

Functional ability of elderly patients after cardiac surgery

(Sprawność funkcjonalna pacjentów w starszym wieku po przebytych zabiegach kardiologicznych)

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Abstract – Introduction. Aging is a physiological stage of biological, psychological, and social change. Meeting the needs and supporting the independence of older people improves their daily functioning and quality of life. Cardiovascular diseases and their treatment methods disturb normal human functioning in all spheres.

Aim of the study. The aim of the study was to assess the functional needs, performance and the relationship between socio-demographic factors of elderly patients who underwent coronary artery bypass grafting.

Materials and methods. The study included a group of 130 patients treated in the Department of Cardiac, Vascular and Transplantation at the John Paul II Specialist Hospital in Krakow. The study used the Care Dependency Scale (CDS) Questionnaire, the Aged Daily Activity Scale (ADL), the Lawton Aggregate Action Scale (IADL), the Cognitive Functional Impairment Test (MMSE), and the authors' own questionnaire. The data obtained was subjected to statistical analysis using the PQStat statistical package.

Results. Functional efficacy of patients after coronary artery bypass graft was defined as moderately dependent. The average length of illness was 9 years. In 55 patients (58%), the presence of the disease in the family was confirmed. The average score obtained by CDS respondents was 47 points, which means that the majority of respondents are people with an average level of dependency on care and ability to meet needs. Studies have shown that men with coronary heart disease after CABG require caregivers to a much greater extent than women.

Conclusions. Ischemic heart disease largely prevented patients from daily activities. Studies have shown that age, sex and co-occurrence of other diseases are affected by the functional efficiency of basic and complex daily activities and the level of dependence on others to meet their own needs. Dependence on helping others in meeting their needs increased with age.

Key words – functional ability, coronary artery bypass, coronary heart disease, elderly people

Streszczenie – Wstęp. Starzenie się jest fizjologicznym etapem przemian biologicznych, psychologicznych i społecznych. Zaspokojenie potrzeb i wspieranie samodzielności osób w starszym wieku poprawia jego codzienne funkcjonowanie oraz jakość życia. Choroby układu sercowo-naczyniowego i metody ich leczenia zaburzają normalne funkcjonowanie człowieka we wszystkich sferach.

Cel pracy. Celem pracy była ocena potrzeb, sprawności funkcjonalnej oraz związku między zmiennymi demograficzno-społecznymi wśród pacjentów w starszym wieku po przebytych zabiegach pomostowania aortalno-wieńcowego.

Materiał i metody. Badaniem objęto grupę 130 pacjentów leczonych w oddziale Chirurgii Serca, Naczyń i Transplantologii Krakowskiego Szpitala Specjalistycznego im. Jana Pawła w Krakowie. W badaniu wykorzystano: Kwestionariusz Care Dependency Scale (CDS), Skalę Aktywności Dnia Codziennego wg Katza (ADL), Skalę Czynności Złożonych wg Lawtona (IADL), Test Upośledzenia Funkcji Poznawczych (MMSE) oraz kwestionariusz autorski. Uzyskane dane poddano analizie statystycznej wykorzystując pakiet statystyczny PQStat.

Wyniki. Sprawność funkcjonalna pacjentów po zabiegu pomostowania aortalno-wieńcowego określony był jako umiarkowanie niesamodzielny. Średnia długość choroby wyniosła 9 lat. W przypadku 55 pacjentów (58%), potwierdziło się występowanie choroby w rodzinie. Średni wynik uzyskany przez ankietowanych w skali CDS wynosił 47 punktów, co oznacza, że większość badanych to osoby o średnim poziomie zależności od opieki i możliwości realizacji potrzeb. Badania wykazały, że mężczyźni z chorobą niedokrwienną serca po zabiegu CABG wymagają opieki opiekunów w zdecydowanie większym stopniu niż kobiety.

Wnioski. Choroba niedokrwienna serca w znacznym stopniu uniemożliwiała pacjentom codzienne funkcjonowanie. Badania wykazały, że na sprawność funkcjonalną w zakresie podstawowych i złożonych czynności dnia codziennego i poziom zależności od osób trzecich w realizacji potrzeb własnych ma wpływ wiek, płeć oraz współwystępowanie innych chorób. Zależność od pomocy innych w realizacji potrzeb zwiększała się wraz z wiekiem.

Słowa kluczowe – stan funkcjonalny, pomostowanie aortalno-wieńcowe, choroba niedokrwienna serca, ludzie starsi.

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I. INTRODUCTION

Ageing is a physiological stage of biological, psychological and social changes. Providing for the elderly people's needs and encouraging their independence is essential to improve their daily living and quality of life. The old age involves a gradual decrease in functional ability and a higher susceptibility to chronic diseases. Frequent chronic diseases account for functional disorders of the whole organism and dysfunctions in the biological sphere and, in consequence, affect patients' mental health and their social life [1,2].

Cardiovascular diseases are the main health problem in developing countries including Poland [3,4]. Nowadays the most frequent disease of cardiovascular system, which is also the most common reason of premature deaths in adults, is coronary heart disease (CHD) [5,6,7]. The morbidity rate of CHD is still growing and it has already been named the 20th century pandemic. For many years it has been the major cause of deaths in Europe and the third one worldwide just after infectious diseases and cancer [3,4]. Coronary heart disease (CHD) is a symptom complex caused by a disproportion between the amount of oxygen which the heart muscle needs and the oxygen supply [8,9,10,11]. Apart from pharmacological treatment, CHD patients may

have a Coronary Artery Bypass Graft (CABG), commonly known as bypass, implanted. The main purpose of this surgery is to supply blood to the areas of heart muscle which do not get enough oxygen because of narrowed walls of coronary arteries [3,12].

The aim of the study was to assess the functional needs, performance and the relationship between socio-demographic factors of elderly patients who underwent CABG surgery.

II. MATERIAL AND METHODS

The study was carried out in the group of 95 patients aged 65 or more who underwent CABG treatment in the Cardiovascular Surgery and Transplantology department of John Paul II Specialist Hospital in Krakow (Oddział Chirurgii Serca, Naczyń i Transplantologii Krakowskiego Szpitala Specjalistycznego im. Jana Pawła II). The study was conducted between 14 March and 30 April 2016. Participation in the study was entirely voluntary and anonymous. The criteria for patients taking part in the study included: 4th day after coronary artery bypass grafting, elective surgery, the first cardiac bypass surgery and lack of perception dysfunctions (the score of ≥ 27 on MMSE scale).

The study was carried out with the application of a diagnostic poll method. To collect the data the following questionnaires were used: Care Dependency Scale (CDS), Katz Activities of Daily Living Scale (ADL), Lawton Instrumental Activities of Daily Living Scale (IADL), Mini-Mental State Examination and a questionnaire designed by the authors.

Statistical methods

Statistical analysis was carried out by means of PQStat statistical package. The level of statistical significance was set at $p < 0.05$. For variables with normal distribution, T-student test or univariate analysis of ANOVA variance were applied to determine the relation between quantity variables within independent groups, whereas appropriate post-hoc tests were used to examine the relation between particular groups. For variables which did not meet the assumption of normal distribution nonparametric Mann-Whitney U test was used to examine the differences between two independent groups. Nonparametric Kruskal-Wallis test was applied in the case of a higher number of independent groups. To assess the potency and direction of the relation between particular quantity variables r-Pearson correlation coefficient was used (for variables with normal distribution) and Rho Spearman rank correlation coefficient (for variables with irregular distribution) accompanied by appropriate significance tests.

III. RESULTS

As many as 35 women (37%) and 60 men (63%) took part in the study. Their age ranged from 66 to 92. The average age of the research subjects was 74. As far as education is concerned 17 people (18%) reported higher education (22%), 21 people (22%) high school and the same number elementary education, whereas as many as 36 people (38%) had vocational education. Majority of the group examined lived in the city (55%). More than a half reported to be married (53%). In the group examined, the average duration of coronary heart disease (CHD) was 9 years. The maximum duration reported was 25 years. In 55 cases (58%), the incidence of CHD in the family was confirmed. Taking into account the incidence of intercurrent diseases, as many as 53 patients (56%) suffered also from arterial hypertension. 40 patients (42%) had diabetes and 38 patients (40%) hypercholesterolemia.

As many as 24 patients (25%) in the examined group declared that prior to their surgery the disease definitely prevented them from following their everyday routine. Another group of 36 patients (38%) claimed that the disease had a significant influence on their everyday routine.

Based on the data provided by the respondents, ADL scale indicator was calculated presenting patients' functional ability. In the examined group 34 patients (36%) proved to be fully fit and they did not require assistance. Another group of 37 patients (39%) presented a moderate level of independence. The smallest group included those 24 patients (25%) who were entirely helpless and dependent on their caregivers in basic activities of daily living.

Functional ability in patients' instrumental activities of daily living ranged as follows: in 37 patients (39%) a significant incapacity was observed, 48 patients (50%) reported moderate incapacity and 10 patients (11%) were found to be fully independent.

Statistical analysis of both sociodemographic data and the scores on ADL and IADL scale proved that there is a significant influence of a few variables (e.g. age, gender, education) on elderly patients' functional ability in basic and instrumental activities of daily living. The research proved a tendency for an age-related decline in basic and instrumental activities of daily living (Table 1).

Table 1. Correlation between the age and functional ability on ADL and IADL scale

Variable	Scales	R	T-test	p-value
Age	ADL scale	-0.299	-3.027	0,003*
	IADL scale	-0.455	-4.924	<0,001*

R - Spearman's rank correlation coefficient; T - T-test correlation coefficient; *statistically significant p-value

Statistical analyses confirm the existence of statistically significant differences in the level of functional ability between men and women. The scores on ADL and IADL scales show that male CHD patients who underwent CABG surgery are definitely more likely to require caregivers' assistance than women (Table 2).

Table 2. Relation between gender and the scores on ADL and IADL scale

Variable	Gender	AM	U test	p-value
ADL scale	Women	4.6	653.5	0.001*
	Men	3.2		
IADL scale	Women	19.9	672.5	0.003*
	Men	16.7		

AM. - arithmetic mean; U-test – Mann-Whitney U test; * statistically significant p-value

Statistically significant differences were found in the level of functional ability on IADL scale in patients with various levels of education. The results show that CHD patients with higher education need much less caregivers' assistance in instrumental activities of daily living than people with elementary or vocational education. No relation has been found between the level of education and the functional ability of the research subjects in basic activities of daily living (Table 3).

Table 3. The results of statistical analysis of relation between education and the scores on ADL and IADL scale

Variable	Education	AM	F-test	p-value
ADL scale	Higher	4.2	2.183	0.095
	High school	4.5		
	Vocational	3.3		
	Elementary	3.2		
IADL scale	Higher	20.8	3.564	0.017*
	High school	18.8		
	Vocational	16.7		
	Elementary	16.6		

AM.- arithmetic mean; F-test – Fisher-Snedecor test; * statistical significant p-value

Statistical analyses confirmed the relation between marital status and patients' functional ability in instrumental activities of daily living. Widows and widowers were much more likely to lack self-reliance in instrumental activities of daily living than married or single people. No relation was found between the scores on ADL scale and patients' marital status (Table 4).

Table 4. Relation between marital status and functional ability

Variable	Marital status	AM	H-test	p-value
ADL scale	Single	4	0.363	0.834
	Married	3.7		
	Widowed	3.6		
IADL scale	Single	20.3	6.515	0.038*
	Married	18.5		
	Widowed	16.4		

AM.- arithmetic mean; H- test – Kruskal-Wallis H test; * statistically significant p-value

Statistical analysis found no relation between the place of residence and patients' functional ability in basic and instrumental activities of daily living.

The average score obtained by research subjects on Care Dependency Scale was 47 points (with a standard deviation of 18 points), which means that most of the patients present an average level of care dependency and capacity to satisfy their needs. The lowest score on Care Dependency Scale was 16 points (which means a low level of independence) and the highest score was 75 points (which means a high level of independence). Among the research subjects as many as 43 patients turned out to be highly dependent on caregivers' help, 16 patients showed a moderate level of care dependency, whereas 16 patients were classified on the lowest level of care dependency.

Statistical analyses proved that factors such as age and gender have a significant influence on elderly patients' capacity to satisfy their needs. The level of care independence is decreasing with age. The study proves that male CHD patients need caregivers' help and assistance to a much higher degree than female patients. No relation was found between the level of education, place of residence or marital status and self-reliability in satisfying one's needs (Table 5).

Statistical analyses confirmed that the disease duration has a significant influence on the level of functional ability in activities of daily living (score on ADL scale). The long-

er the disease duration, the lower functional ability of CHD patients. On the other hand, no relation was found between the level of functional ability in instrumental activities of daily living (score on ADL scale) and the degree of incapacity to satisfy one's needs (score on CDS scale) (Table 6).

Table 5. Relation between sociodemographic data and the scores on CDS scale

Variable	Variable	R	T-test	p-value
CDS scale	Age	-0.42	-4.464	<0.001*
Variable	Gender	AM	U test	p-value
CDS scale	Women	54.2	687.5	0.005*
	Men	43.2		
Variable	Education	AM	H-test	p-value
CDS scale	Higher	54.9	7.366	0.061
	High school	52		
	Vocational	43.9		
	Elementary	42		
Variable	Place of residence	AM	F-test	p-value
CDS scale	Country	44.7	1.361	0.261
	city with the population below 50,000	46.9		
	city with the population over 50,000	52.2		
Variable	Marital status	AM	F-test	p-value
CDS scale	Single	52.1	1.471	0.235
	Married	49.1		
	Widowed	43.4		

AM.- arithmetic mean; * statistically significant p-value; R - Spearman's rank correlation coefficient; T - T-test correlation coefficient ; U-test – Mann-Whitney U test; H- test – Kruskal-Wallis H test; F-test – Fisher-Snedecor test;

Table 6. Relation between the length of the disease, functional ability, cognitive disorders and the level of independence

Variable	Variable	R	T-test	P-value
Length of disease	ADL scale	-0.232	-2.064	0.042*
	IADL scale	-0.216	-1.919	0.059
	CDS scale	-0.222	-1.976	0.052

R - Spearman's rank correlation coefficient; T - T-test correlation coefficient * statistically significant p-value

IV. DISCUSSION

Nowadays, Coronary Artery Bypass Grafting (CABG) is the most common cardiac surgery in Poland. The number of heart surgeries carried out on patients aged 75 or more is continuously increasing and these patients frequently suffer from intercurrent diseases. Such surgeries impose a severe physical and mental strain on patients. Post-operative care of elderly patients requires from the whole therapeutic team a lot of cooperation, attention, watchfulness and a detailed analysis and control of test results and hemodynamic parameters. Proper post-operative care contributes to boosting treatment results and speeds up patients' recovery and return to independence [13,14,15,16].

Patients with cardiovascular diseases in the medical history of their families are more vulnerable to coronary heart disease. In the authors' own studies the incidence of cardiovascular diseases in patients' families was confirmed in 58% of patients. Similar results were obtained in the research carried out by Jurkiewicz et al., in which cardiovascular diseases in the medical history of patients' families were reported in 54.1% of patients and also in the research conducted by Zwoliński et al. where positive medical history was confirmed in the group of 41.5% of CHD patients. In the research carried out in the Netherlands 47.1 to 60% of the research subjects reported cardiovascular diseases in their families [14,17,18].

EUROASPIRE III survey carried out in 2006-2007 in 22 European countries dealt with the problem of the incidence of modifiable risk factors of cardiovascular diseases and it showed that among health problems which tend to coincide with coronary heart disease the most frequent ones are lipid disorders (51% in EUROASPIRE III and 40% in the authors' own research) and arterial hypertension (56% both in EUROASPIRE III survey and in the authors' own research). This idea was also confirmed in the research conducted by Jurkiewicz et al., which prove that in the case of

coronary heart disease the most frequent intercurrent diseases are lipid disorders (68,9% of the research subjects) and arterial hypertension (57,4% of the research subjects) [14,19].

In the authors' own research the level of functional ability of elderly patients who underwent coronary artery bypass grafting was defined as moderate dependence according to Katz ADL scale and Lawton IADL scale. The relation was found between the patients' age and the scores on ADL, IADL and CDS scale. It was proved that, as they grow older, patients are becoming more and more dependent on care provided by other people and it is more and more difficult for them to satisfy their needs and cope with activities of daily living. Similar relation is presented by other authors who carried out research in the group of patients aged 60 or more suffering from mental disorders [1]. The results resemble the ones obtained in the research carried out in 2003 in 11 German hospitals in a group of patients aged 60 or more. The research proved that most elderly patients were independent as far as satisfying their daily needs was concerned, however, their need for care and dependence on other people were increasing with age. Patients aged 80 or more needed more help in satisfying their needs than younger patients [20]. The research conducted by Muszalik et al. in Nursing Homes and Long-term Care Facilities show a significant decrease in self-reliance in patients turning 80, especially the ones suffering from chronic somatic diseases [21].

V. CONCLUSIONS

- Coronary heart disease has a significant impact on patients' daily living and makes it harder for them to follow their daily routine. Functional ability of elderly patients who underwent coronary artery bypass grafting was defined as moderately dependent according to ADL and IADL scales.
- The level of care dependency is high in elderly patients. The highest number of patients had problems with controlling physiological needs, mobility, taking care of personal hygiene, activities of daily living and organizing outdoor recreational activities.
- There are many factors responsible for the decline in the level of functional ability both in activities of daily living and instrumental activities of daily living and the decrease in the level of independence in satisfying one's needs. These factors include, among others: age, gender and the incidence of intercurrent diseases.

- Proper post-operative care after cardiac surgery contributes to a quicker recovery and patients' return to independence.

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