

## Demographic, clinical, and psychological factors influencing sexual activity cessation in patients with angiographically-confirmed ischaemic heart disease

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### Summary

**Introduction.** Sexual activity constitutes a significant aspect of health considerably influencing self-assessment of the quality of life. In Poland, data regarding the return in patients with ischaemic heart disease (IHD) to sexual activity are scarce and inadequate.

**Aim.** The aim of this work is to analyse the return to sexual activity in patients with IHD after a hospitalisation related to invasive diagnostics of coronary arteries as well as to identify predisposing factors associated with cessation of sexual activity.

**Material and methods.** 98 patients with angiographically documented IHD were involved in retrospective analysis. 46 patients (46.9%) were diagnosed with myocardial infarction (MI), 29 (29.6%) with stable angina (SA) and 23 (23.5%) with unstable angina (UA). Demographic, clinical and psychological factors were assessed. Beck Depression Inventory, State-Trait Anxiety Inventory, Acceptance of Illness Scale, and EuroQol-5D health questionnaires were used.

**Results.** The cessation of sexual activity after a hospitalisation due to invasive diagnostics of coronary arteries was noted almost in 1/3 of the IHD patients within 6-months observation period. There were no statistically significant differences in the percentages of sexually active and inactive patients related to gender. The elderly patients were more likely to cease sexual activity ( $p = 0.006$ ). Sexually active patients also represented significantly lower level of anxiety-trait ( $p = 0.0003$ ) and anxiety-state ( $p = 0.001$ ). They also had a higher level of the acceptance of the disease ( $p = 0.002$ ) at the end of hospitalisation and presented significantly lower severity of depression ( $p = 0.02$ ).

**Conclusions.** Cessation of sexual activity in patients with IHD after a hospitalisation due to coronarography is associated with their older age, being single, obesity, lower quality of life, depression, higher level of anxiety, and lower acceptance of illness. Underestimating or omitting the realm of sexual health of hospitalised patients with IHD affects the patients' return to sexual activity. Patients with IHD, who decided to discuss, during their hospitalisa-

tion, the impact of cardiac disease and the invasive procedure they had undergone on their sexual activity, more frequently return to sexual activity over the 6-months observation period.

**Key words:** ischaemic heart disease, return to sexual activity, quality of life

## Introduction

Sexual activity constitutes a significant aspect of health considerably influencing self-assessment of the quality of life. Even though acute coronary syndromes are successfully treated in our country owing to high availability of primary coronary angioplasty and cardiac surgery units, as well as the use of new medicines providing higher cardioselectivity with lower risk of erectile dysfunction [1], the improvement in the sexual health outcomes of IHD (ischaemic heart disease) patients is not explicit. Available data suggests, that only 25% of patients diagnosed with IHD return to sexual activity with the same frequency as before, 50% return to less intensive sexual activity, and the remaining 25% of patients never return to sexual activity [2].

The review of Polish literature indicates that the data related to the return of patients with IHD to sexual activity are scarce and insufficient in our country, while international literature reflects the situation of diverse populations living in different healthcare and socioeconomic systems [3–6].

## Aim

The aim of this work is to analyse the return to sexual activity in patients subject to invasive diagnostics of coronary arteries during hospitalisation due to IHD, as well as to identify predisposing factors associated with ceasing sexual activity. Demographic, clinical and psychological factors were evaluated in order to forecast their sexual status in the 6 months follow-up period.

## Material

The study was performed under the consent of the Bioethical Committee no. RNN/167/10/KE. Initially, 170 patients hospitalised in order to carry out invasive coronary procedures due to stable ischaemic heart disease (SIHD), unstable angina (UA) or myocardial infarction (MI) were screened for eligibility. 22 patients did not fulfil the criteria of inclusion (most frequently, informed consent to participate in the study was rejected). 14 patients were excluded during the study: due to the refusal of follow-up appointment, and death ( $n = 2$ ). The cessation of sexual activity was defined as absence of sexual activity during 6 months after hospitalisation in a subject who had been sexually active 12 months before the hospitalisation. 98 (74.2%) patients were sexually active 12 months before the hospital admission. 30 (22.8%) patients were not sexually active 12 months before admitting to a hospital and 4 (3%) patients refused a response to the question. Finally, 98 sexually active patients with IHD – 66

men and 32 women, participated in the analysis, including 46 (46.9%) patients with MI, 29 (29.6%) patients with SIHD, and 23 (23.5%) patients with UA.

### Method

The following instruments were used for psychological assessment:

- Beck Depression Inventory (BDI);
- State-Trait Anxiety Inventory (STAI);
- Acceptance of Illness Scale (AIS);
- EuroQol-5D (EQ-5D) health questionnaire measuring the quality of life.

EQ-5D is a general, universal instrument designed to examine groups with varied health state. The questions regarding the QoL are grouped in the EQ-5D into 5 dimensions assessing restrictions in patients related to: mobility, self-care, usual daily activities, determining the existence and the level of pain, determining the existence and the level of mood disorders. For each of the analysed parameter three categories of responses were prepared, thus qualifying a patient in one out of 243 possible states representing the current QoL. The questionnaire is supplemented with a Visual Analogue Scale (VAS), where a respondent self-reports in a graphic form one's health state from 0 (worst imaginable health state) to 100 (best imaginable health state) [7].

State-Trait Anxiety Inventory (STAI) is a tool designed for examination of anxiety understood as a temporal and situation-determined state of an individual as well as anxiety understood as a relatively constant personality trait. STAI consists of two subscales, one of them (STAI-state) is designed to measure anxiety-state while the other (STAI-trait) to measure anxiety-trait. Point scores for both scales may vary from 20 points (low anxiety) to 80 (high anxiety) [8].

AIS was used to assess the level of illness acceptance. Scores on the scale range from 8 to 40 points. The higher the score, the higher the illness acceptance, better coping with restrictions resulting from the disease and lower level of mental discomfort [9].

Beck Depression Inventory (BDI) is a self-report rating inventory that measures the severity of depression and is composed of 21 questions taking into account emotional, cognitive, motivational and somatic symptoms of depression [10]. Each of the questions has 4 variants of responses taking into account varied severity of symptoms. It is assumed that the score between 12 and 26 points indicate mild depression, score between 27 and 49 indicate moderately severe depression, while the score of 50 and over 50 points indicate very severe depression [11, 12].

The patients filled out the questionnaires on the last day of their hospitalisation, directly after receiving hospital discharge. Each time a physician or psychologist left the room, leaving a patient alone with the questionnaire. Medical check-up was related to a follow-up appointment in Cardiac Clinic and was done within 6 months ( $\pm 1$  month) after the hospitalisation. The patients were also asked whether they had discussed with a physician the impact of their cardiac disease and the invasive procedure they

had undergone on their sexual activity, and if so, who initiated the conversation (the physician or the patient him/herself).

All statistical calculations were carried out with the use of STATISTICA version 10.0. (StatSoft, Inc.; 2011) statistical package and Excel sheet. Quantitative variables were characterised by an arithmetic mean, standard deviation, median, as well as minimum and maximum value (range). Qualitative variables were represented by means of the numerosness and percentage values. In order to verify whether the quantitative variable originated from a population of normal distribution the Shapiro-Wilk test was applied. Whereas, in order to verify the hypothesis on equal variances, the Levene's (Brown-Forsythe) test was applied. The significance of differences between the two groups (a model of non-associated variables) was examined with the use of the tests for the significance of differences: Student's t-test (or Welch's t-test in the instance of the lack of homogeneity of variances) or the Mann-Whitney U test (in case the Student's t-test was inappropriate due to the data characteristics). The chi-square tests of independence and the Fisher's exact test were used for qualitative variables. For correlation of severity and direction between the variables, Pearson's and/or Spearman's correlation coefficients were calculated. For all calculations  $p < 0.05$  was assumed to be the level of significance.

## Results

In the examined group, 32/98 (32.6 %) patients ceased their sexual activity within 6 months following the invasive procedure, including 12 women (37.5%), and 20 men (62.5% of the group). The mean age of patients who ceased sexual activity was  $60.8 \pm 6.0$  years, while the age of the patients still sexually active was  $56.6 \pm 7.2$  years. No statistically significant differences were found in the percentage of patients sexually active and patients who ceased the activity on the account of gender, while younger patients more seldom ceased sexual activity ( $p = 0.0056$ ) during the 6-months observation period. Marital status had no statistically significant influence on ceasing sexual activity, as opposed to the statement whether they are in a steady relationship, which was significantly more frequent in sexually active subjects ( $p = 0.0064$ ). Among patients who ceased sexual activity there was 28.1% of single persons and 71.9% of individuals being in steady relationship. While in the group of still sexually active patients only 7.6% declared to be single. Education had no statistically significant influence on ceasing sexual activity. No statistically significant differences with respect to the fact of ceasing sexual activity due to the type of hospital admission procedure or the main reason for hospitalisation were found. Table 1 presents the characteristics of the examined group in view of demographic factors, the type of hospital admission procedure and the main reason for hospitalisation.

**Table 1. Characteristics of the examined group with regard to gender, age, marital status, education, hospital admission procedure and the main reason for hospitalisation divided by sexual activity status**

	Sexually inactive N = 32	Sexually active N = 66	p value
Woman	12 (37.5%)	16 (24.2%)	p = 0.17
Man	20 (62.5%)	50 (75.8%)	
Age			
mean $\pm$ standard deviation	60.8 $\pm$ 6.0	56.6 $\pm$ 7.2	p = 0.006
Marital status I			
unmarried woman/unmarried man	1 (3.1%)	1 (1.5%)	p = 0.21
married woman/married man	23 (71.9%)	57 (86.4%)	
divorced woman/divorced man	3 (9.4%)	5 (7.6%)	
widow/widower	2 (6.3%)	0 (0.0%)	
cohabitation	3 (9.4%)	3 (4.5%)	
Marital status II			
single person	9 (28.1%)	5 (7.6%)	p = 0.006
single person in a steady relationship	23 (71.9%)	61 (92.4%)	
Education			
primary	2 (6.3%)	5 (7.6%)	p = 0.37
basic vocational	7 (21.9%)	11 (16.7%)	
secondary	13 (40.6%)	21 (31.8%)	
higher	10 (31.3%)	29 (43.9%)	
Admission procedure			
urgent	22 (68.8%)	47 (71.2%)	p = 0.80
planned	10 (31.3%)	19 (28.8%)	
Reason for hospitalisation			
myocardial infarction	13 (40.6%)	33 (50.0%)	p=0.64
stable angina	10 (31.3%)	19 (28.8%)	
unstable angina	9 (28.1%)	14 (21.2%)	

No statistically significant differences were found with respect to ceasing sexual activity due to hypercholesterolemia, smoking, past myocardial infarction, diabetes, stroke, intermittent claudication or prostatic hyperplasia (Table 2).

**Table 2. Characteristics of the examined group in view of co-morbidities divided by individuals still sexually active and individuals who ceased sexual activity within 6 months following the invasive procedure**

	Sexually inactive N = 32	Sexually active N = 66	p value
History of smoking	19 (59.4%)	38 (57.6%)	p = 0.87
Hypertension	29 (90.6%)	59 (89.4%)	p = 0.85
Past myocardial infarction/s	4 (12.5%)	14 (21.2%)	p = 0.30
Stroke	0 (0.0%)	4 (6.1%)	p = 0.16
Diabetes	11 (34.4%)	15 (22.7%)	p = 0.22
Intermittent claudication	2 (6.3%)	4 (6.1%)	p = 0.97
Mild prostatic hyperplasia	6 (18.8%)	8 (12.1%)	p = 0.38
Hypercholesterolemia	32 (100.0%)	64 (97.0%)	p = 0.32

Moreover, the examined sub-groups were retrospectively compared with respect to the BMI (body mass index), heart rate, as well as systolic and diastolic blood pressure value. The mean BMI of patients who ceased sexual activity was  $30.2 \pm 5.6$  kg/m<sup>2</sup>, while in the case of patients still sexually active it was  $27.9 \pm 5.0$  kg/m<sup>2</sup>. The patients with a lower BMI significantly more seldom ceased sexual activity (p = 0.02) during the 6-months period of observation after their hospitalisation. Among the patients who ceased sexual activity, 18.8% of them had normal BMI, 34.4% were overweight and 46.9% were obese. While in the group of still sexually active patients 30.3% had normal BMI, 45.5% were overweight, and 24.2% were obese. However, no statistically significant differences due to sexual activity were observed with respect to blood pressure value, resting heart rate, and left ventricular ejection fraction (EF– ejection fraction) (Table 3).

**Table 3. Characteristics of the examined group in view of BMI, blood pressure, systolic and diastolic blood pressure, 6MWT, and EF divided by individuals still sexually active and individuals who ceased sexual activity within 6 months following the invasive procedure**

	Sexually inactive N = 32	Sexually active N = 66	p value
BMI [kg/m <sup>2</sup> ]			
mean ± standard deviation	30.2 ± 5.6	27.9 ± 5.0	p = 0.02
Range	19.0–41.4	19.2–43.4	
Obesity			
normal	6 (18.8%)	20 (30.3%)	p = 0.04
overweight	11 (34.4%)	30 (45.5%)	
obesity	15 (46.9%)	16 (24.2%)	

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Heart rate			
mean $\pm$ standard deviation	70.8 $\pm$ 8.5	67.7 $\pm$ 7.3	p = 0.07
Range	52.0–90.0	50.0–90.0	
Systolic blood pressure [mm/Hg]			
mean $\pm$ standard deviation	125.9 $\pm$ 12.7	125.4 $\pm$ 11.6	p = 0.93
Range	100.0–165.0	90.0–160.0	
Diastolic blood pressure [mm/Hg]			
mean $\pm$ standard deviation	77.1 $\pm$ 9.5	77.5 $\pm$ 8.7	p = 0.55
Range	60.0–100.0	50.0–100.0	
6MWT [m]			
mean $\pm$ standard deviation	365.3 $\pm$ 149.6	413.6 $\pm$ 109.8	p = 0.07
Range	50.0–700.0	100.0–700.0	
EF [%]			
mean $\pm$ standard deviation	50.8 $\pm$ 10.0	49.4 $\pm$ 9.5	p = 0.34
Range	16.0–64.0	24.0–65.0	

The mean value of the 6-minute walk test, performed before hospital discharge (six minute walk test – 6MWT) was 365.3  $\pm$  149.6m (range 50–700 m) in patients who ceased sexual activity, while in the sexually active group it was 413.6  $\pm$  109.8 m (range 100–700 m range). However, no statistically significant differences of the 6-minute walk test results due to sexual activity (p = 0.07) were observed.

**Table 4. Characteristics of the examined group in view of laboratory values obtained during hospitalisation divided by individuals still sexually active and individuals who ceased the activity within 6 months following the invasive procedure**

	Sexually inactive N = 32	Sexually active N = 66	p value
RBC [ $10^6/\mu\text{l}$ ] range/median	4.52 $\pm$ 0.40 3.47–5.32/4.65	4.62 $\pm$ 0.42 3.77–5.56/4.67	p = 0.28
WBC [ $10^6/\mu\text{l}$ ] range/median	8.37 $\pm$ 2.27 4.8–14.8/8.35	9.02 $\pm$ 3.37 4.2–23.7/8.75	p = 0.49
PLT [ $10^6/\mu\text{l}$ ] range/median	225.50 $\pm$ 55.03 124–350/211	223.53 $\pm$ 51.87 112–393/218.5	p = 0.80
HGB [ $10^6/\mu\text{l}$ ] range/median	14.25 $\pm$ 1.17 11.7–15.9/14.35	14.36 $\pm$ 1.33 10.9–16.9/14.75	p = 0.58
HCT [ $10^6/\mu\text{l}$ ] range/median	41.92 $\pm$ 3.39 34.7–46.6/42.6	42.47 $\pm$ 3.75 32.4–50.8/42.9	p = 0.48

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Total cholesterol [ $10^6/\mu\text{l}$ ]	$193.31 \pm 43.15$	$200.26 \pm 42.22$	$p = 0.45$ $p = 0.41$ $p = 0.32$ $p = 0.82$
range/median	104–270/183.5	108–307/203	
HDL [ $10^6/\mu\text{l}$ ]	$50.36 \pm 14.56$	$48.38 \pm 12.36$	
range/median	28.5–97/49.5	25.4–87/46.9	
LDL [ $10^6/\mu\text{l}$ ]	$115.16 \pm 37.51$	$124.44 \pm 45.28$	
range/median	46–177/109	34–252/118	
Triglycerides [ $10^6/\mu\text{l}$ ]	$150.63 \pm 78.76$	$147.33 \pm 76.93$	$p = 0.31$
range/median	69–450/132.5	41–437/128.5	
Urea [ $10^6/\mu\text{l}$ ]	$36.34 \pm 9.58$	$34.00 \pm 9.05$	$p = 0.78$
range/median	19–56/34	18–76/33	
Creatinine [ $10^6/\mu\text{l}$ ]	$0.97 \pm 0.30$	$0.94 \pm 0.26$	$p = 0.94$
range/median	0.55–2.02/0.86	0.61–2.27	
Sodium [ $10^6/\mu\text{l}$ ]	$140.19 \pm 2.76$	$140.14 \pm 3.44$	$p = 0.08$
range/median	134–146/140	132–149/140	
Potassium [ $10^6/\mu\text{l}$ ]	$4.40 \pm 0.57$	$4.22 \pm 0.40$	$p = 0.08$
range/median	3.54–5.79/4.41	3.56–5.25/4.22	

Table 4 and 5 present laboratory values of patients, obtained during hospitalisation as well as the drug therapy prescribed at the end of the hospitalisation. No statistically significant differences with respect to the range of such parameters in relation to sexual activity during the 6-months observation period were observed.

**Table 5. Characteristics of the examined group in view of drug therapy prescribed at the end of hospitalisation divided by individuals still sexually active and individuals who ceased the activity within 6 months following the invasive procedure**

	Sexually inactive N = 32	Sexually active N = 66	p value
Beta-blockers	31 (96.9%)	62 (93.9%)	$p = 0.90$
Angiotensin Converting Enzyme Inhibitors	32 (100%)	64 (96.9%)	$p = 0.82$
Angiotensin II receptor blockers	0 (0%)	2 (3.03%)	$p = 0.82$
Calcium channel blockers	6 (18.7%)	10 (15.1%)	$p = 0.65$
Statins	32 (100%)	66 (100%)	---
Fibrates	4 (12.5%)	5 (7.5%)	$p = 0.68$
ASA	32 (100%)	66 (100%)	---
Clopidogrelum	24 (75.0%)	56 (84.8)	$p = 0.25$
Diuretics	11 (34.7%)	14 (21.2%)	$p = 0.16$
Alpha-blockers	6 (18.7%)	7 (10.6%)	$p = 0.28$
Nitrates recommended as rescue medication	18 (56.2)	33 (50%)	$p = 0.56$
Nitrates	3 (9.3%)	3 (4.5)	$p = 0.63$

*table continued on the next page*

**Table 6. Characteristics of the examined group in view of the EQ-5D questionnaire results divided by individuals still sexually active and individuals who ceased the activity within 6 months following the invasive procedure**

	Sexually inactive N = 32	Sexually active N = 66	p value
<b>Mobility</b>			
no problems with walking	19 (59.4%)	52 (78.8%)	p = 0.04
moderate problems with walking	11 (34.4%)	13 (19.7%)	
forced to stay in bed	2 (6.3%)	1 (1.5%)	
<b>Self-care</b>			
no problems with self-care	20 (62.5%)	50 (75.8%)	p = 0.15
moderate problems with washing and dressing	10 (31.3%)	15 (22.7%)	
not able to wash or dress by myself	2 (6.3%)	1 (1.5%)	
<b>Usual activities (e.g. work, house duties)</b>			
no problems	16 (50.0%)	46 (69.7%)	p = 0.06
moderate problems	14 (43.8%)	18 (27.3%)	
not able	2 (6.3%)	2 (3.0%)	
<b>Pain/discomfort</b>			
no	19 (59.4%)	38 (57.6%)	p = 0.98
moderate	11 (34.4%)	26 (39.4%)	
severe	2 (6.3%)	2 (3.0%)	
<b>Anxiety/depression</b>			
not anxious/depressed	8 (25.0%)	30 (45.5%)	p = 0.01
moderately anxious/depressed	14 (43.8%)	28 (42.4%)	
extremely anxious/depressed	10 (31.3%)	8 (12.1%)	
<b>Health state</b>			
mean $\pm$ standard deviation	61.1 $\pm$ 15.9	71.6 $\pm$ 16.3	p = 0.002
range/median	20.0–85.0	24.0–100.0	

In the group of sexually active patients the percentage of individuals with no problems associated with anxiety was significantly higher ( $p = 0.01$ ). Whereas, no statistically significant differences with respect to sexual activity in relation to self-care, usual activities or pain were observed (Table 6). The “average self-assessed health state” of patients still sexually active was  $61.1 \pm 15.9$ , while in the case of patients who ceased sexual activity it was  $71.6 \pm 16.3$  on the E5-QD scale. The patients still sexually active assessed their health state significantly higher ( $p = 0.002$ ).

**Table 7. Characteristics of the examined group in view of the self-assessment of anxiety, depression and illness acceptance divided by individuals still sexually active and individuals who ceased the activity within 6 months following the invasive procedure**

	Sexually inactive N = 32	Sexually active N = 66	p value
STAI-state			
mean $\pm$ standard deviation	48.8 $\pm$ 6.8	43.4 $\pm$ 8.1	p = 0.001
Range	36.0–62.0	27.0–65.0	
STAI-trait			
mean $\pm$ standard deviation	43.1 $\pm$ 5.5	39.0 $\pm$ 6.5	p = 0.0003
Range	32.0–57.0	29.0–63.0	
AIS			
mean $\pm$ standard deviation	23.6 $\pm$ 7.2	28.3 $\pm$ 5.3	p = 0.002
Range	8.0–38.0	17.0–40.0	
BDI			
mean $\pm$ standard deviation	13.9 $\pm$ 5.9	11.0 $\pm$ 3.1	p = 0.02
Range	7.0–28.0	6.0–19.0	
The level of depression severity			
no depression	17 (53.1%)	46 (69.7%)	p = 0.02
mild depression	12 (37.5%)	20 (30.3%)	
moderately severe depression	3 (9.4%)	0 (0.0%)	

In the Spielberger Questionnaire two component elements of anxiety are measured – the anxiety-state and the anxiety-trait (Table 7). The average anxiety-state of patients who ceased sexual activity was  $48.8 \pm 6.8$ , while in the case of patients still sexually active it was  $43.4 \pm 8.1$ . The average anxiety-trait of patients who ceased sexual activity was  $43.1 \pm 5.5$ , while in the case of patients still sexually active it was  $39.0 \pm 6.5$ . The patients still sexually active represented significantly lower level of anxiety-trait ( $p = 0.0003$ ) and anxiety-state ( $p = 0.001$ ).

The average illness acceptance index in patients who ceased sexual activity was  $23.6 \pm 7.2$ , while in the case of patients still sexually active it was  $28.3 \pm 5.3$ . The patients still sexually active significantly better accepted the disease ( $p = 0.002$ ) at the end of hospitalisation.

The average value of the intensity of depression in patients who ceased sexual activity was  $13.9 \pm 5.9$ , while in the case of patients still sexually active it was  $11.0 \pm 3.1$ . The patients still sexually active presented significantly lower intensity of depression ( $p = 0.02$ ). In the group of patients who ceased sexual activity, the patients with no depression constituted 53.1%, patients with mild depression constituted 37.5%, and

patients with moderately severe depression constituted 9.4%. Conversely, in the group of patients who returned to sexual activity, the patients with no depression constituted 69.7%, and the patients with mild depression constituted 30.3%. In the group of patients still sexually active the percentage of patients with no depression was significantly higher ( $p = 0.02$ ).

In the group of patients who ceased sexual activity, 4/32 (12.5%) of the group talked to a physician about sexual activity, while in the group of patients still sexually active the percentage was 36/66 (54.5%) – in the group of patients still sexually active the percentage of patients who talked to a physician about sexual activity was significantly higher ( $p = 0.0001$ ).

Table 8. The results of logistic regression of parameters estimation with backwards stepwise approach for modelling the likelihood of ceasing sexual activity

	Level – effect	p	Odds ratio	Confidence interval of 95%
AIS – Acceptance of Illness Scale		0.006	0.81	(0.70; 0.94)
STAI-trait (anxiety-trait)		0.011	1.17	(1.04; 1.33)
Health state (EQ-5D)		0.005	0.92	(0.86; 0.97)
Pain/discomfort	Moderate	0.005	0.03	(0.01; 0.35)
Pain/discomfort	Severe	0.044	46.24	(1.10; 1945.89)
Talking to a physician	No	0.0001	10.57	(3.39; 32.90)
Resting heart rate		0.001	1.25	(1.09; 1.43)
Past myocardial infarction/s	No	0.003	7.41	(1.96; 28.07)
Age		0.018	1.21	(1.03; 1.42)

The model of logistic regression with the backwards stepwise approach considered statistically significant parameters from Table 8. Negative parameter estimates corresponding to such variables as: AIS, health state, and pain/discomfort for the moderate level indicate that the increase of such values results in the increase of the likelihood of continued sexual activity. Whereas, positive parameter estimates corresponding to such variables as: STAI-trait, pain/discomfort for the severe level, the lack of talking to a physician about sexual activity, resting HR, past MI/s, and age indicate that the increase of such values results in the increase of the likelihood of ceasing sexual activity. ROC analysis was also carried out for all the available continuous variables. Sensitivity, specificity, AUC, and the proposed cut-off points were calculated. The highest AUC value 0.73 was obtained for the STAI-trait. Whereas, the highest sensitivity and specificity value was obtained for the demographic factor – age.

**Table 9. Results of sensitivity, specificity, the value of area under the ROC (AUC) curve for the variables as follows: age, BMI, HR, systolic blood pressure, diastolic blood pressure, 6MWT, EF, STAI-state, STAI-trait, AIS, BDI scores, and health state**

	Sensitivity	Specificity	AUC	Proposed cut-off point
Age	53.1%	80.3%	0.68	62
BMI	37.5%	87.9%	0.64	32.1
HR	21.9%	92.9%	0.61	80
Systolic blood pressure	3.1%	100.0%	0.51	165
Diastolic blood pressure	6.3%	95.5%	0.46	100
6MWT	21.9%	97.0%	0.63	250
EF	0.0%	98.5%	0.56	65
STAI-state – anxiety-state	34.4%	87.9%	0.70	54
STAI-trait – anxiety – trait	50.0%	83.3%	0.73	44
AIS – Acceptance of Illness Scale	37.5%	93.9%	0.70	20
BDI scores	28.1%	93.9%	0.64	17
Health state	34.4%	89.4%	0.69	50

## Discussion

Our study presents unique data related to the fact of maintaining sexual activity after a hospitalisation due to coronary disease involving invasive coronary procedures. Cessation of sexual activity in patients with IHD after a hospitalisation due to coronarography is associated with their older age, being single, obesity, lower quality of life, depression, higher level of anxiety, and lower acceptance of illness. Interestingly, elective or urgent status of admission did not determine return to sexual activity.

In the examined group, 1/3 of the patients did not return to sexual activity during the 6-months period of observation. Maintaining previous sexual activity in most patients with IHD is challenging, considering the anxiety that serious symptoms or disease exacerbations (shortness of breath, anginal pain, myocardial infarction, irregular heart beat or even sudden cardiac death) may occur during an intercourse. Another important factor is the fear of sexual functioning disorders due to disease or treatment side-effects [13]. However, the problems associated with sexual life may be uncomfortable to discuss both for a patient and a physician. The study carried out by Bendel et al. indicate that only 3% of patients with chronic coronary artery disease feel to be properly informed about the sexology related issues [14]. Two important documents published in 2012 are very helpful to the specialists taking care of the group of patients in question. These are “The Princeton III Consensus Recommendations for the Management of Erectile Dysfunction and Cardiovascular Disease”, and “Sexual Activity and Cardiovascular Disease: A Scientific Statement from the

American Heart Association” [15, 16]. The first of them includes recommendations on the means of ascertaining the possibility of safe undertaking or resumption of sexual activity and/or treatment of sexual dysfunction in cardiac patients, dividing them into three groups of low, medium and high risk. Both documents in question emphasise the importance, expressed by many specialists, of interdisciplinary approach in ascertaining sexual function and treatment of sexual dysfunction in patients with cardiovascular risk [17].

In our study, in the group of patients who ceased sexual activity, only 12.5% of the group talked to a physician (at the initiative of either of the parties) on the impact of cardiac disease or the invasive procedure they had undergone, while in the group of patients still sexually active over half of them had such a conversation. In the group of patients still sexually active the percentage of the patients who talked to a physician about sexual activity was considerably higher. Such a great difference may result not only from the talk itself and the information provided, but also from the fact that the patients who initiated such a talk focused their attention on this subject.

Simultaneously, the study shows that a significant proportion of patients do not return to their previous sexual activity after MI, PCI (percutaneous coronary intervention), or CABG (coronary artery bypass graft) [16, 18].

Physicians talk to patients about overweight and the necessity to reduce the body weight too seldom and even more seldom raise this subject in relation to sexual activity of patients. Whereas, sexual disorders and obesity often do go together, thus talking to an obese patient about his or her sexual health is more than recommended [19]. The average BMI of patients who ceased sexual activity in our study was  $30.2 \pm 5.6$  kg/m<sup>2</sup>, while in the case of patients who were still active it was  $27.9 \pm 5.0$  kg/m<sup>2</sup>. Patients with lower BMI index significantly less often ceased sexual activity.

More and more studies associated with disorders of sexual functioning refer to psychological variables. This is because sexual activity is considerably influenced by psychological factors. Our study indicates that ceasing sexual activity is related to lower quality of life, depression, anxiety, and lower illness acceptance in the group of patients with IHD.

Concluding, information related to sexual activity in patients with IHD hospitalised for invasive diagnosis of coronary arteries may help a physician in assessing the likelihood of patient having problems with this important aspect of life. This information may cover the period before admission to hospital as well as selected demographic and psychological variables, such as age or being in a steady relationship. Clinical variables, however, seem to be less valuable source of information on the matter in question, than demographic and psychological variables.

The main limitation of our work is a single-centre, retrospective character of the study and small population of examined patients. Moreover, the quality of informational support provided to patients by physicians was not assessed. Further long-term studies on sexual activity in patients with IHD are necessary, including various age groups of patients and the participation of partners of the patients. Importantly, our study group

was heterogeneous with regard to initial diagnosis (SIHD, UA, AM), but this factor did not seem to constitute a major determinant of outcome.

### Conclusions

1. Cessation of sexual activity after hospitalisation for invasive diagnostics of coronary arteries is reported by 1/3 of patients with IHD after invasive coronary procedures during 6-months observation period.
2. Cessation of sexual activity in patients with IHD is related to age, not being in a steady relationship, obesity, lower quality of life, depression, higher intensity of anxiety, and lower illness acceptance.
3. The aspects of the sexual health of patients hospitalised due to IHD, if underestimated or neglected by physicians, influence the return to sexual activity of such patients. Patients with IHD who discuss their sexual activity during hospitalisation more often return to sexual activity during the 6-months observation period.

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