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Health status and socioeconomic factors as determinants of physical activity level in the elderly

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Summary

Background: The aim of our study was to assess the health status and Physical Activity Level (PAL) of the elderly population and determine the role of health status and socioeconomic factors in PAL.

Material/Methods: A total of 84 subjects (65 men and 19 women) participated in this study. These individuals were living independently, and attending rehabilitation centers for the elderly in Thessaloniki, Greece. The mean age of the subjects was 74.4 years (SD 7.9). Data was collected with a special questionnaire regarding health status and PAL, during individual interviews.

Results: The mean PAL value was 1.519, SD 0.115. Significant positive correlation was found between PAL and educational level ($r=0.286$, $p<0.05$). Regarding the relation of illnesses to PAL, one-way ANOVA indicated that individuals under treatment for heart arrhythmia and myocardial infarction, as well as those who had undergone a by-pass operation, had higher PAL values (1.659 ± 0.0649, 1.551 ± 0.093 and 1.613 ± 0.0978, respectively) compared to those not suffering from any of these disorders (1.512 ± 0.112, 1.515 ± 0.118 and 1.508 ± 0.112 respectively, $p<0.05$ for each comparison). Cancer affected PAL negatively.

Conclusions: In conclusion, the elderly spent most of their time carrying out low-intensity activities and did not participate in leisure activities of high or moderate intensity. Educational level was the only socio-economic factor that was correlated to PAL. The positive effect of certain disorders on PAL might be attributed to patients' compliance with physicians' instructions. Further research is necessary.

key words: physical activity level • elderly • health status • socioeconomic status

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BACKGROUND

Regular physical activity can enhance flexibility, muscle strength, and endurance, and can reduce morbidity caused by cardiovascular, cerebrovascular and pulmonary disorders, diabetes, arthritis, osteopenia and cancer of the colon. Regular physical activity can also be beneficial for physical and emotional health, as well as mental well-being [1–5]. The Physical Activity Level (PAL) (ratio of daily metabolic rate to basic metabolic rate) is not associated with body composition in the elderly [6]. A high level of physical activity could improve muscle function and impaired mobility due to increased age [6]. During aging, moderate exercise can be important for stimulating the immune system [7].

In a region of France [8], it was reported that only a very restricted amount of time was provided for physical activity programs in nursing homes. More specifically, only 30%, 11% and 10% of these institutions provide vigorous walking sessions 3 times a week, gymnastics once a week and occasionally motor skill games, respectively. The main reason for the limited provision of physical activity programs was lack of financial support and poor attendance of the elderly. The latter was attributed to pain (20%), fatigue (40%), and lack of interest (40%) [8]. In a Thai study, PAL was lower among the elderly living in a residential home than among those living in a rural community; the respective values ranged from 1.21 to 1.73 and 1.21 to 3.08. The limited physical activity of women living in a residential community leads to obesity compared to women in a rural environment, and may result in high morbidity and poor quality of life in the future [9]. According to other studies, the institutionalized elderly younger than 75 years have more body fat than their non-institutionalized counterparts, possibly due to less physical activity [10]. In addition, PAL has a positive correlation with the body cell mass in the elderly [11]. The aim of the study was to assess the health status and PAL of the elderly population and to determine the role of health status and socioeconomic factors in PAL.

MATERIAL AND METHODS

The sample of our study was chosen with stratified sampling and consisted of 84 subjects (19 women and 65 men) of mean age 74.4 years (SD 7.9). The subjects were living independently, attending rehabilitation centers for the elderly in Thessaloniki, where leisure activities, cultural events and medical care are provided by municipal authorities. Men outnumbered women in our study because mostly men attend these centers. The selection of the sample took place as follows: Thessaloniki was divided into three sections (eastern, western and central). One Rehabilitation Center was chosen from each section and all members of this specific center participated in the study. Data was collected with special questionnaires regarding health status and physical activity during individual interviews [12,13].

Statistical analysis

The tools used for statistical analysis were one-way ANOVA, multiple regression and t-test for independent samples, using SPSS, version 10. Statistical significance was set at $p<0.05$.

RESULTS

Table 1 shows the most frequently mentioned disorders among the elderly. The mean PAL value was 1.519 SD (SD 0.115). 22.6% of the sample was illiterate (21.5% of the men and 26.3% of the women). 73.3% of women were widowed, while 80.0% of men were married. There was a statistically significant negative effect of educational level on PAL ($r=0.286$, $p=0.08$). Education was the only socio-economic factor related to the PAL level. Marital status, income, sex and smoking were not related to PAL (Figure 1). Using the t-test for independent samples, it was found that illiterate people had lower PAL values than did others (Figure 2). Tables 2 shows the mean PAL values with regard to sex and age, income, smoking status, and marital status, respectively.

Multiple regression was used in order to examine the predictability of PAL (dependent factor) with the use of predictor variables, such as sex, age, marital status, income, and education (independent factors). The mul-

Table 1. The most commonly mentioned diseases.

Diseases	Frequency
Anxiety disorder	34.5%
High systolic blood pressure	32.1%
High diastolic blood pressure	17.9%
Arthritis	14.3%
Osteoporosis	13.1%
Myocardial infarction	13.1%
Diabetes mellitus	10.7%
By pass	10.7%
Angina pectoris	9.5%

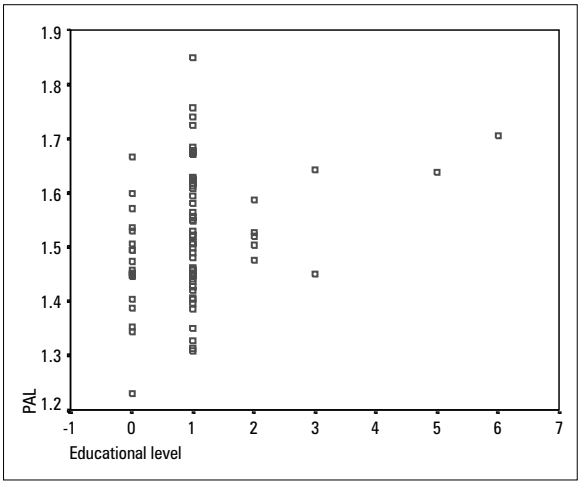

Figure 1. Correlation of PAL values and educational level.

Table 2. Means of PAL in relation to age, sex, income, smoking and marital status.

		PAL
Age	65–75	1.517±0.124
	Above 75	1.507±0.108
Sex	Men	1.513±0.116
	Women	1.541±0.115
Income	Poverty level	1.517±0.115
	Above poverty level	1.521±0.117
Smoking status	Smokers	1.544±0.140
	Non-smokers	1.515±0.110
Marital status	Unmarried	1.575±0.134
	Married	1.529±0.113
	Widowed	1.477±0.106
	Divorced	1.609±0.163

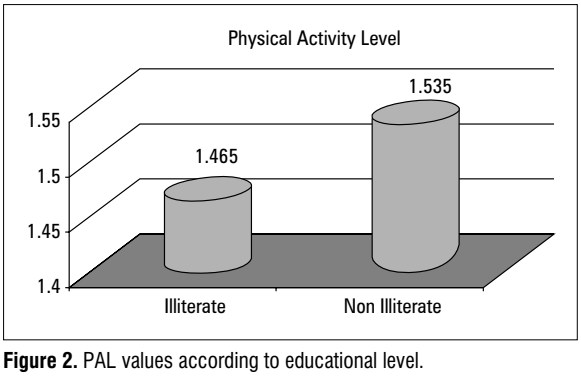

Figure 2. PAL values according to educational level.

tiple R of regression analysis was 0.39, which is significantly different from zero, $F(5,66)=2.4$, $p<0.05$. The 10.1% of the PAL variability was justified by the five independent variables. Of these five factors, only marital status and income contributed significantly to PAL prediction. More specifically, marital status justified 5.5% of the variability ($t=-2.34$, $p<0.05$), and income 4.6% of the variability ($t=-2.14$, $p<0.05$).

Regarding the effect of several disorders on PAL, one-way ANOVA showed that heart arrhythmia, myocardial infarction, and bypass surgery had a positive effect on PAL, while cancer had a negative effect. Several disorders, such as arthritis, cervical syndrome, osteoporosis, hyperthyroidism, chronic bronchitis, chronic back pain, depression, anxiety disorder, diabetes mellitus, high systolic blood pressure, high diastolic blood pressure, angina pectoris, stroke and peripheral vascular disease were not found to be related with PAL values (Table 3).

Discussion

The low PAL value of the subjects in the present study is attributed to their sedentary lifestyle. This finding is in substantial agreement with another study, according to which there was a negative relation between PAL and the amount of time spent on low-intensity activity (lying, sitting, and standing) [14]. Walsh et al. mentioned that 51% of the women reported walking 3.9 times per week

Table 3. PAL means according to disease history.

Diseases	PAL	
	Patients	No patients
Heart arrhythmia	1.660±0.065*	1.513±0.113*
Bypass	1.613±0.098*	1.508±0.112*
Myocardial infarction	1.551±0.093*	1.515±0.118*
Cancer	1.230±0.051*	1.523±0.111*
Peripheral vascular disease	1.530±0.117	1.519±0.116
Angina pectoris	1.590±0.122	1.512±0.112
Stroke	1.564±0.154	1.516±0.112
High systolic blood pressure	1.518±0.099	1.520±0.122
High diastolic blood pressure	1.514±0.113	1.521±0.116
Diabetes mellitus	1.460±0.125	1.527±0.113
Chronic bronchitis	1.581±0.113	1.515±0.115
Chronic back pain	1.557±0.032	1.518±0.117
Cervical syndrome	1.536±0.075	1.519±0.117
Arthritis	1.567±0.109	1.512±0.115
Osteoporosis	1.545±0.093	1.516±0.118
Depression	1.406±0.052	1.521±0.115
Anxiety disorder	1.542±0.121	1.508±0.111
Hyperthyroidism	1.545±0.137	1.519±0.115

*Significant difference between patients and non-patients, $p<0.05$

on average. Gardening was reported by 35%, while swimming and cycling were preferred by 16% and 13% of the sample, respectively. The most common and popular activity among the older women was walking, an activity which, according to these authors, should be encouraged by clinicians [15].

PAL was inversely related to age (from 60 to 90 years) [11]. There is a dispute in opinions whether there is a difference in PAL level between the two sexes. More specifically, one study showed that elder men were more physically active than elder women with respective PAL values 1.65 (SD 0.66) and 1.50 (SD 0.29) [16], whereas another study failed to confirm these observations [17]. Mean PAL was 1.65 (SD 0.14) in the older population, aged 61 years (SD 4), whose body fat was 33% (SD 7) and BMI 27 (SD 5) [14]. PAL has been estimated to be 1.25 to 2.11, and the total energy expenditure was positively related to fat free mass and VO_2max in the elderly [18].

A high proportion of the population in the present study was illiterate, due to the 'awkward' period of wars in Greece during the first half of the 20th century. In another study 3% of the sample were illiterate, while 35% of them had a University degree or had attended postgraduate studies. 42.9% of women were widowed and 88.9% of men were married [19]. In our study, marital status did not affect PAL, while educational status had a positive association with PAL. Thus illiterate individuals had lower PAL values than literate. These results are supported by Walsh et al, who reported that marital status was not associated with walking as exercise, while high school education had a positive effect on walking as exercise [15].

Those older people who suffer from depression had lower PALs than did other subjects, but the differences

were not statistically significant. This finding is in agreement with the suggestion that depression has a negative effect on taking walks for exercise in elder women [15]. Our study demonstrated no statistically significant differences in PAL values between smokers and non-smokers, while another study found non-smokers to have higher PAL levels in comparison with smokers [15]. In older women, increased physical activity may lead to enhanced muscle mass, which is attributed to higher levels of the insulin-like growth factor I [20]. Also, smoking has been associated with lower bone mass density in older women, but there are no differences among men [5]. Physical activity is inversely related to arterial stiffness both in older men and women [21,22]. A six-week exercise program for developing flexibility, muscular strength and endurance had a positive effect on physical and emotional health, as well as on their body image as they perceive it themselves [4]. Strength or resistance training may offset the muscle mass loss that occurs in the elderly [23–25], while aerobic activities such as walking, running and gardening were not effective in this respect [24].

CONCLUSIONS

Our elderly spent most of their time carrying out low-intensity activities and did not participate in leisure activities of high or moderate intensity. The only socio-economic factor which was correlated to PAL, was the educational level. The positive effect of certain disorders on PAL may be attributed to patient compliance with physicians' instructions. Certain physical activity programs focused on illiterate older persons are necessary. Further research is essential.

The population of the world is growing older. It is believed that the number of elderly individuals will have tripled within the next fifty years [26]. It is estimated that by the year 2050 there will be over 50 million individuals over 85 years old US. [27]. Proper information concerning the benefits of exercise in the Third Age and the development of specialized trained staff are essential for organizing physical activity seminars, conferences and sessions focusing on the elderly [8]. The physical and psychological components of functional life in the elderly improved after the implementation of a combined mental and aerobic training program. According to the authors, planning a new training method for the Third Age, which will elevate their personal feeling of satisfaction, is imperative [28]. Social support by friends and family can promote physical activity in older women [29]. Only with appropriate nutrition and physical exercise can quality of life be achieved. 'Adding life to years' is of high significance for the most vulnerable part of our population, the Third Age [30].

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