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The characteristics of impaired functions and life limitations of disabled people due to coronary heart disease

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ABSTRACT

The article presents the characteristics of the impaired functions and life limitations of disabled individuals due to coronary heart disease, considering the clinical data, the disease stages, and the disability severity. It was revealed that the largest share in the structure of impaired functions was made up by the impaired functions of the cardiovascular neuromuscular, movement-related (statodynamic), endocrine systems and metabolism and life limitations of I, II and III degrees related to self-care, movement and labor activity.

Keywords: *coronary heart disease, disability, dysfunction, impaired function, life limitations*

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INTRODUCTION

Diseases of the circulatory system are the leading cause of morbidity, disability, and death in the world.[1,3] According to the Federal State Statistics Service, 21.4% of cardiovascular diseases are caused by the coronary heart disease.[9] It accounts for 48.1% of total mortality owing to the diseases of the circulatory system.[3,9] The incidence of the coronary heart disease increases with age; it equals to 15% among women aged 65–74 and 20% among men.[2,9] The increase in the incidence of the coronary heart disease is observed in advanced economies due to an increase in life expectancy.[4,6] In the structure of disability, coronary heart disease is ranked first among the circulatory diseases.[5,7,8] This research is the study of body dysfunctions and limitations, considering its severity among the disabled people due to the coronary heart disease, and the effectiveness of the carried out rehabilitation measures. It was conducted to assess the severity of impaired functions, and the limitations of disabled people with the coronary heart disease.

MATERIALS AND METHODS

In the course of processing and analyzing data, a primary database was loaded into the R-environment [the environment for statistic data analysis (https://www.z-progict.org)]. By means of R-scripts, a working database with the corresponding variables and indicators was created (248 lines and 120 columns). For quantitative variables statistics was used (the mean and the median). For the comparison of two groups with numerical variables, the non-parametric Mann-Whitney test (U-test) and Spearman's rank correlation coefficient were used. To compare categorical data, the x^2 statistic was calculated. For testing statistical hypotheses, the significance level equaled to 0.05 was taken.

RESEARCH RESULTS

The study found out that the medical and social characteristics of disabled individuals due to coronary heart disease were as follows: men accounted for 62% and women made up 38% of cases. About 87% were over 60 years of age, 62% had higher education, and 73% had white collar jobs. Around 35.9% were overweight (obesity of II and III degrees), 61% suffered acute heart attack (9.7% had repeated heart attack). The percentage of men who had AMI was higher (69.5%) than women (30.5%), $p = 0.002$. The proportion of transmural AMI (77.9%) is higher among men than among women (22.1%), $p = 0.064$. The majority was represented by disabled people of group III (73%), and group II made up 26%. The largest proportion was accounted for by disabled people with a disability duration of 3 to 6 years (34%). The most common clinical signs were shortness of breath (88.7%), general weakness, fatigue (64.1%), chest pain (58.1%), edema of the lower limbs (50.4%), dizziness (47.9%), high blood pressure (44.8%), palpitation (39.5%), cardiac arrhythmia (39.1%), headache (33.1%), and cardiac-related pains (29%). The individuals who were disabled due to coronary heart disease and suffered myocardial infarction, often reported gripping restrosternum pains. The chronic cardiac insufficiency of stage 2A occurred more often in disabled people without heart attack, while stage 2B was noticed by disabled people with myocardial infarction. According to the functional class, grade II chronic cardiac insufficiency occurred more often in the disabled people with heart attack, while grade III was observed in the disabled people without AMI. The disabled individuals with the repeated AMI were more often diagnosed with exertional angina and new-onset angina, while cardiac arrhythmia was reported by disabled people without AMI. Myocardial contractility (EF <35%) was more often noticed in disabled people with AMI. The proportion of men was higher in groups with a more severe

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circulatory insufficiency, and cardiac arrhythmia was more common among women. The proportion of males is inversely proportional to the value of the ejection fraction. Among the disabled people with AMI, men were more likely to have average and high tolerance to physical activity (64%) than women (33%).

The largest share in the structure of impaired functions is made up of the disorders of the cardiovascular system (moderate, significant and highly significant disorders constituted 71.8%, 26.2% and 1.2% respectively) as shown in Table 1. The disorders of the neuromuscular, skeletal and motional system were mild, moderate, and significant in 41%, 8.1%, and 1.6% of the cases respectively. The dysfunctions of the endocrine system and metabolism were reported as mild in 23% of cases and moderate in 3.6% of cases. The rank correlation coefficients between the stage of chronic heart failure and the below-mentioned impaired systems and functions were as follows: the cardiovascular system – 0.78, the respiratory system – cor = 0.15, the endocrine system and metabolism cor = 0.15, mental functions cor = 0.13, total impairment cor = 0.75.

TABLE 1. The Characteristics of the Body Impaired Functions of Disabled People Due to Coronary Heart Disease with Regard to Dysfunction Severity (Absolute Number, %).

Main types of permanent body dysfunctions	**Dysfunction severity**									
	Normal		**Mild**		**Moderate**		**Significant**		**Highly significant**	
	absolute number	**%**	**absolute number**	**%**	**absolute number**	**%**	**absolute number**	**%**	**absolute number**	**%**
Mental dysfunctions	247	99.6	–	–	1	0.4	–	–	–	–
Language and speech dysfunctions	248	100.0	–	–	–	–	–	–	–	–
Sensory dysfunctions	247	99.6	1	0.4	–	–	–	–	–	–
Neuromuscular (skeletal) and motional dysfunctions	123	50.9	101	41.0	20	8.1	4	1.6	–	–
Dysfunctions of the cardiovascular system	1	0.4	1	0.4	178	71.8	65	26.2	3	1.2
Dysfunctions of the respiratory system	226	91.0	15	6.0	7	3.0	–	–	–	–
Dysfunctions of the digestive system	224	90.0	22	8.9	1	0.4	1	0.4	–	–
Dysfunctions of the endocrine system and metabolism	180	73.0	58	23.0	9	3.6	1	0.4	–	–
Dysfunctions of the blood and immune system	238	96.0	5	2.0	5	2.0	–	–	–	–
Dysfunctions of the urinary system	235	95.0	11	4.4	–	–	2	0.8	–	–
Total	–	–	–	–	180	72.6	64	25.8	4	1.6

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TABLE 2. The correlation Between Clinical Data and the Body Impaired Functions of the disabled People Due to the Coronary Heart Disease.

Clinical signs	Body dysfunction		
	Cardiovascular	Neuromuscular, skeletal, and motional	Total
Dizziness	–	0.25	–
Walking instability	0.21	0.30	–
Defective memory	–	0.22	–
Edema of lower limbs	0.31	–	0.30
Movement difficulties	0.21	–	0.20

Among the disabled people, due to the coronary artery disease, a direct weak correlation between such clinical implications as dizziness and defective memory or the dysfunctions of the musculoskeletal system was revealed (cor = 0.25 and cor = 0.22 respectively).

Walking instability was accompanied by cardiovascular (cor = 0.22) and musculoskeletal (cor = 0.30) dysfunctions. The lower limbs edema and movement difficulties were combined with the cardiovascular (cor = 0.3 and cor = 0.21 respectively) and total (cor = 0.30 and cor = 0.20 respectively) impaired functions.

Among men, the dysfunctions of the cardiovascular system were reported as moderate in 56.7% of cases, while as significant and highly significant in 76.5% (p = 0.005). Among women, the impaired functions of the cardiovascular system were described as moderate and significant in 43.3% and 24.6% of cases respectively. Men had more severe disorders of the cardiovascular system than women. Overall dysfunctions too were severe among men – they were moderate in 56.1% of cases and significant and highly significant in 76.5% of cases (p = 0.005), as shown in Table 3.

The impairments of neuromuscular and motional (statodynamic) functions in disabled people with higher education were noticed in 56% of the cases (mild, moderate, and significant dysfunctions in 53.5%, 75%, and 25% of cases respectively). Among disabled people with secondary education, the impairments of statodynamic functions were mild in 46.5%, moderate in 25%, and significant in 75% of the cases. Thus, in disabled people with secondary education, the statodynamic dysfunctions are more severe. In the disabled people with higher education, significant and highly significant dysfunctions of the cardiovascular system were reported in 73.5% of cases (p = 0.04), as shown in Table 4.

There is a direct strong correlation between the disability group and the cardiovascular dysfunction (cor = 0.99) as well as between the disability group and the total impairment (cor = 1.0), as shown in Table 5.

In the under 60 age group, the significant and highly significant dysfunctions of the cardiovascular system accounted for 14.3% of cases among women and 38.5% of cases among men (p = 0.45). In the age group of 60–69 years, such significant impairments constituted 8% of cases among women and 24% of cases among men (p = 0.13). In the age group of 70–79 years, significant and highly significant disorders of the cardiovascular system made up 16.3% of cases among women and 34.5% of cases among men (p = 0.06). In the above 80 age group, such dysfunctions were noted in 35.7% of cases among women and in 47.4% of cases among men (p = 0.75). The rank correlation coefficient for patients above 60 was 0.17 (cor = 0.27 for women and cor = 0.15 for men). The data is tabulated in Table 6.

Self-care limitations of degree I was reported in 69%, while 24.6% of the disabled people had such

TABLE 3. The Characteristics of Permanent Body Impaired Functions of the Disabled People due to the Coronary Heart Disease with Consideration to Gender (Absolute Number, %).

Functions	Gender	Dysfunction severity									
		Normal		Mild		Moderate		Significant		Highly significant	
		absolute number	%	absolute number	%	absolute number	%	absolute number	%	absolute number	%
Cardiovascular	M	0	0	0	0	101	56.7	49	75.4	3	100.0
	F	0	0	2.0	100.0	77	43.3	16	24.6	0	0
Total	M	0	0	0	0	101	56.1	48	75.0	4	100.0
	F	0	0	0	0	79	43.9	16	25.0	0	0

TABLE 4. The Comparison of the Main Body Impaired Functions of Disabled People Due to the Coronary Heart Disease with Consideration to Education (Absolute Number, %).

Functions	Education	Degree of severity of violations									
		Normal		Mild		Moderate		Significant		Highly significant	
		absolute number	%	absolute number	%	absolute number	%	absolute number	%	absolute number	%
Neuromuscular, skeletal and motional (statodynanic)	secondary	38	30.9	47	46.5	5	25.0	3	75.0	0	0
	higher	85	69.1	54	53.5	15	75.0	1	25.0	0	0
Cardio vascular	secon dary	0	0	1	50.0	74	41.6	16	24.6	2	66.7
	higher	0	0	1	50.0	104	58.4	49	75.4	1	33.3
Total	secon dary	0	0	0	0	75	41.7	15	23.4	3	75.0
	higher	0	0	0	0	105	58.3	49	76.6	1	25.0

TABLE 5. The Characteristics of the Disability Groups and the Body Impaired Functions of Disabled People Due to the Coronary Heart Disease (Absolute Number, %).

Impaired body functions and their severity		**Disability group**					
		I		**II**		**III**	
		absolute number	**%**	**absolute number**	**%**	**absolute number**	**%**
Mild sensory dysfunctions		0	0	0	0	1	0.4
Neuromuscular, skeletal and motional (statodynamic) system	mild	0	0	16	6.5	85	34.3
	moderate	0	0	13	5.2	7	2.8
	significant	2	0.8	2	0.8	0	0
Dysfunctions of the cardiovascular system	mild	0	0	0	0	2	0.8
	Moderate	0	0	0	0	178	71.8
	Significant	1	0.4	64	25.8	0	0
	Highly significant	3	1.2	0	0	0	0
Dysfunctions of the respiratory system	Mild	0	0	3	1.2	12	4.8
	Moderate	0	0	5	2.0	1	0.4
Dysfunctions of the digestive system	Mild	0	0	5	2.0	17	6.9
	Moderate	0	0	1	0.4	0	0
	Significant	0	0	1	0.4	0	0
Dysfunctions of the endocrine system and metabolism	Mild	0	0	15	6.0	43	17.3
	Moderate	0	0	6	2.4	3	1.2
	Significant	0	0	1	0.4	0	0
Dysfunctions of the blood and immune system	Mild	0	0	2	0.8	3	1.2
	Moderate	0	0	0	0	5	2.0
Dysfunctions of the urinary system	Mild	0	0	1	0.4	10	4.0
	Significant	1	0.4	1	0.4	0	0
Суммарные нарушения	Moderate	0	0	0	0	180	72.6
	Significant	0	0	64	25.8	0	0
	Highly significant	4	1.6	0	0	0	0

limitations of degrees II and III. Movement limitations of degrees I, II, and III were noted in 71.7%, 19.8% and 0.8% of the disabled people respectively. The work limitations of degrees I, II, and III made up 66.9%, 22.9%, and 1.6% respectively, as shown in Table 7.

Among men, the self-care limitations was of degree I in 57.2% cases and of degrees II and III in 75.4% of cases (p = 0.017). Men are less capable of self-care than women. A similar picture is observed for the work limitations. The movement limitations were characteristic of men with degree I and degrees II and II in 57.8% and 74.5% of cases respectively (p = 0.051). Men are less capable of walking, as shown in Table 8.

There was a direct weak correlation between the lower limbs edema and self-care (cor = 0.32–0.21), movement (cor = 0.24), and work (cor = 0.30–0.21) limitations among the disabled due to coronary heart disease. The data is shown in Table 9.

The self-care limitations of the disabled people due to coronary heart disease had a direct weak

TABLE 6. The Severity of the Cardiovascular Dysfunctions Depending on Gender and Age (Absolute Number, %).

Age	Gender	Severity							
		Mild		Moderate		Significant		Highly significant	
		absolute number	%	absolute number	%	absolute number	%	absolute number	%
Under 60	Male	–	–	16	61.5	10	38.5	–	–
	Female	–	–	6	85.7	1	14.3	–	–
60-69	Male	–	–	37	74.0	12	24.0	1	2.0
	Female	2	8.0	21	84.0	2	8.0	–	–
70-79	Male	–	–	38	65.5	19	32.8	1	1.7
	Female	–	–	41	83.7	8	16.3	–	–
80 and above	Male	–	–	10	52.6	8	42.1	1	5.3
	Female	–	–	9	64.3	5	35.7	–	–

TABLE 7. The Characteristics of Life Limitations of the Disabled People Due to the Coronary Heart Disease with Consideration to their Severity (Absolute Number, %)

Life limitations	Severity							
	Normal		I		II		III	
	absolute number	%	absolute number	%	absolute number	%	absolute number	%
Self-care	16	6.4	171	69.0	57	23.0	4	1.6
Movement	19	7.7	178	71.7	49	19.8	2	0.8
Work	21	8.6	166	66.9	57	22.9	4	1.6

TABLE 8. The Gender Characteristic of the Life Limitations Severity of the Disabled People Due to the Coronary Heart Disease (Absolute Number, %)

Life limitations	Gender	Severity							
		Normal		I		II		III	
		absolute number	%	absolute number	%	absolute number	%	absolute number	%
Self-care	M	9	56.2	98	57.3	42	73.7	4	100.0
	F	7	43.8	73	42.7	15	26.3	0	0
Movement	M	12	63.2	103	57.9	36	73.5	2	100.0
	F	7	36.8	75	42.1	13	26.5	0	0
Work	M	11	52.4	96	57.8	42	73.7	4	100.0
	F	10	47.6	70	42.2	15	26.3	0	0

correlation relationship with the impaired statodynamic functions, and a direct strong correlation relationship with the dysfunction of the cardiovascular system and with total disorders. The movement limitations had a direct weak correlation relationship with the impaired statodynamic function and a direct average correlation with cardiovascular and total dysfunctions. The work limitations had a strong direct correlation with the impairment of the cardiovascular system and total disorders. The data is shown in Table 10.

TABLE 9. The Coefficient of Correlation Between Clinical Data and Life Limitations of Disabled People Due to the Coronary Heart Disease (absolute number).

Clinical data	Life limitations		
	Self-care	Movement	Work
Lower limbs edema	0.32	0.24	0.30
Movement instability	0.21	0.24	0.21

The study revealed a direct strong correlation between self-care and work limitations, and the cardiovascular (cor = 0.79) and total disorders (cor = 0.78) among the disabled people due to the coronary heart disease without acute myocardial infarction. Meanwhile, a weak direct correlation between the movement limitations and the impairment of statodynamic functions (cor = 0.21) and a direct average correlation between movement limitations and the cardiovascular (cor = 0.68) and total disorders (cor = 0.67) were seen. The study revealed a weak direct correlation between their behavior control and total disorders (cor = 0.23) and disorders of the urinary system (cor = 0.41). The data is tabulated in Table 11.

Among the disabled people, due to IHD with AMI, a weak direct correlation between statodynamic dysfunctions and self-care (cor = 0.26), movement (cor = 0.25) and work (cor = 0.28) limitations, and a strong direct correlation between the cardiovascular disorders and self-care (cor = 0.75) and work (cor = 0.73) limitations were found. There was an average direct correlation between movement limitations and the cardiovascular disorders (cor =

TABLE 10. The Correlation Coefficient of Life Limitations with the Impaired Body Functions of Disabled People Due to the Coronary Heart Disease (Absolute Number).

Life limitations	Body dysfunctions			
	Statodynamic	Cardiovascular	Urinary	Total
Self-care	0.22	0.77	–	0.77
Movement	0.23	0.66	–	0.66
Behavior control	–	–	0.28	–
Work	0.24	0.75	–	0.75

TABLE 11. The Correlation Coefficient of Life Limitations with the Impaired Body Functions of Disabled People due to the Coronary Heart Disease without Acute Heart Attack (Absolute Number).

Life limitations	Body dysfunctions			
	Statodynamic	Cardiovascular	Urinary	Total
Self-care	–	0.79	–	0.78
Movement	0.21	0.68	–	0.67
Behavior control	–	–	0.41	0.23
Work	–	0.79	–	0.78

TABLE 12. The Correlation Coefficient of Life Limitations with the Impaired Body Functions of Disabled People Due to Coronary Heart Disease with Acute Heart Attack (Absolute Number).

Life limitations	Body dysfunctions			
	Statodynamic	Cardiovascular	Urinary	Total
Self-care	0.26	0.75	0.24	0.76
Movement	0.25	0.65	0.29	0.65
Work	0.28	0.73	0.24	0.74

0.65). Disorders of the endocrine system and metabolism showed a weak direct correlation with movement (cor = 0.29), self-service (cor = 0.24), and work (cor = 0.24) limitations. The total impairments had a strong direct correlation with self-care (cor = 0.76), and work (cor = 0.74) limitations and a direct average correlation with movement limitations (cor = 0.65). The data is tabulated in Table 12.

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