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## **HEALTH BEHAVIORS UNDERTAKEN BY PATIENTS WITH PULMONARY TUBERCULOSIS**

**Zachowania zdrowotne podejmowane przez chorych z gruźlicą płuc**

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**Abstract (in Polish):**

Cel pracy: Celem badań była ocena zachowań zdrowotnych, kontroli własnego zdrowia osób z gruźlicą płuc.

Materiał i metody: Badania przeprowadzono w grupie 100 osób chorych na gruźlicę płuc. Zastosowane w badaniu metody obejmowały kwestionariusz socjodemograficzny oraz skale, w tym: Health Behaviour Inventory (HBI) (IZZ) and Multidimensional Health Locus of Control Scale (MHLC-from B).

Wyniki: Wiek miał istotny wpływ na prawidłowe nawyki żywieniowe ( $p=0,0035$ ). Natomiast, stan cywilny determinował podejmowanie określonych zachowań profilaktycznych ( $p=0,0446$ ). Wskaźnik zachowań zdrowotnych korelował z wpływem innych osób ( $p = 0,0151$ ) oraz z przypadkowymi działaniami ( $p = 0,0079$ ). W obszarze kontroli zdrowia – przypadkowe zdarzenia korelowały z prawidłowymi nawykami żywieniowymi ( $p = 0,0039$ ). Zachowania profilaktyczne istotnie statystycznie związane były z wszystkimi kategoriami kontroli zdrowia. Ponadto, pozytywne nastawienie psychicznie korelowało z wpływem innych osób ( $p = 0,0084$ ) oraz przypadkowymi zdarzeniami ( $p = 0,0498$ ). Również, praktyki zdrowotne determinowane były przez wpływ czynników innych ( $p = 0,0009$ ). Płeć ( $p < 0,0001$ ), wykształcenie ( $p = 0,0001$ ), aktywność zawodowe ( $p = 0,0039$ ) oraz warunki mieszkaniowe ( $p < 0,0001$ ) miały istotny wpływ na wskaźnik zachowań zdrowotnych oraz poszczególne kategorie.

Wnioski: Zachowania zdrowotne istotnie były związane z kontrolą zdrowia, co stanowi decydujące powiązanie w obszarze edukacji osób z gruźlicą płuc, a także ma przełożenie na działania w obrębie utrzymania zdrowia.

**Abstract (in English):**

Aim: Introduction: The aim of this study was to evaluate health behaviors, health self-control of people with pulmonary tuberculosis.

Material and methods: The study was conducted in a group of 100 patients with pulmonary tuberculosis. The methods used included a sociodemographic questionnaire and scales, such as: Health Behaviour Inventory (HBI) and Multidimensional Health Locus of Control Scale (MHLC-from B).

Results: Results: Age had a significant impact on proper eating habits ( $p=0.0035$ ). However, marital status determined the adoption of certain preventive behaviors ( $p=0.0446$ ). The health behavior index correlated with the influence of others ( $p=0.0151$ ) and with incidental actions ( $p=0.0079$ ). In the area of health control – random events correlated with proper eating habits ( $p=0.0039$ ). Preventive behaviors were statistically significantly associated with all categories of health control. In addition, positive mental attitude correlated with the influence of others ( $p=0.0084$ ) and random events ( $p=0.0498$ ). Also, health practices were determined by the influence of others ( $p=0.0009$ ). Gender ( $p<0.0001$ ), education ( $p=0.0001$ ), occupational activity ( $p=0.0039$ ) and housing ( $p<0.0001$ ) had a significant impact on the health behavior index and individual categories.

Conclusions: Conclusions: Health behaviors were significantly related to health control, which is a critical link in the area of education of people with pulmonary tuberculosis, and has implications for activities within health maintenance.

**Keywords (in Polish):** gruźlica płuc, zachowania zdrowotne, choroba przewlekła, zdrowie populacji, styl życia.

**Keywords (in English):** pulmonary tuberculosis, health behavior, chronic disease, population health, life style.

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Zachowania zdrowotne

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**Authors (short)**

I. Repka et al.

Although tuberculosis has accompanied mankind since the beginning of its history, it was recognized as a serious social issue approximately 200 years ago. It still remains an important diagnostic problem and a priority public health challenge. Analyzing recent medical reports, an increase in the incidence of tuberculosis has been observed. This is due to the emergence of drug-resistant strains of bacteria. In addition, the impact on tuberculosis resurgence is related to the breakdown in disease control and the reported increase in HIV infections [1].

The WHO reports that about a quarter of the world's population has latent TB [1]. In 2019, 5321 tuberculosis cases were reported, 166 fewer than in the previous year. The incidence of tuberculosis of all forms accounted for 13.9%, which was 2.8% less than in 2018. The predominant form of tuberculosis was the pulmonary variety, which was 95.4% of all cases [2,3]. The aim of this study was to assess health behaviors and locus of health control among pulmonary tuberculosis patients.

The study included a total of 100 patients hospitalized in the Department of Lung Diseases with Oncology Subdivision in one of Cracow's hospitals. Participation in the study was voluntary and anonymous. It was conducted by a diagnostic survey method using a questionnaire technique. Standardized tools were used to collect data: Multidimensional Health Locus of Control Scale (MHLC-from B), Health Behaviour Inventory (HIB), and an author's survey questionnaire, which included information related to lifestyle, demographic and social data.

Statistical analysis was conducted using the SPSS statistical package. A significance level of  $p < 0.05$  was adopted. Associations between health behavior and sociodemographic data were analyzed using the  $\chi^2$  test of independence, the Mann-Whitney U test and the Kruskal-Wallis test. In addition, Spearman's rank correlation coefficient was used.

Fifty-two men and 48 women participated in the study. Subjects aged 18 to 65 years, of both genders, who had received antimicrobial treatment for more than 4 weeks in the past and were currently hospitalized for relapse, were included in the study.

Within the respondents' age, those over 45 years of age predominated (55%). In the area of marital status, the most numerous group were married (53%) and living in an urban environment (62%). In the area of education, individuals with vocational (43%) and higher education (37%) dominated. The majority of respondents were professionally active (74%). In case of housing conditions, up to 61% of participants rated them as good, while only 8% described them as bad.

Health behaviors were assessed using the Health Behaviour Inventory (HBI), the overall index of which was  $M=71.93$  points. The highest values were obtained by respondents in the area of positive mental attitude ( $M=3.20$  points). However, the lowest results were obtained in the area of professional practices undertaken ( $M=2.91$  points) (Table 1).

Analysis of the relationship between the subjects' sociodemographic data and health behavior showed that women obtained better values within the overall health behavior index ( $M=79.50$  points), compared to men ( $M=64.94$  points). It was observed that there was a statistically significant difference in health behavior in relation to the gender of subjects (higher scores were obtained by women). In terms of the subjects' age, there was a significant association only in the category of – proper eating habits ( $p=0.0035$ ) especially among patients from the younger age bracket (20-44 years; 3.18 points), compared to patients over 45 years of age (2.72 points).

This study showed that preventive behaviors were most often undertaken by married people (3.14 points). There was a significant difference in this area ( $p=0.0446$ ), compared to the other subgroups. An association was found between respondents' education and overall HBI index ( $p=0.0001$ ), proper eating habits ( $p<0.0001$ ), preventive measures taken ( $p<0.0001$ ) and positive mental attitude ( $p=0.0032$ ). Higher levels of health behavior intensity were presented by those with higher education (80.70 points), and the lowest by those with primary education (57.89 points). There were no significant differences in the health behavior of individuals living in urban and rural environments (Table 2).

Furthermore, professional activity significantly influenced the health behavior of subjects ( $p=0.0039$ ). It was found that those who were not working had a significantly lower health behavior severity index (56.93) than the other subjects. This relationship translated into all categories of health behavior. There was a significant difference between professional activity and proper eating habits ( $p=0.0018$ ), preventive measures taken (0.0003), positive mental attitude ( $p=0.0066$ ) and health practices carried out ( $p=0.0036$ ) (Table 3).

Our study found that as the housing conditions improved, the severity of the subjects' health behaviors increased. The relationship studied showed a significant difference in all categories of the subjects' health behaviors (Table 4).

The locus of health control was assessed using the MHLC scale, where scores were categorized into three dimensions of locus of health control. Higher scores corresponded to greater belief in the locus of health control in a given area (from 6 to 36 points). It was found that the highest locus of health control among respondents was related to incidental activities (24.17). To a lesser extent, respondents associated control of their health with personal actions (22.50), and to the least extent as the influence of others (21.09) (Table 5).

An analysis of the relationship between health behaviors and the locus of health control among respondents showed that those with a higher overall index of health behaviors associated their health to a greater extent with the influence of factors of others. However, they associated their health to a lesser extent with random actions. In particular, it was found that individuals who indicated higher levels of proper eating habits entrusted their health to a lesser extent to random actions. Respondents with higher scores related to preventive actions entrusted their health to a greater extent to the influence of other factors, while they presented an internal locus of health control and a locus of health related to random actions to a lesser extent. Subjects who had higher scores related to positive mental attitude entrusted their health to a greater extent to the influence of others, while to a lesser extent they entrusted their health to chance. Those with higher scores related to professional practices undertaken had their health dominated to a greater extent by other factors (Table 6).

The study analyzed the relationship between health behaviors and dimensions of locus of health control and selected sociodemographic variables (age, gender, marital status, education, place of residence), as well as occupational activity and housing conditions. The overall index of health behavior in the group of women surveyed was comparable to the averages obtained among patients with cardiovascular disease in both the study conducted by Kurpas et al. [4] and Kurowska et al. [5]. Analysis of the results showed an association between education and occupational activity and the health behaviors undertaken. A similar relationship was obtained in studies conducted by Ostrowska [6] and Andruszkiewicz et al. in a group of post-mastectomy women [7]. The analysis by Kurowska et al. on the other hand, presented different results among patients with heart failure, which prove that those with the lowest level of education obtained the highest averages within the preventive behaviors undertaken [8].

A study conducted by Kurowska et al. indicates that sociodemographic variables such as gender and age affect the rate of health behavior [5]. The results of own study confirm the result obtained by Kurowska et al. and the results of the study by Ostrowska and Zielińska-Więczkowska et al. where women were significantly more likely than men [6,9] to engage in health behaviors in all categories [6,9,8,10]. Also in a study by Ślusarska et al. it was shown that women were more likely to pay attention to undertaking proper professional practices compared to men [11].

Also, people who have been hospitalized more often for pulmonary tuberculosis take preventive measures and health practices to a greater extent. This may indicate that individuals have had time to become familiar with the disease and the factors that determine the slowing of disease processes. Own research indicate that people living in urban environments undertook health behaviors in all the categories mentioned [6,9,10]. However, the place of residence in the study conducted was a statistically insignificant factor, as was the case in Kurowska's study conducted among patients with lower extremity atherosclerosis [12].

This study analyzed the obtained values of locus of health control in 3 categories. The results show that the index values of the sense of internal health control were the lowest (22.50 points), compared to the results obtained by Juczyński in a group of dialyzed patients (24.13 points) and diabetics (25.77 points) [13]. The lower scores may translate into the respondents' lower autonomy in terms of the actions taken to improve and maintain their own health. The highest scores were obtained in the area relating to incidental actions (24.17 points), which may positively contribute to modification of own health behavior by making lifestyle changes. However, the low level in the

category of influence of others (21.09 points) and the low index value of the sense of internal control, may significantly reduce the mobilization to take effective actions by the subjects.

Analysis of the results of own research showed a significantly statistical negative correlation between the overall health behavior index and incidental actions ( $p=0.0079$ ) and a positive correlation within the influence of other factors ( $p=0.0151$ ). The lower the overall health behavior index value, the greater the influence of incidental actions, and as the HBI scores increase, the tendency of the influence of other determinants on respondents' health decreases. In case of health behavior related to healthy eating habits, a negative correlation was identified only in terms of external factors. Such results indicate a lesser influence of "chance" on the respondents' health with a higher Health Behaviour Inventory (HBI), which represents a greater awareness of control over own health.

The study showed that the subjects present a low level of internal locus of control. The results obtained may be due to the fact that analysis did not include such factors as self-efficacy, valuing own health, which determine the areas of health behavior among people with chronic conditions. At the same time, they provide strong support for the measures taken to maintain health through greater involvement in monitoring own health.

### **Conclusions**

1. Higher levels of correct preventive behaviors were shown in people with higher education and professionally active people, who had a high prevalence of internal locus of health control.
2. People with pulmonary tuberculosis represented high scores in the area of positive mental attitude in all categories of health behavior.
3. Significant factors influencing the level of health behavior include gender, labor force participation, education, housing, and age in the category of proper eating habits and marital status with regard to the dimension of preventive behavior.
4. Comparison of the health behavior index and locus of health control is a critical link in the area of education among people with pulmonary tuberculosis, which can influence attitudes and actions within health maintenance.

**Tabela 1. Ocena zachowań zdrowotnych osób badanych według Inwentarza Zachowań Zdrowotnych (IZZ)**

**Table 1. Evaluate health behaviors in the study group according to Health Behaviour Inventory**

Results	Health behavior index	Proper eating habits	Preventive behaviors	Positive mental attitude	Health practices
Mean	71,93	2,93	2,95	3,20	2,91

Abbreviations: M, mean.

**Tabela 2. Związek między wybranymi danymi socjodemograficznymi a zachowaniami zdrowotnymi według Inwentarza Zachowań Zdrowotnych (IZZ)**

**Table 2. Relationship between the subjects' sociodemographic data and health behaviors in the study group according to Health Behaviour Inventory**

Demographic characteristic		Health behavior index	Proper eating habits	Preventive behaviors	Positive mental attitude	Health practices
<b>Sex</b>						
Female	Mean	79,50	3,28	3,30	3,44	3,23
	SD	14,67	0,79	0,77	0,67	0,67
Men	Mean	64,94	2,60	2,63	2,97	2,62
	SD	14,52	0,69	0,72	0,71	0,66
Total	Mean	71,93	2,93	2,95	3,20	2,91
	SD	16,26	0,81	0,81	0,73	0,73
<b>p</b>		<b>&lt;0,0001*</b>	<b>0,0001*</b>	<b>&lt;0,0001*</b>	<b>0,0017*</b>	<b>0,0001*</b>
<b>Age</b>						
20-44 years	Mean	75,62	3,18	3,10	3,34	2,98
	SD	12,75	0,73	0,68	0,55	0,66
45-64 years	Mean	68,91	2,72	2,83	3,08	2,85
	SD	18,20	0,82	0,89	0,83	0,78
Total	Mean	71,93	2,93	2,95	3,20	2,91
	SD	16,26	0,81	0,81	0,73	0,73
<b>p</b>		<b>0,0566*</b>	<b>0,0035*</b>	<b>0,1709*</b>	<b>0,1186*</b>	<b>0,3925*</b>
<b>Marital status</b>						
Single	Mean	72,63	2,98	2,82	3,20	3,11
	SD	19,12	0,91	0,92	0,86	0,79
Married	Mean	73,58	3,00	3,14	3,28	2,84
	SD	11,54	0,65	0,59	0,51	0,62
Widower	Mean	69,71	2,67	2,71	3,10	3,14
	SD	23,82	0,87	1,18	1,16	1,08
Divorced	Mean	62,60	2,57	2,52	2,82	2,53
	SD	21,52	1,17	1,04	0,92	0,72
Total	Mean	71,93	2,93	2,95	3,20	2,91
	SD	16,26	0,81	0,81	0,73	0,73
<b>p</b>		<b>0,2878**</b>	<b>0,2507**</b>	<b>0,0446**</b>	<b>0,4115**</b>	<b>0,1048**</b>
<b>Educational level</b>						
Elementary	Mean	57,89	2,13	2,37	2,50	2,65
	SD	16,99	0,51	1,04	0,70	0,97
Basic	Mean	74,64	3,03	2,94	3,38	3,09
	SD	19,76	0,73	0,99	0,84	0,86

<b>High school</b>		<b>Mean</b>	66,63	2,62	2,69	3,08	2,72
		<b>SD</b>	15,08	0,71	0,72	0,76	0,67
<b>Higher education</b>		<b>Mean</b>	80,70	3,45	3,41	3,45	3,15
		<b>SD</b>	11,16	0,68	0,56	0,52	0,63
<b>Total</b>		<b>Mean</b>	71,93	2,93	2,95	3,20	2,91
		<b>SD</b>	16,26	0,81	0,81	0,73	0,73
<b>p</b>			<b>0,0001**</b>	<b>&lt;0,0001**</b>	<b>&lt;0,0001**</b>	<b>0,0032**</b>	<b>0,0572**</b>
<b>Living environment</b>							
<b>City</b>	<b>Mean</b>	72,81	3,00	3,01	3,21	2,92	
	<b>SD</b>	17,47	0,83	0,88	0,78	0,74	
<b>Village</b>	<b>Mean</b>	70,50	2,82	2,86	3,18	2,89	
	<b>SD</b>	14,16	0,78	0,69	0,65	0,72	
<b>Total</b>	<b>Mean</b>	71,93	2,93	2,95	3,20	2,91	
	<b>SD</b>	16,26	0,81	0,81	0,73	0,73	
<b>p</b>			0,3688*	0,1665*	0,3134*	0,6899*	0,9744*

Abbreviations: M, mean; SD, standard deviation; p - coefficient of the statistical significance; \*test U Manna-Whitneya; \*\*test Kruskala- Wallisa.

**Tabela 3. Związek między aktywnością zawodową a zachowaniami zdrowotnymi według Inwentarza Zachowań Zdrowotnych (IZZ)**

**Table 3. Relationship between professional activity and health behaviors in the study group according to Health Behaviour Inventory**

		<b>Health behavior index</b>	<b>Proper eating habits</b>	<b>Preventive behaviors</b>	<b>Positive mental attitude</b>	<b>Health practices</b>
<b>Professional activity</b>						
<b>Working people</b>	<b>Mean</b>	74,32	3,10	3,08	3,29	2,91
	<b>SD</b>	14,22	0,75	0,68	0,61	0,69
<b>Pensioners</b>	<b>Mean</b>	71,00	2,31	2,98	3,12	3,43
	<b>SD</b>	14,11	0,65	1,00	0,71	0,52
<b>Retirees</b>	<b>Mean</b>	85,50	2,96	3,58	3,96	3,75
	<b>SD</b>	14,82	0,55	0,74	0,63	0,69
<b>People not working</b>	<b>Mean</b>	56,93	2,34	2,12	2,58	2,44
	<b>SD</b>	18,91	0,89	0,90	0,93	0,71
<b>Total</b>	<b>Mean</b>	71,93	2,93	2,95	3,20	2,91
	<b>SD</b>	16,26	0,81	0,81	0,73	0,73
<b>p</b>		<b>0,0039*</b>	<b>0,0018*</b>	<b>0,0003*</b>	<b>0,0066*</b>	<b>0,0036*</b>

Abbreviations: M, mean; SD, standard deviation; p - coefficient of the statistical significance; \*test Kruskala - Wallisa.



**Tabela 4. Związek między warunkami mieszkaniowymi a zachowaniami zdrowotnymi według Inwentarza Zachowań Zdrowotnych (IZZ)**

**Table 4. Relationship between housing conditions and health behaviors in the study group according to Health Behaviour Inventory**

		Health behavior index	Proper eating habits	Preventive behaviors	Positive mental attitude	Health practices
<b>Housing conditions - subjective assessment</b>						
Very good	Mean	87,56	3,94	3,43	3,78	3,44
	SD	12,28	0,74	0,53	0,49	0,59
Good	Mean	76,49	3,11	3,21	3,39	3,04
	SD	12,22	0,63	0,64	0,58	0,67
Medium	Mean	63,73	2,45	2,57	2,87	2,73
	SD	12,40	0,57	0,73	0,61	0,64
Poor	Mean	42,13	1,69	1,50	1,96	1,88
	SD	10,11	0,50	0,42	0,60	0,53
Total	Mean	71,93	2,93	2,95	3,20	2,91
	SD	16,26	0,81	0,81	0,73	0,73
<b>p</b>		<b>&lt;0,0001*</b>	<b>&lt;0,0001*</b>	<b>&lt;0,0001*</b>	<b>&lt;0,0001*</b>	<b>&lt;0,0001*</b>

Abbreviations: M, mean; SD, standard deviation; p - coefficient of the statistical significance;

\*test Kruskala - Wallisa.

**Tabela 5. Ocena kontroli własnego zdrowia według Wielowymiarowej Skali Umiejszczenia Kontroli Zdrowia (MHLC)**

**Table 5. Evaluate health control in the study group according to Multidimensional Health Locus of Control Scale (MHLC)**

Results	Internal locus of health control	Influence of others	Random actions
Mean	22,50	21,09	24,17

Abbreviations: M, mean.

**Tabela 6. Związek między zachowaniami zdrowotnymi a umiejscowieniem kontroli zdrowia w badanej grupie**

**Table 6. Relationship between health behaviors and the locus of health control among respondents**

		Internal locus of health control	Influence of others	Random actions
Health behavior index	rho	-0,1463	0,2423	-0,2641
	*p	0,1463	<b>0,0151</b>	<b>0,0079</b>
Proper eating habits	rho	-0,0856	0,0552	-0,2859
	*p	0,3973	0,5855	<b>0,0039</b>
Preventive behaviors	rho	-0,1982	0,2764	-0,3201
	*p	<b>0,0481</b>	<b>0,0054</b>	<b>0,0012</b>
Positive mental attitude	rho	-0,1591	0,2623	-0,1967
	*p	0,1140	<b>0,0084</b>	<b>0,0498</b>
Health practices	rho	-0,1200	0,3272	-0,1891
	*p	0,2343	<b>0,0009</b>	0,0595

Abbreviations: \*statistically significant p-value; rho - Spearman's rank correlation coefficient.

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