VIA MEDICA

ORIGINAL ARTICLE

Łukasz Pietrzykowski*[1], Piotr Michalski*[1], Agata Kosobucka[1], Michał Kasprzak[2], Aldona Kubica[1]

[1]Katedra i Zakład Promocji Zdrowia, Collegium Medicum w Bydgoszczy Uniwersytet Mikołaja Kopernika w Toruniu
[2]Katedra i Klinika Kardiologii i Chorób Wewnętrznych, Collegium Medicum w Bydgoszczy Uniwersytet Mikołaja Kopernika w Toruniu

Knowledge about health and disease in obese patients after myocardial infarction. An observational study

Corresponding author:

Łukasz Pietrzykowski, MD
Department of Health Promotion, Collegium Medicum, Nicolaus Copernicus University
ul. Łukasiewicza 1
85-821 Bydgoszcz, Poland
tel. 52 585 58 01
e-mail:
lukasz.pietrzykowski@cm.umk.pl

Medical Research Journal 2017; Volume 2, Number 4, 135–140
10.5603/MRJ.2017.0018

ISSN 2451–2591

ABSTRACT

Introduction. Conscious implementation of a therapeutic plan immediately after discharge from hospital is pivotal in myocardial infarction survivors. Obesity and overweight are known as factors increasing the risk of adverse cardiovascular events and worsening long-term clinical outcome.

The aim of the study was to assess the knowledge regarding cardiovascular diseases in patients with myocardial infarction undergoing in-hospital brochure-based education in relation to the prevalence of overweight and obesity.

Patients and methods. A prospective, single-centre, cohort, observational study was conducted in 228 patients hospitalised due to myocardial infarction (women n = 52, men n = 176). A dedicated questionnaire containing 20 single-choice questions was applied for the knowledge assessment. Patients were divided into three groups depending on the BMI level (normal, overweight, obesity).

Results. Comparison of patients' knowledge at baseline and on the day of discharge revealed a significant increase of overall result ($p = 0.0264$) and of knowledge about prophylaxis ($p = 0.0115$). Multivariate analysis showed education level (-5.82 ± 2.576, $p = 0.025$) and BMI (-4.54 ± 1.771, $p = 0.011$) as independent factors determining the overall increase in patients' knowledge.

Conclusions. Educational interventions in overweight and obese patients should be intensified. The brochure is an effective educational tool.

Key words: body mass index, obesity, myocardial infarcion, patient education

Med Res J 2017; 2 (4): 135–140

Introduction

The increasing number of overweight and obese people is a global social, economic, and medical problem [1–4]. According to estimates published in The Global Burden of Disease Study 2013 [3], the percentage of people with BMI above 25 kg/m^2 in 2013 was 37% in men and 38% in women. This accounted for an increase of 8% as compared to 1980 [3].

A prospective population study, aiming to assess the mortality causes in relation to the body mass index (BMI), showed that BMI above 22.5 kg/m^2 was associated with increased mortality. For every 5 kg/m^2 of BMI increase, mortality increase due to diabetes (by 120%), vascular diseases (by 40%), kidney and liver diseases (by 60–80%), respiratory diseases (by 20%), and cancer (by 10%) were observed [5]. Moreover, excessive body weight contributed to the occurrence of emotional problems related to the reduction of self-esteem [6] and to worse cognitive functioning [7].

The aim of the study was to assess the knowledge regarding cardiovascular diseases in patients with myocardial infarction undergoing in-hospital brochure-based education in relation to the prevalence of overweight and obesity.

Patients and Methods

A prospective, single-centre, cohort, observational study was conducted in accordance with the principles contained in the Declaration of Helsinki. The study site received approval from the Local Ethics Committee to conduct the study (study approval reference number KB 248/2015). Each patient provided written, informed consent to participate in the study.

A dedicated questionnaire containing 20 single-choice questions regarding coronary artery disease was applied for the knowledge assessment. The questionnaire included questions about the awareness

* Autorzy równorzędni

of disease symptoms, understanding the mechanisms of the disease, and knowledge about prevention. Each correct answer was awarded one point. The same questionnaire was completed within the first 48 hours after admission to the hospital and at the day of discharge. After the first examination of the knowledge, a purposely developed educational brochure was given to each patient. It contained all the information necessary to provide correct answers in the questionnaire. The effectiveness of education based on this brochure was assessed on the basis of a comparison of patients' knowledge at the beginning and at the end of hospitalisation.

Prisoners, soldiers, and people who were in any way dependent on the researchers, as well as patients with physical or mental limitations that did not allow them to fill out the questionnaires, were excluded from the study.

The study population consisted of 228 consecutive patients meeting the inclusion criteria hospitalised due to myocardial infarction at the Department of Cardiology of University Hospital No. 1 in Bydgoszcz. There were 176 men (77.2%) and 52 women (22.8%) aged from 30 to 91 years (62.96 ± 11.34) with BMI from 16.44 to 41.02 (27.08 ± 4.42). Obesity (BMI ≥ 30) was found in 48 patients (21%) and overweight (25 ≤ BMI < 30) in 104 (45.6%). Patients were divided into three groups depending on the BMI level (normal, overweight, obesity).

The socio-demographic data are displayed in Table 1.

The applied definitions of coronary artery disease, hypertension, hypercholesterolaemia, nicotinism, diabetes, and family disease burden were based on the guidelines of the European Society of Cardiology [8].

The statistical analysis was performed using the Statistica 12.0 package (StatSoft, Tulsa, USA). Continuous variables were presented as medians with interquartile ranges and means with standard deviations. The Shapiro-Wilk test demonstrated non-normal distribution of the investigated continuous variables. Therefore, non-parametric tests were used for statistical analysis. Comparisons between two groups were performed with the Mann-Whitney unpaired rank sum test. For comparisons between three or more groups, the Kruskal–Wallis one-way analysis of variance was used. Spearmann's rank correlation was used to assess the relationship between two variables. Differences were considered significant at $P < 0.05$.

To identify factors with independent influence on the ACDS score, multiple regression analysis was performed. For identification of the best statistical model, backward stepwise regression was applied. Variables with a P value < 0.1 in the univariate analysis were introduced into the multiple regression model. Subsequently, variables without significant impact ($P > 0.05$) were removed one after another from the multivariate model.

Results

Taking into account the division of patients into three groups: BMI < 25, 25 ≤ BMI < 30, and BMI ≥ 30, there were no differences in the level of knowledge at the first assessment (KA I), while at the second assessment (KA II), after educational intervention, a clear trend to obtain better results with smaller BMI values was observed. The increase in knowledge during hospitalisation was highest in patients with BMI < 25, and lowest in obese patients (Figure 1).

Significant differences were demonstrated in the increase of overall patients' knowledge ($p = 0.0264$) and in the knowledge about prevention ($p = 0.0115$). A correlation between the increase of knowledge and BMI was observed ($R = -0.132$, $p = 0.0471$).

This regularity was noted in all assessed ranges of knowledge, but it was particularly expressed in relation to knowledge about prevention. The increase in knowledge in obese people was more than three-fold lower than in patients with BMI < 25.0; ($R = -0.1464$, $p = 0.0271$).

The waist circumference did not differentiate patients' knowledge before education (KA I) and at the day of discharge (KA II).

The multivariate analysis showed that the level of education (-5.82 ± 2.576, $p = 0.025$) and the BMI (-4.54 ± 1.771, $p = 0.011$) are independent determinants of total knowledge increase, explaining 5.12% of variation ($R = 0.226$; $R \wedge 2 = 0.05129$; $p = 0.0428$). Moreover, the level of education and the BMI (-6.73 ± 2.209, $p = 0.0026$) were also independent factors influencing the increase of knowledge about prevention. Secondary or higher education was associated with a lower increase of knowledge (-9.18 ± 3.214, $p = 0.0047$). The model explains only 7.46% of the variation of the increase in knowledge regarding prevention ($R = 0.273$; $R \wedge 2 = 0.0746$; $p = 0.00016$).

Discussion

The educational brochure is an easy and relatively cheap educational tool that can be widely used by patients at any convenient time [9–10]. The patient's motivation to obtain the knowledge regarding the disease is a necessary condition for the effectiveness of education based on the brochure [11–13]. Our experience indicates that the educational brochure is often preferred by patients as a source of knowledge about health and disease [14–19].

According to a multivariate analysis, we have shown that education level and BMI are independent factors conditioning the increase in patients' knowledge. Di Chiara et al. [20] observed a significantly higher incidence of abdominal obesity, hypertension, meta-

Table 1. Characteristics of the study population with regard to body mass index (BMI).

Variable	Total		Body Mass Index (BMI)						
	Amout n=228	%	BMI< 25 n=76	%	25≤BMI<30 n=104	%	BMI≥30 n=48	%	p
Gender									0.6706
Women	52	22.80%	20	26.31%	22	21.15%	10	20.83%	
Men	176	77.20%	56	73.69%	82	78.85%	38	79.79%	
Age									0.2161
< 65 years	131	57.45%	45	59.21%	54	51.92%	32	66.67%	
≥ 65 years	97	42.55%	31	40.79%	50	48.08%	16	33.33%	
Education									0.5497
Primary education	28	12.30%	12	15.79%	12	11.54%	4	8.33%	
Basic vocational education	84	36.80%	27	35.53%	39	35.50%	18	37.50%	
Secondary education	83	36.40%	28	36.84%	40	38.46%	15	31.25%	
Higher education	33	14.50%	9	11.84%	13	12.50%	11	22.92%	
Employment status									0.3518
Employed	98	43.0%	28	36.84%	48	46.15%	22	45.83%	
Unemployed	12	5.30%	5	6.58%	5	4.81%	2	4.17%	
Pensioner	89	39.0%	28	36.84%	43	41.35%	18	37.50%	
Invalid	29	12.70%	15	19.74%	8	7.69%	6	12.50%	
Economic status									0.8987
Very good	13	5.70%	5	6.58%	5	4.81%	5	6.25%	
Satisfactory	201	88.16%	65	85.53%	93	89.42%	43	89.58%	
Bad	14	6.14%	6	7.89%	6	5.77%	2	4.17%	
Very bad	0	-	-	-	-	-	-	-	
Place of residence									0.4295
Big city: > 100 thousand inhabitants	117	51.32%	44	57.89%	52	50.0%	21	43.75%	
Small town: ≤ 100 thousand inhabitants	46	20.17%	13	17.11%	24	23.08%	9	18.75%	
Village	65	28.51%	19	25.0%	28	26.92%	18	37.50%	
Marital status									0.0842
Single	22	9.65%	12	15.79%	6	5.77%	4	8.33%	
In a relationship	172	75.44%	50	65.79%	82	78.85%	40	83.34%	
Widow/ widower	34	14.91%	14	18.42%	16	15.38%	4	8.33%	
Waist circumference *									<0.0001
Optimal	123	53.95%	65	85.53%	58	55.77%	0	0.0%	
Risk	58	25.44%	11	14.47%	29	27.88%	18	37.50%	
Pathology	47	20.61%	0	0.0%	17	16.35%	30	62.50%	
Coronary artery disease									0.7748
Yes	106	46.49%	34	44.74%	51	49.04%	21	43.75%	
No	122	53.51%	42	55.26%	53	50.96%	27	56.25%	
Hypertension									0.4114
Yes	144	63.16%	48	63.16%	62	59.62%	34	70.83%	
No	84	36.84%	28	36.84%	42	40.38%	14	29.17%	
Hypercholesterolaemia									0.1285
Yes	119	52.19%	39	51.32%	49	47.12%	31	64.58%	
No	109	47.81%	37	48.68%	55	52.88%	17	35.42%	
Nicotinism									0.0393
Yes	82	35.96%	36	47.37%	32	30.77%	14	29.17%	
No	146	64.04%	40	52.63%	72	69.23%	34	70.83%	
Diabetes									0.0477
Yes	65	28.51%	14	18.42%	34	32.69%	17	35.42%	
No	163	71.49%	62	81.58%	70	67.31%	31	64.58%	
Family disease burden									0.6923
Yes	132	57.89%	47	61.84%	58	55.77%	27	56.25%	
No	96	42.11%	29	38.16%	46	44.23%	21	43.75%	

*Waist circumference – women: optimal ≤ 80 cm, 80 cm < risk ≤ 88 cm, pathology > 88 cm; men: optimal ≤ 94 cm, 94 cm < risk ≤ 102 cm, pathology > 102 cm [8]

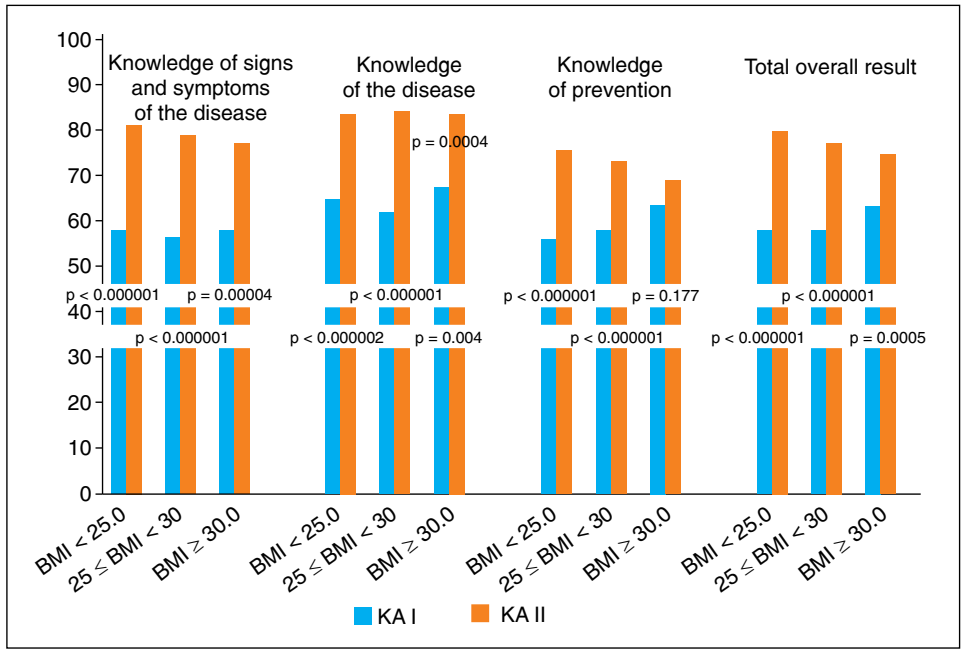

Figure 1. Comparison of the knowledge level at baseline (KA I) and at discharge (KA II) with regard to BMI.

Table 2. The comparison of the knowledge level (% of correct answers) in patients before education (KA I) and after education (KA II) and the effectiveness of educational intervention (ΔKA= KA II – KA I) with regard to BMI.

Knowledge assessment		**Total result**	**Body Mass Index (BMI)**				
Range of patients' knowledge			**BMI<25.0**	**25 ≤ BMI < 30**	**BMI ≥ 30.0**	**p**	**p for trend**
		n =228	**n = 76**	**n = 104**	**n = 48**		
Knowledge of signs and symptoms of the disease	KA I	57.54±22.96	58.42±25.25	56.73±6.46	57.92±26.49	0.95	-
	KA II	79.74±20.26	81.8±418.81	79.23±20.84	77.50±21.29	0.52	-
	Δ KA II- KA I	22.19±28.17	23.42±24.09	22.50±32.34	19.58±24.58	0.75	-
Knowledge of the disease	KA I	64.47±31.23	65.26±32.56	62.31±29.93	67.92±32.15	0.49	-
	KA II	85.7±024.71	88.16±25.34	84.62±24.65	84.17±24.04	0.26	-
	Δ KA II- KA I	21.23±33.51	22.89±34.05	22.31±32.54	16.25±34.92	0.45	-
Knowledge of prevention	KA I	58.64±22.59	56.32±21.22	57.79±23.32	64.17±22.68	0.12	-
	KA II	73.60±17.24	76.18±16.41	73.65±16.25	69.38±19.94	0.12	-
	Δ KA II - KA I	14.96±25.09	19.87±22.24	15.87±25.60	5.21±26.01	0.012	0.005
Total overall result	KA I	59.82±19.36	59.08±18.45	58.65±19.30	63.54±20.81	0.24	-
	KA II	78.16±15.07	80.59±14.88	77.79±14.16	75.10±16.90	0.08	0.022
	Δ KA II- KA I	18.33±19.86	21.51±18.46	19.13±20.10	11.56±20.29	0.027	0.010

bolic syndrome, and microalbuminuria in patients with a lower level of education. On the other hand, Gardina et al. [21] indicated ethnic origin and education level as factors conditioning knowledge about symptoms of myocardial infarction. The authors did not confirm the impact of BMI on their knowledge.

Examination of patients' knowledge and the effectiveness of brochure-based educational intervention showed that obese patients acquired a significantly lower amount of knowledge, in particular, knowledge regarding prevention, as compared to patients with normal body mass.

Cournot et al. [22] showed a negative correlation between BMI and results of cognitive functioning tests assessing attention, verbal memory, and fresh memory in middle-aged patients.

Jaracz et al. [23] also noted worse mental functioning in terms of thinking stiffness and reaction in obese people. Furthermore, the authors indicated worse results in the parameters assessing the effectiveness of thinking and the ability to maintain in memory and respond in accordance with the accepted logic concept [23].

Other researchers show poorer functioning of obese people in terms of concentration, endurance, and resistance to distractors [24].

It has been proven that excessive nutrition affects mental processes and behaviour [25]. Gomez-Pinilla et al. [26] confirmed that high-calorie foods, mainly those rich in saturated fatty acids and simple sugars, induce oxidative stress and reduce synaptic plasticity in the nervous system [26]. Alosco et al. [27] revealed a strong correlation between cognitive impairment and deposition of adipose tissue, especially abdominal fat. The authors prove that obesity through metabolic changes leads to changes in brain plasticity [27].

Taking into account the above-mentioned reports, the overweight and obese patients should not only be recognised as a high-risk group for cardiovascular diseases, but also as people who require intensified educational activities due to the worse cognitive functioning [28]. Perhaps combining different educational methods, increasing the frequency of educational meetings, and motivating to increase knowledge resources can lead to beneficial effects in the acquisition of knowledge about health and disease [29-32].

Conclusions

1. The brochure has proven to be an effective educational tool.
2. Educational interventions in overweight and obese patients should be intensified.

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