Cognitive disorders and fitness of the elderly in residential homes in Bydgoszcz

Zaburzenia funkcji poznawczych, a sprawność fizyczna u osób starszych w Domach Pomocy Społecznej w Bydgoszczy

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Streszczenie

Wstęp. Proces starzenia oraz zwiększająca się liczba osób w wieku poprodukcyjnym, stanowi jeden z głównych problemów współczesnego świata. Wraz z postępującym wiekiem pogarsza się zarówno sprawność fizyczna jak i umysłowa. Badania dowodzą, iż istnieje zależność

między funkcjami poznawczymi, a sprawnością seniorów.

Cel. Cel badania stanowiło porównanie sprawności fizycznej z funkcjami poznawczymi wśród mieszkańców z Domu Pomocy Społecznej w Bydgoszczy.

Materiał i metody. Badanie objęło 59 osób (35 kobiet i 24 mężczyzn) w wieku 60-98 lat. Do badania funkcji poznawczych użyto Krótką Skalę Oceny Stanu Psychicznego (Mini-Metal State Examination, MMSE). Do oceny sprawności fizycznej użyto testu Tinetti. Badanych podzielono według a) wieku na grupę 60- 75 i 75+, b) płci.

Wyniki. W badaniach zaobserwowano ujemną korelację między wiekiem, a wynikami testu Tinetti. W całym badaniu wyniki skali MMSE, korelowały dodatnio i umiarkowanie z wynikami testu Tinetti. Wyniki dotyczące różnic ze względu na płeć, były blisko istotności statystycznej, jeśli chodzi o test Tinetti.

Wnioski. Istnieje zależność między wiekiem, a osłabieniem sprawności fizycznej u osób starszych w Domach Pomocy Społecznej w Bydgoszczy. Ryzyko upadków wrasta wraz z wiekiem. Istnieje zależność między zaburzeniami funkcji poznawczych, a sprawnością fizyczną seniorów z Domów Pomocy Społecznej w Bydgoszczy.

Abstract:

Introduction. Process of ageing and the growing number of people in retirement age is one of the main problems of the modern world. Together with advancing age both fitness and mental capacity deteriorate. Research proves that there is dependence between cognitive functions and fitness of the elderly.

Aim. The aim of the study was to compare fitness with cognitive functions among residents of residential home in Bydgoszcz.

Material and methods. 59 people (35 women and 24 men) at the age of 60 to 98 participated in the study. Mini-Mental State Examination (MMSE) was used to assess cognitive functions. Fitness was assessed by means of Tinetti Test. The subjects were divided according to a) age: group 60-75 and 75+ and b) gender.

Results. Negative correlation was observed between age and Tinetti Test results. In the study there was positive and moderate correlation between MMSE scale and Tinetti Test results. In Tinetti Test results regarding differences due to gender were close to statistical significance.

Conclusions. There is a dependence between age and weakening of fitness in the elderly in residential homes in Bydgoszcz. Risk of falls increases with age. There is a dependence between cognitive functions disorders and fitness of the elderly from residential homes in Bydgoszcz.

Key words:
the elderly, geriatrics, cognitive functions

Introduction:
Cognitive functions encompass perception, attention, memory, imagination, problem solving, thinking, and speech [1,2]. From the moment we are born, by means of cognitive functions, we get to know the world, communicate with the external environment, shape our character and personality. Cognitive functions allow us to gain experience, exist and obtain and process information on a daily basis [3]. Unfortunately, with age and the process of ageing decrease of cognitive reserves occurs. Our perception, attention, ability to remember facts deteriorates greatly. Physiological decrease in the pace of processing information in the elderly leads to less interest in current activities and depressed mood. The elderly have the ability to recapture events from the past and at the same time they experience problems with memorising newly learned facts [4]. Changes taking place in brain tissue also lead to weakening in the area of peripheral sensation, proprioception and vibration leading to decrease in fitness [2,5,6,7,8]. Cognitive disorders encompass i.a. Mild Cognitive Impairment. It is connected with memory disorders (anterograde and retrograde amnesia) and disorders involving attention, verbal communication, spatial imagination and executive functions [2,5,9]. Such people notice disorganisation and dysfunctions in everyday life. Deteriorating cognitive functioning lasting more than 6 months may eventually lead to dementia, which is characterised by the following symptoms. Difficulties in learning and recalling information from the past occur together with disorganisation in life, inability to perform instrumental activities of daily living, apathy and constrained communication with other people. The level and amount of the above symptoms occurrence divides dementia into three stages: early (mild dementia), moderate (moderate dementia) and late (severe dementia)[2,5,10].

Medicine tries to find different measures to prevent the process and pharmacists produce more and more new medications and new supplements improving memory appear on the market. Psychologists propose exercises of cognitive functions [11]. Physiotherapists suggest physical

activity, because movement supports both physical and mental health [12].

Therefore, screening tests are essential to control cognitive functions in the elderly and recognize the loss of cognitive functions as early as possible. Among them we distinguish: Clock Drawing Test, The General Practitioner Assessment of Cognition, The 7-Minute Screen, Short Test of Mental Status, Test Your Memory, Six Item Cognitive Impairment Test, The Saint Louis University Mental Status Examination, Montreal Cognitive Assessment, Mini Mental State Examination and others. To assess fitness in geriatrics the following tests are most frequently used: Activities of Daily Living, Barthel Scale, Timed " Up and Go" Test, Tinetti Test [2,5,13,14,15,16,17,18].

The aim:

The aim of the study was to examine the dependence between cognitive functioning and fitness in people over the age of 60 living in residential homes in Bydgoszcz.
Furthermore, the study checked whether age and gender differentiates cognitive and physical functioning of the elderly.

Material and methods:

59 residents of residential homes "Jesień Życia" and "Promień Życia" in Bydgoszcz participated in the study (24 men, M=72.37). Group characteristics is shown in Tables 1 and 2.

Table 1. Age characteristics / gender

Age	MEN	WOMEN	AMOUNT
60-75	15	14	29
75+	9	21	30
AMOUNT	24	35	59

Table 2. Age characteristics

The eldest participant		The youngest participant		Mean age	
men	women	men	women	men	women
94	98	60	63	73	79

Mini-Mental State Examination (MMSE) was used to assess cognitive functions and fitness was assessed by means of Tinetti Test. The study was carried out among residents of residential homes in Bydgoszcz from 1 June to 20 June 2016. The tests were made in kinesitherapy room. The subjects, who entered the room, were informed about the character of the study and gave written consent to take part in it. Next, cognitive functions were assessed by means of MMSE scale and then Tinetti test was used to assess fitness. The subjects were not informed about the number of point gained in a given part of a test. It was ensured that questions were not passed between the subjects. Every resident had an assigned time of entering the room. Therefore, the next subject was asked to enter the room directly after the previous subject had left the room.

During the tests the subjects were questioned about their education and length of stay in the facility. However, majority of the charges were unable to define the length of stay in the residential home. It was also difficult to obtain information about education of particular people. Exclusion criteria were: age below 60, severe sight disorders (cataract), inability to move and severe stage of dementia. Eventually 2 patients were excluded.

Analysis of the results was made by means of STATISTICA 12.5. The dependence was tested using Mann Whitney Test and R. Spearman's correlation.

Results:

To determine dependence between cognitive disorders and fitness among the subjects, the results of tests were compared.

For the average subject at the age of 76 in the MMSE test the average equals 23 points (M=22.59;SD=5.82). MMSE results are shown in Chart 1.

Chart 1. Results of Mini Mental State Examination (MMSE) - scores.
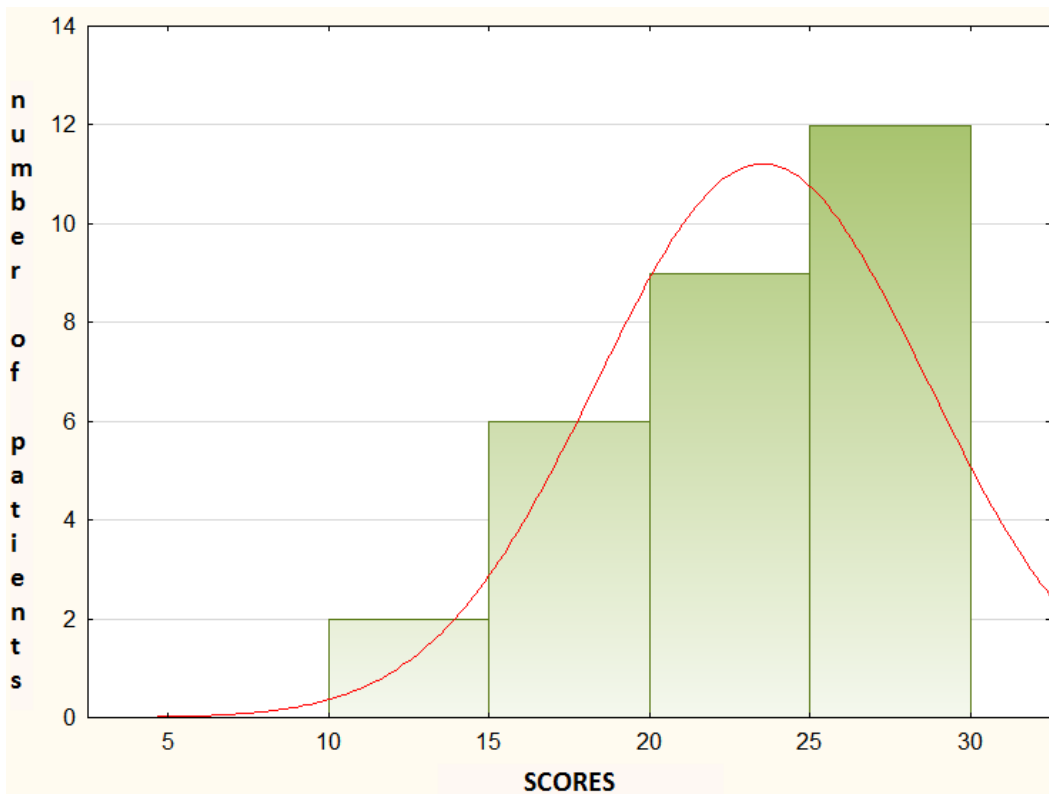
Chart 2. Results of MMSE for age group 60-75
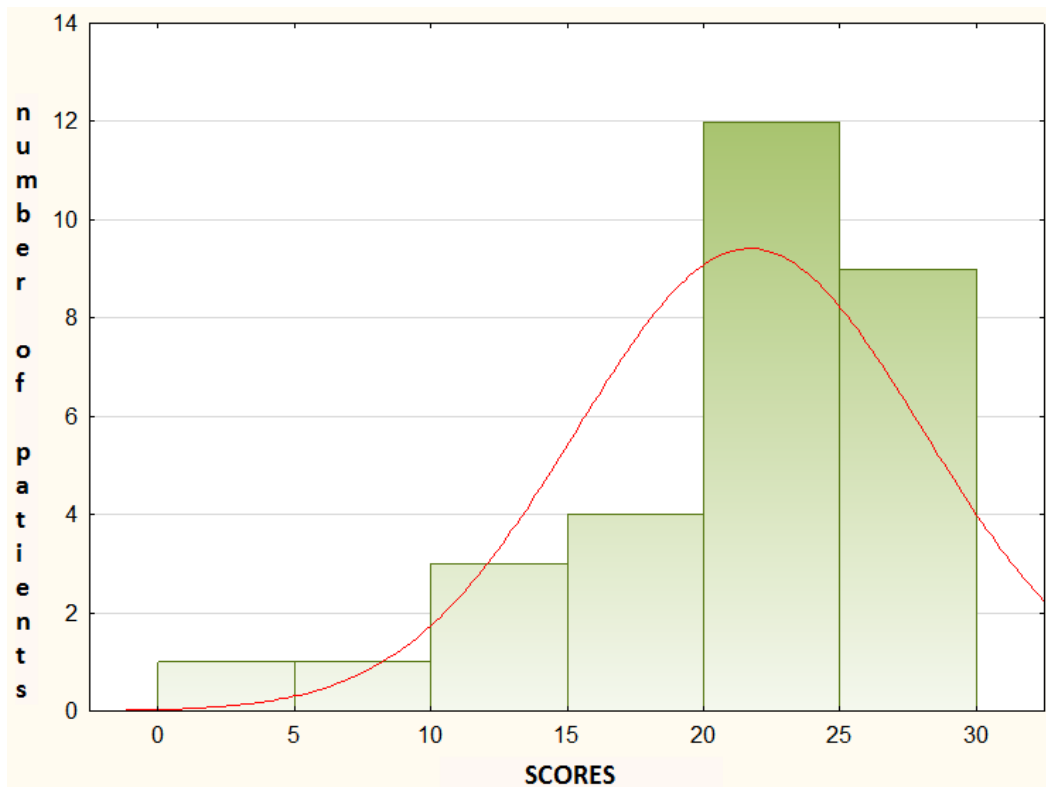
Chart 3. Results of MMSE for age group 75+

In the studied group no statistically significant differences can be observed between age subgroup 60-75 (Chart 2) and subgroup 75+ (Chart 3) within the scope of the whole MMSE scale or its particular parts. There is lack of correlation between age and MMSE results.

Average result in the whole group of subjects of Tinetti Test reaches 20 (M=20.10;SD=6.41). Minimal amount of points in the test is 1, whereas the highest 28. The results of Tinetti Test are shown in Chart 4. The risk of falls is presented in Table 3.

Chart 4. Results of Tinetti Test

Table 3. Risk of falls.

Scores of Tinetti Test	Risk of falls	Number of participants
28-24	low	**22**
23-19	moderate	**15**
≤ 18	high	**22**

Chart 5. Results of Tinetti Test for age group 60-75.

Chart 6. Results of Tinetti Test for age group 75 +
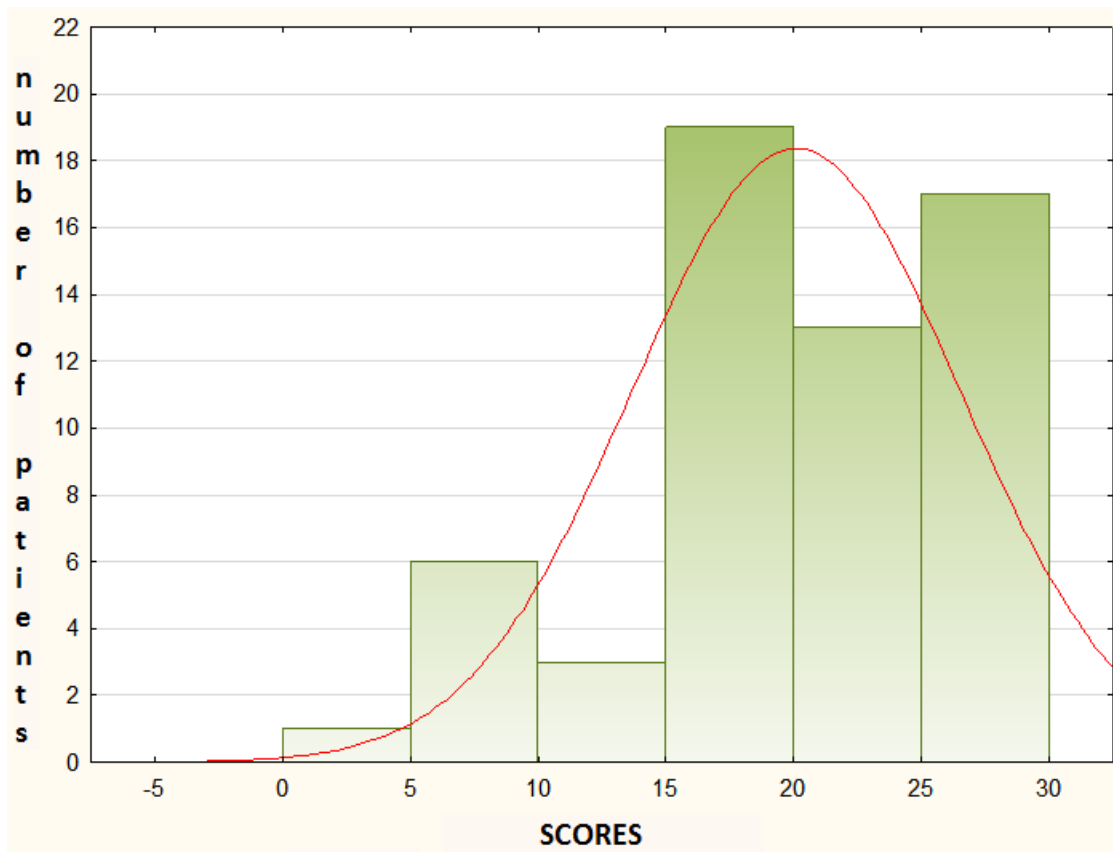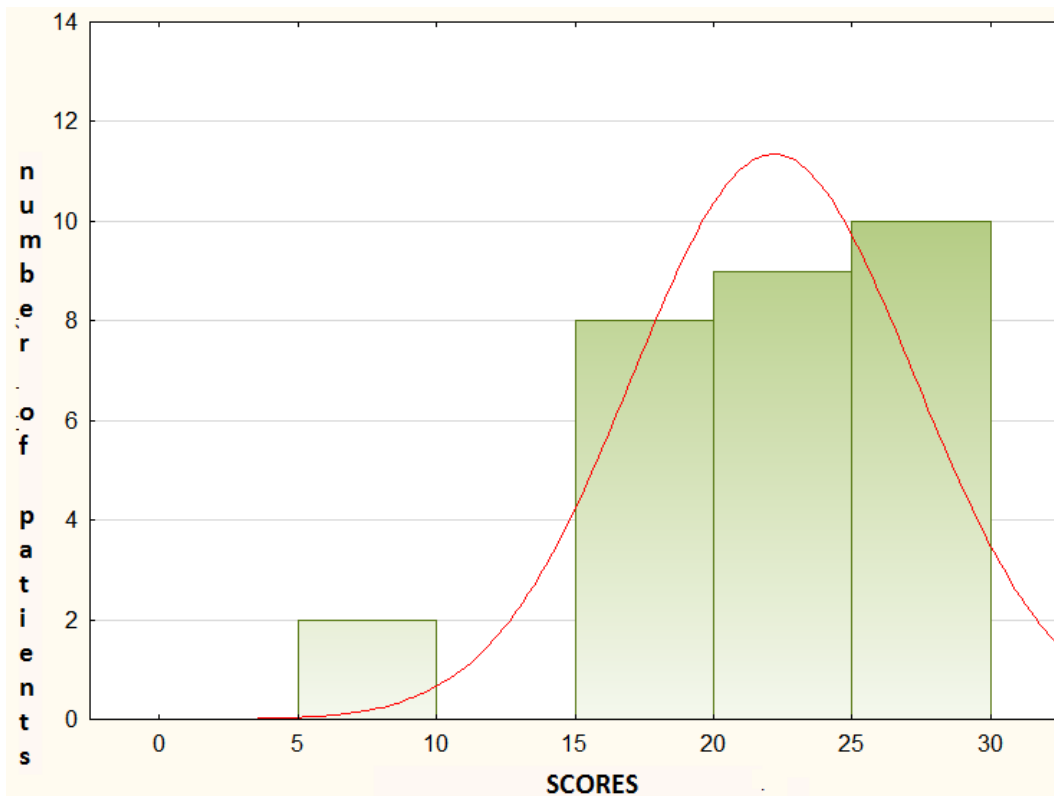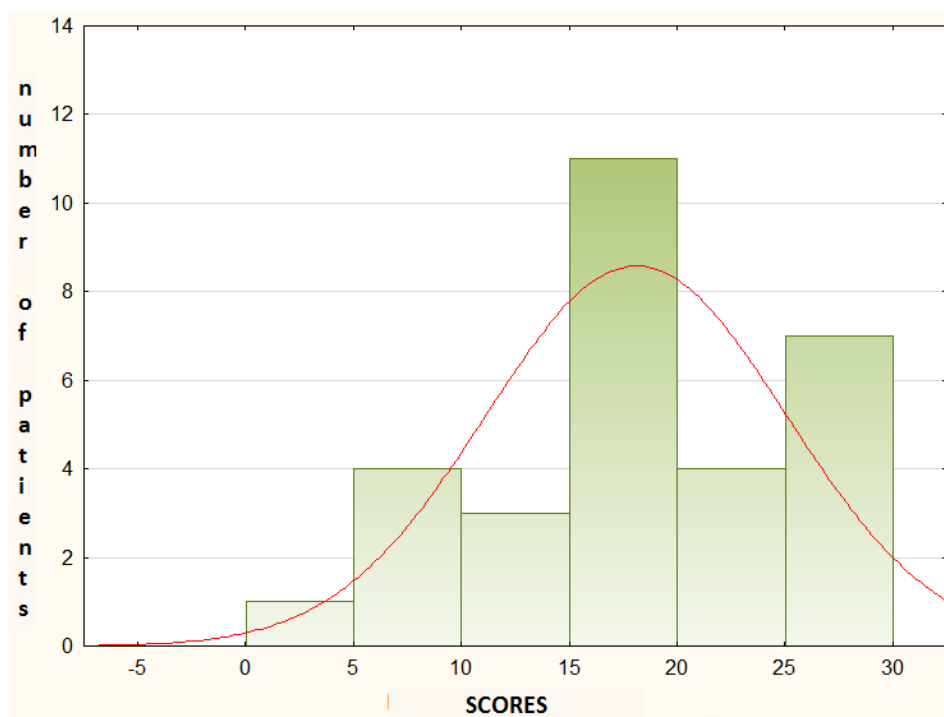
Table 4. Results of Tinetti Test for age groups.

	Age group 60-75		Age group 75+		Z	p
	M	**SD**	**M**	**SD**		
Tinetti balance	11,97	2,80	9,77	3,73	**2,28**	**0,02**
Tinetti gait	10,20	2,80	8,30	3,83	**2,28**	**0,02**
Tinetti total score	22,17	5,10	18,10	6,97	**2,34**	**0,02**

In the studied group of the elderly, there were statistically significant differences between age subgroup 60-75 (Chart 5) and subgroup 75+ (Chart 6) within the scope of Tinetti Test (Z=2.34; p=0.02) and its subscales: balance - (Z=2.28; p=0.02) and gait (Z=2.28; p=0.02). These results are shown in Table 4. The obtained data shows that people at the age 75+ get worse results in the gait and balance test than people from the age group 60-75.

Table 5. Correlations between age and Tinetti Test results.

	Tinetti balance	Tinetti gait	Tinetti total score
Age	**-0,380****	**-0,323***	**-0,380****

(*) p<0.05 (**) p<0.01

A negative correlation between age and a general result in Tinetti Test (r=-0,380; p<0,01) and its subscales - balance (r=-0.380; p<0.01) and gait (r=-0.323; p<0.05) can be observed among the subjects. It is shown in Table 5. It means that the older the resident of residential home, the worse is their fitness and thereby higher risk of falls.

Table 6. MMSE results according to gender.

	Women		Men		Z	p
	M	**SD**	**M**	**SD**		
Orientation	7,43	2,59	8,00	2,70	-1,14	0,25
Registration	2,80	0,63	2,88	0,34	0,03	0,99
Attention and calculation	2,43	1,94	2,50	2,02	-0,22	0,83
Recall	1,91	1,12	2,00	1,06	-0,24	0,81
Language	6,74	1,29	6,92	1,50	-0,83	0,41
Complex commands	0,94	0,24	1,00	0,00	-1,16	0,25
MMSE - total score	22,09	5,73	23,33	5,60	-1,84	0,31

In Table 6, MMSE results and its particular sub-tests are shown and they are compared to gender. In the tested group of the elderly there were no statistically significant differences between men and women in terms of cognitive functions tested by MMSE scale and Tinetti Test functional assessment.

DISCUSSION

The ageing of organism extensively leads to deterioration of fitness. In research carried out at the University in Białystok, where 80 participants over the age of 60 were qualified (60 W, 20M), the mean age was 75 (M=75.2; SD= 6.63) and it was not different in relation to gender (K= 75.2, M= 75.0 lat).

In MMSE scale the average result was 27 points (M= 27.0; SD= 1.28). The average for women and men were 26.85 points and 27.05 points respectively. No statistical differences referring to gender were observed. In addition, majority of patients obtained points within the scope of 26-27 points [19].

Similar results were obtained in the study carried out among the residents of residential homes

"Promień Życia" and "Jesień Życia". No significant dependence between gender and points gathered in MMSE scale was observed. The average amount of points was lower and it equalled 22 (M= 22.29; SD= 5.82). The average for gender was W= 22.09; M=23.33.

As authors of the article state, falls regard 45% of elderly residents of residential homes. In the studied group that consisted of 102 elderly residents of residential homes (67 W, 35 M), at the age of 65-96 (M=76,2), 69% reported that they experience falls. 18% underlined that this happens once a year and only 4% admitted that they fell at least once a month. More than 21% of them stated that they are afraid of the next fall [20].
These statistics are comparable to the results obtained in the studied group within the scope of low risk of falls (37.30%), people prone to falls (25.4%), and also people with high risk of falls (37,3%).

Also, other study carried out among 50 patients of coronary care unit at the age over 60 (25 W, 25 M) showed that between the age of 61 and 70 the subjects experienced at least one fall. Over the age of 70, the falls were multiple [21].
These statistics are comparable to the results obtained in the studied group within the scope of low risk of falls (37.30%), people prone to falls (25.4%), and also people with high risk of falls (37.3%).
It was demonstrated by the negative correlation in the above study. The more advanced the age of the subject, the higher the risk of falls.

Tinetti (r=-0.380; p<0.01), balance (r=- 0.380; p<0.01) , gait (r=-0.323; p<0.05).

The test regarding cognitive functions depending on physical activity. Interesting is the fact that, only aerobic training led to the increase of grey and white matter amount in the brain [22].
Research done by Flanker on 179 healthy people (M= 66 years) showed, that greater physical capacity developed by aerobic workout correlates with higher accuracy coefficient relating to switching attention ability [23].
Referring to more similar study, carried out on 60 people over the age of 60 -80 (48 W, 17 M), where dependence between functional efficiency measured by MMSE and fitness assessed with Short Physical Performance Battery (SPPB), Timed " Up and Go" Test and Dynamic Gait Index. The results obtained in the scale of cognitive functions showed dependence to tests checking physical abilities [24].
The results prove that higher result in MMSE scale correlates with shorter time in " Up and

Go" Test and Dynamic Gait Index.

Differences occurred also in functional efficiency between people with cognitive disorders and the subjects not suffering from such disorders. The group with weak results needed more time to do functional tests [25-30].

In the studies carried out on residents of residential homes no statistically significant dependence between cognitive disorders and deterioration of fitness was observed [20]. The study carried out on residents of residential homes in Bydgoszcz revealed that there is a positive correlation between MMSE scale and Tinetti Test results (r= 0.0331; p< 0.01).

More tests measuring cognitive functions and fitness should be done to accurately verify if a given correlation does not occur.

Conclusion:

To answer what has been hypothesized, the following statements can be concluded from the study:

1. Along with going through the following phases of ageing cognitive functions deteriorate, however there are no differences observed in disorder progress between women and men.

2. Ageing leads to higher risk of falls by deteriorating balance and gait abilities in the elderly.

3. There is a correlation between fitness and progress of cognitive disorders in the elderly living in residential homes in Bydgoszcz.

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