Median		164.50	72.50
	Mode		165	70[a]
	Std. Deviation		6.165	12.709
	Minimum		150	60
	Maximum		173	112
71-87 years	N	Valid	33	33
		Missing	0	0
	Mean		**161.67**	**72.18**
	Median		163.00	69.00
	Mode		163	60[a]
	Std. Deviation		8.049	12.714
	Minimum		148	50
	Maximum		184	110

a. Multiple modes exist. The smallest value is shown

Source: SPSS software

It is seen that the sample is much more homogeneous in terms of height, registering minor variations in relation to age. Mean height for all age groups was placed around 161 cm. The sample is much more heterogeneous with respect to weight (large standard deviation), the largest weight recorded in the 63-70 age group (75.92 kg). The average weight registers a decrease in the oldest age group, so the weight does not increase linearly with age.

The weight distribution can be analyzed in Figure 2.

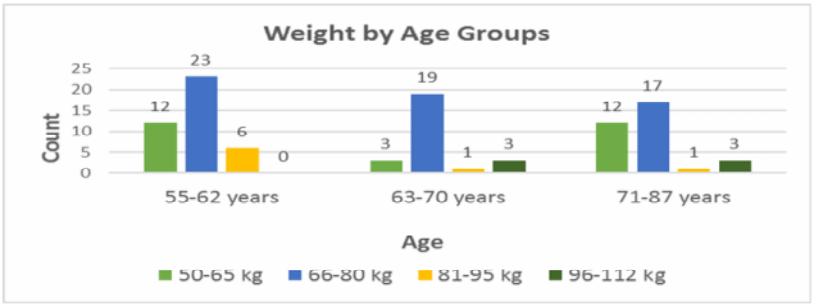

Figure 2. Weight distribution by age groups

Sample structure according to the variables of weight and age in Figure 2 is as follows: in the 55-62 age group, most subjects weigh between 66-80 kg, followed by those weighing between 50-65 kg and then those weighing between 81-95 kg; in the 63-70 age group, most subjects weigh between 66-80 kg, followed by those in the 50-65 kg range, then those weighing between 96-112 kg and then those weighing between 81-95 kg; in the 71-87 age group, most subjects weigh between 66-80 kg, followed by those in the 50-65 kg range, then those weighing between 96-112 kg and then those weighing between 81-95 kg.

Figure 3 illustrates the height distribution over the three age groups:

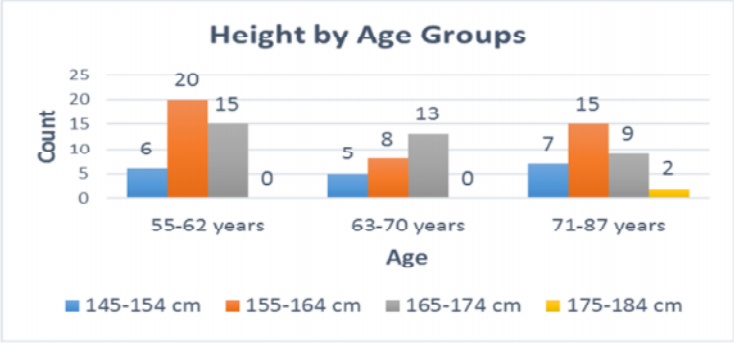

Figure 3. Height distribution by age groups

Height distribution in the three age groups shown in Figure 3 is as follows: in the 55-62 age group, the height of most subjects was between 155-164 cm, followed by those with 165-174 cm and 145-154 cm in height, respectively; in the 63-70 age group, the height of most subjects was between 165-174 cm, followed by those with 155-164 cm and 145-154 cm in height, respectively; in the 71-87 age group, the height of most subjects was between 155-164 cm, followed by those with height between 165-174 cm, then those with 145-154 cm and 175-184 cm in height.

Hypotheses Testing

In order to emphasize the variation of the demographic and anthropometric parameters across the investigated sample, One-Way ANOVA (Analysis of Variance) method was used. The method compares the means of three or more independent groups (in the present case, the three age groups of the investigated sample). One working hypothesis (H_1) was formulated:

H_1: There are statistically significant differences between the three age groups regarding weight.

H_0: There are no differences between the three age groups regarding weight.

In order to test the two hypotheses, the results of the One-Way ANOVA test are presented in Table 4.

Table 4. One-Way ANOVA test results for the variance of weight over age groups

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.761	2	.881	1.505	.227
Within Groups	56.749	97	.585		
Total	58.510	99			

Source: SPSS software

As p=0.227, greater than the confidence level of 0.05 established for this analysis, the alternative hypothesis has to be rejected, therefore the null hypothesis has to be accepted: there are no statistically significant differences between the three age groups of elderly women in terms of weight.

H_1: There are statistically significant differences between the three age groups regarding height.

H_0: There are no differences between the three age groups regarding height.

The results of the One-Way ANOVA to test these hypotheses are presented in Table 5.

Table 5. One-Way ANOVA test results for the variance of height over age group

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.238	2	.119	.201	.818
Within Groups	57.472	97	.592		
Total	57.710	99			

As p=0.818, greater than the significance level of 0.05 established for this analysis, this alternative hypothesis has also to be rejected, therefore the null hypothesis has to be accepted: there are no statistically significant differences between the three age groups of elderly women in terms of height.

CONCLUSIONS

To highlight anthropometric parameter variation in elderly women by age, One-Way ANOVA statistical test was used and no significant differences were found among the three age groups investigated in terms of weight and height.

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