Disparities in knowledge of cardiovascular risk factors and prevention methods related to cardiovascular status and functional health literacy in Poland, 2020–2021

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Editorial
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ABSTRACT

Background: Numerous studies have reported a significant role of health literacy (HL) in the prevention or treatment of various diseases. However, in Poland, there was no scientific research involving simultaneously the status of cardiovascular disease (CVD) and HL in assessment of health knowledge; therefore, it became the objective of our study.

Aims: We aimed to evaluate the level of CVD knowledge depending on CVD status and functional HL in the Polish population.

Methods: The study population consisted of 2827 participants from the WOBASZ II Survey aged 20–89 years: 2266 were CVD-free (non-CVD), 361 were hospitalized for CVD (CVDH[+]), and 200 were diagnosed with CVD but not hospitalized (CVDH[-]). The Newest Vital Sign test (NVS) was applied to determine functional HL. Self-reported knowledge of CVD risk factors (RFs) and prevention methods (PMs) in participants with different CVD status depending on HL was estimated. Multivariable ordinal and binary logistic regression analyses were performed to find predictors of RFs and PMs knowledge.

Results: The knowledge of CVD RFs and/or PMs was strictly related to HL and CVD status. Inadequate HL decreased the satisfactory (≥5 RFs/PMs) knowledge of RFs (odds ratio [OR], 0.50; 95% confidence interval [CI], 0.40–0.62) and PMs (OR, 0.56; 95% CI, 0.45–0.71). CVDH(-) participants were more likely to have satisfactory PMs knowledge (OR, 1.49; 95% CI, 1.02–2.16), while CVDH(+) participants satisfactory RFs knowledge (OR, 1.85; 95% CI, 1.35–2.53).

Conclusions: HL and CVD status are the key determinants of CDV RFs/PMs knowledge. Functional HL significantly affects health knowledge; therefore, HL screening should be recommended in primary care to increase the effectiveness of primary CVD prevention.

Key words: cardiovascular disease, health inequalities, health literacy, health promotion, risk factors

INTRODUCTION

Cardiovascular disease (CVD) is the main cause of mortality and disability throughout the world and in Poland. It caused 17.9 million deaths (32% of all global deaths) in 2019 [1]. Forty percent of deaths in Poland are due to CVD. One of the biggest threats to global health that occurred in the last 10 years was the high number of deaths from ischemic heart disease and stroke [2]. One way to reverse this unfortunate situation would be to place more emphasis on primary prevention, which refers to the steps taken by individuals to prevent the onset of CVD. Knowlege of risk factors (RFs) and non-pharmacological prevention methods (PMs) is required to take these steps.

Individuals cannot change unmodifiable CVD RFs (age, sex) but can modify their lifestyle by making proper choices such as a healthy diet, exercise, no tobacco use, no excessive alcohol drinking, and avoiding

WHAT'S NEW?

Cardiovascular disease (CVD) knowledge is associated with health literacy (HL): the higher level of HL, the better CVD knowledge. The novelty of this study is in-depth analysis of the knowledge of CVD risk factors and prevention methods in people with different CVD status (free from CVD, diagnosed with CVD, or hospitalized for CVD) and adequate or inadequate HL, simultaneously. The most important findings were differences between persons with varying CVD status within the HL subgroups. Our study revealed that CVD status plays a crucial role in acquiring knowledge of particular CVD risk factors and prevention methods — the greatest knowledge was mostly observed in hospitalized CVD patients with inadequate HL and in non-hospitalized CVD patients with adequate HL. These findings may be particularly important in public health practice because they show that patients' HL may affect CVD prevention and/or development. Therefore, HL screening should be recommended in primary care to better understand patient needs, reduce health inequalities, and increase the effectiveness of CVD prevention and/or treatment.

chronic stress. Lifestyle change is possible at every stage of life, both among CVD-free or CVD-diagnosed people and can bring tangible benefits.

Numerous studies report a helpful role of functional health literacy (HL) [3, 4], defined as "a person's ability to read and comprehend information and instructions in health settings" [5]. An adequate level of HL can significantly contribute to maintaining a healthy lifestyle, increasing detection of CVD, and the effectiveness of CVD treatment [6]. Limited HL has been shown to result in "an increased risk of morbidity and premature death in older adults independent of age, socioeconomic position, cognitive function and pre-existing illness" [7].

CVD RFs and/or PMs knowledge has also been shown to depend on CVD status [3, 4]. However, to our best knowledge, there was no scientific research involving simultaneously different CVD status and HL in the assessment of CVD health knowledge in Poland.

Therefore, the purpose of our study was to investigate and describe similarities and disparities between individuals with different CVD status and with adequate and inadequate functional HL.

METHODS

Study population

The current study related to the assessment of functional HL in participants with different CVD status was conducted in 2020–2021. We used data from the National Multicenter Health Examination Survey (Polish acronym WOBASZ II), which took place in 2013–2014 in a randomly selected sample of 6170 respondents; details are available elsewhere [8]. A pilot study on the evaluation of HL was included in the WOBASZ II Survey in 2014 among participants from 8 voivodeships (dolnoslaskie, kujawsko-pomorskie, lubuskie, opolskie, podkarpackie, warminsko-mazurskie, wielkopolskie, zachodniopomorskie). There were 2868 respondents who completed the main questionnaire of the WOBASZ II Survey and participated in the HL test. Finally, our study was based on 2827 interviewees aged 20–89 years, 1270 (44.9%) men, and 1557 (55.1%) women, after excluding 39 of the respondents who did not provide information about their CVD status. Both studies were approved by the Bioethics Committee of the National Institute of Cardiology (current study: no. 1857/2020, WOBASZ II: no. 1344/2012). Written informed consent was obtained from all participants.

Identifying CVD status

We classified the interviewees as free from CVD if they answered "no" to the question about being diagnosed or hospitalized for CVD (non-CVD group, n = 2266) and as having CVD if they answered "yes" to the same question (CVD group, n = 561). Then we assigned participants into two CVD subgroups: the group hospitalized for CVD (CVDH[+], n = 361) and the group diagnosed with CVD but not hospitalized (CVDH[-], n = 200). Respondents were diagnosed with any of the following CVDs: coronary heart disease (n = 214, 38.1%), myocardial infarction (n = 95, 16.9%), atrial fibrillation (n = 144, 25.7%), abnormal heart rhythm or other cardiac arrhythmias (n = 204, 36.4%), peripheral vascular disease of the lower limbs (n = 135, 24.1%), and stroke (n = 69, 12.3%). CVD-related hosptializations were due to acute coronary heart disease (n = 138, 38.3%), myocardial infarction (n = 100, 27.8%), atrial fibrillation (n = 119, 33.1%), abnormal heart rhythm or other cardiac arrhythmias (n = 107, 29.7%), heart failure (n = 96, 26.7%), stroke (n = 72, 20.0%), coronary angioplasty or coronary artery bypass grafting (n = 54, 15.0%), an implanted pacemaker or cardioverter-defibrillator (n = 25, 6.9%).

Measurement of health literacy

From many validated instruments used to assess HL skills [5], the Newest Vital Sign Test (NVS) was applied to determine functional HL [9, 10]. Respondents completed the 6-question test in the Polish language version, which was adopted for the first time during the European Health Literacy Survey (HLS-EU) in 2011 [11]. We applied the bivalent classification to convert the NVS score from a seven-point scale. An adequate level of HL was assigned to the respondent if he/she achieved a score of 4–6 in NVS and an inadequate (limited) level of HL if his/her result was in the range of 0–3.

Assessment of knowledge of CVD risk factors and non-pharmacological prevention methods

A multistage approach was applied to evaluate the level of CVD RFs/PMs knowledge based on open-ended questions. First, we estimated the knowledge of single CVD RFs or PMs. We classified respondents as knowing relevant CVD RFs if they listed any of the following modifiable RFs: hypertension, tobacco smoking, increased alcohol consumption, overweight and/or obesity, improper diet, low physical activity, chronic stress, diabetes mellitus (DM), increased total cholesterol (T-Chol), increased low-density lipoprotein cholesterol (LDL-C), and decreased high-density lipoprotein cholesterol (HDL-C). We classified participants as knowing relevant CVD PMs if they mentioned any of the following non-pharmacological modifiable PMs: tobacco smoking cessation, alcohol consumption reduction, regular physical activity, weight reduction in persons with overweight or obesity, leading a regular lifestyle and/or avoiding chronic stress, fat intake reduction, salt intake reduction, and regular consumption of fruits and vegetables.

Respondents could obtain one point for each correct answer, and a composite knowledge index was created by summing the responses for each item. CVD RFs and PMs knowledge indices were calculated separately and were in the range of 0–11 and 0–8, respectively. Furthermore, they were converted to a 4-point scale: poor (0–1 points), moderate (2–3 points), good (4–5 points), and very good (≥6 points). The method of recoding reflected the degree of dissemination of knowledge; therefore, the same scale was used for CVD RFs/PMs despite the different ranges of the original scales. We also defined a satisfactory level of CVD RFs/PMs knowledge (≥5 points). The threshold value was arbitrarily determined as the value equal to the upper limit of good CVD RFs/PMs knowledge.

Statistical analysis

First, the prevalence of CVD RFs and PMs knowledge was estimated between different CVD status groups depending on functional HL. Second, multivariable ordinal (a partial proportional odds model) and binary logistic regression analyzes were performed to find potential predictors of CVD RF/PM knowledge, respectively, for four-level (very good, good, moderate, poor) and two-level (satisfactory, unsatisfactory) dependent variables.

Descriptive statistics were presented as means (standard deviation [SD]) for continuous data and numbers (percentages) for categorical data, and the Kruskal-Wallis test or χ^2 test was applied for comparisons between groups, respectively. Percentages and means with a 95% confidence interval (CI) related to the level of CVD RFs/PMs knowledge were adjusted for age, sex, education, and size of the place of residence in a general linear model with the Tukey-Kramer adjustment for multiple comparisons. The determinants of CVD RFs/PMs knowledge were expressed as the odds ratio (OR) with 95% CI. The level of significance was assumed at P <0.05. Data analyzes were performed using SAS9.4 software (SAS Institute Inc., Cary, NC, US).

RESULTS

The mean age (SD) of the study population was 49.7 (16.3) years. Respondents with different CVD status varied in the background variables: sex, age, education, some categories of marital status or place of residence, and HL (Table 1). The respondents with CVDH(+) status were the oldest (64.5 [13.0] years vs. CVDH[-], 58.9 (14.9) years, and non-CVD, 46.5 (15.2) years; P <0.001), with the lowest level of secondary and higher education (40.1% vs. CVDH[-], 56.5% and non-CVD, 62.3%; P <0.001) and with the highest percentage of individuals with inadequate functional HL (65.7% vs. CVDH[-], 44.0% and non-CVD, 42.5%; P <0.001).

First, the relationships between knowledge of CVD RFs/PMs were found separately either for the HL level of the respondent or the presence or absence of CVD. As expected, participants with adequate HL or positive CVD status had better knowledge than participants with inadequate HL and non-CVD status.

The differences in CVD knowledge by HL were statistically significant for the following RFs: hypertension, tobacco smoking, increased alcohol consumption, overweight and/or obesity, improper diet, low physical activity, chronic stress, and increased T-Chol, and for the following PMs: tobacco smoking cessation, alcohol consumption reduction, regular physical activity, weight reduction, leading a regular lifestyle, fat or salt intake reduction (Supplementary material, *Figure S1A* and *S1B*, respectively).

The differences in CVD knowledge between non-CVD and CVD persons were significant for the following RFs: hypertension, tobacco smoking, increased alcohol consumption, DM, and increased T-Chol, and for the following PMs: tobacco smoking cessation, weight reduction, fat intake reduction, and regular consumption of fruits and vegetables (Supplementary material, *Figure S1A* and *S1B*, respectively).

Secondly, the knowledge of CVD RFs/PMs was investigated simultaneously by CVD status and HL level. The detailed data and distribution of 2 to 4 most frequently mentioned CVD RFs/PMs, and their sums are presented in Supplementary material, *Table S1* and *Figure S2*, respectively. Additionally, the graph shows the level of ignorance about CVD RFs/PMs (no CVD RFs or PMs known).

There were two different patterns of CVD RFs knowledge distribution between respondents with different CVD status within each HL subgroup.

Subgroup with inadequate health literacy

In the subgroup with inadequate HL, the highest knowledge was observed in CVDH(+) participants almost for all significantly different RFs: hypertension (47.3%; 95% CI, 40.8%–53.9%), overweight and/or obesity (36.7%; 95% CI, 30.8%–42.6%), increased T-Chol (31.1%; 95% CI, 26.6%–37.6%), except for DM (the highest knowledge

Table 1. Baseline characteristics of respondents by CVD status

	Total	Cardiovascular disease status			
		Non-CVD	CVD		*P*-value
			CVDH(-)	CVDH(+)	
Respondents, n (%)	2827 (100.0)	2266 (80.1)	200 (7.1)	361 (12.8)	—
Sex, n (%)					
Male	1270 (44.9)	1015 (44.8)	67 (33.5)	188 (52.1)	<0.001
Female	1557 (55.1)	1251 (55.2)	133 (66.5)	173 (47.9)	
Age, years					
Mean (SD)	49.7 (16.3)	46.5 (15.2)	58.9 (14.9)	64.5 (13.0)	<0.001
Age group, n (%)					
20–44 years	1149 (40.6)	1086 (47.9)	34 (17.0)	29 (8.0)	<0.001
45–59 years	822 (29.1)	683 (30.1)	59 (29.5)	80 (22.2)	
60–74 years	646 (22.9)	404 (17.8)	75 (37.5)	167 (46.3)	
≥75 years	210 (7.4)	93 (4.1)	32 (16.0)	85 (23.5)	
Marital status, n (%)					
Married/cohabited	1856 (65.7)	1487 (65.6)	129 (64.5)	240 (66.5)	<0.001
Single	493 (17.4)	456 (20.1)	22 (11.0)	15 (4.1)	
Widowed	317 (11.2)	189 (8.3)	40 (20.0)	88 (24.4)	
Divorced/separated	161 (5.7)	134 (5.9)	9 (4.5)	18 (5.0)	
Education, n (%)					
Primary	490 (17.3)	312 (13.7)	50 (25.0)	128 (35.5)	<0.001
Vocational	669 (23.7)	544 (24.0)	37 (18.5)	88 (24.4)	
Secondary	1023 (36.2)	844 (37.3)	72 (36.0)	107 (29.6)	
Higher	645 (22.8)	566 (25.0)	41 (20.5)	38 (10.5)	
Size of the place of residence, n (%)					
Small community (<8000 inhabitants)	933 (33.0)	764 (33.7)	51 (25.5)	118 (32.7)	0.017
Medium community (8000–40 000 inhabitants)	940 (33.3)	739 (32.6)	65 (32.5)	136 (37.7)	
Large community (≥40 000 inhabitants)	954 (33.7)	763 (33.7)	84 (42.0)	107 (29.6)	
Health literacy, n (%)					
Inadequate	1289 (45.6)	964 (42.5)	88 (44.0)	237 (65.7)	<0.001
Adequate	1538 (54.4)	1302 (57.5)	112 (56.0)	124 (34.3)	

Abbreviations: CVD, cardiovascular disease; SD, standard deviation

Definitions: non-CVD, without CVD; CVDH(-), CVD-diagnosed but not hospitalized; CVDH(+), CVD-diagnosed and hospitalized; education: primary, none, partial or completed primary school; vocational, after completed primary or middle school; secondary, high or post-secondary school, higher, bachelor's degree or tertiary education

in CVDH[-] subjects [21.6%; 95% CI, 14.5%–28.6%]). No significant differences were noticed in the knowledge of singular CVD PMs, except knowledge of the necessity for weight reduction.

There was a difference between participants with different CVD status (non-CVD, CVDH[-], CVDH[+]) in the average and satisfactory levels of CVD RF knowledge (2.3 [95% CI, 2.1–2.5]; 2.7 [95% CI, 2.2–3.2]; 3.0 [95% CI, 2.7–3.3]; P <0.001, and 14.8% [95% CI, 12.5%–17.2%]; 21.1% [95% CI, 14.2%–28.0%]; 21.2% [95% CI, 16.7%–25.7%]; P = 0.02, respectively), but not in the average or satisfactory levels of CVD PMs knowledge. The lowest percentage of participants with poor CVD RFs knowledge was in the CVDH(+) subgroup (31.6% [95% CI, 25.0%–38.2%]) (Supplementary material, *Table S1*).

Subgroup with adequate health literacy

In the subgroup with adequate HL, the greatest CVD RF knowledge was noticed in CVDH(-) respondents in relation to the following significantly different RFs: tobacco smoking (56.1% [95% CI, 46.4%–65.8%]), improper diet (54.4% [95% CI, 46.2%–64.5%]), and low physical activity (33.1% [95% CI, 24.3%–42.0%]), except increased alcohol consumption (the highest knowledge in CVDH(+) subjects (43.2% [95% CI, 34.1%–52.3%]). Furthermore, CVDH(-) respondents had the greatest PMs knowledge, although not statistically significant, except knowledge of the requirement for fat intake reduction and regular consumption of fruits and vegetables.

There was no significant difference in the average number of self-reported CVD RFs between participants with different CVD status (non-CVD, CVDH[-], CVDH[+]), although it was in the average and satisfactory levels of CVD PMs knowledge (3.3 [3.2–3.4], 3.9 [3.5–4.2], 3.4 [3.0–3.7]; P = 0.005 and 21.8% [18.8%–24.8%], 32.7% [24.3%–41.1%], 26.2% [18.1%–34.3%]; P = 0.03, respectively). The lowest percentage of participants with poor CVD RFs and PMs knowledge was in the CVDH(-) subgroup (17.3% [9.4%–25.2%] and 5.7% [0%–12.0%], respectively) (Supplementary material, *Table S1*).

Predictors of knowledge of CVD risk factors and prevention methods

HL and CVD status impacted the knowledge of CDV RFs/PMs. Inadequate HL reduced the knowledge by 51% and 48% (Table 2, model 1) for RFs and PMs, respectively, while the presence of CVD increased the knowledge about RFs/PMs. Participants diagnosed or hospitalized for CVD were more likely to have a higher level of knowledge of RFs and PMs (by 48% and 62%, and by 65% and 32%, respectively).

Education also impacted CVD RFs/PMs knowledge: the lower the educational level, the lower knowledge (Table 2). Furthermore, the place of residence had a substantial impact on RFs/PMs knowledge. Living in a medium community substantially increased only the possibility of a very good level of RFs knowledge (OR, 1.74; 95% CI, 1.38–2.20), while living in a small community significantly decreased the knowledge (OR, 0.80; 95% CI, 0.67–0.96) regardless of its level. In turn, living in a medium community increased the level of PMs knowledge by 28%, 48%, and 86% for moderate, good, and very good levels of knowledge, respectively. Living in a small community did not affect CVD PMs knowledge.

Additionally, participants aged 45–59 years were more likely to have a higher level of RFs knowledge (by 47%), while persons aged 75 years and older were more likely to have a lower level of PMs knowledge (by 42%). In our study, neither RFs knowledge nor PMs knowledge was sex-dependent (Table 2).

Similar results were obtained for satisfactory knowledge of RFs/PMs in relation to HL, education, and sex (Table 2, model 2). Living in a small community did not impact RFs knowledge, while living in a medium community increased by 43% and 81% the possibility of achieving satisfactory RFs and PMs knowledge, respectively. Participants aged 45–59 years were more likely to obtain satisfactory RFs knowledge, whereas age did not affect the achievement of satisfactory PMs knowledge.

The ability to achieve satisfactory RFs knowledge was significantly higher only in CVDH(+) subjects (OR, 1.85; 95% CI, 1.35–2.53) and satisfactory PMs knowledge only in CVDH(-) subjects (OR, 1.49; 95% CI, 1.02–2.16). It was the main difference in the influence of CVD status on RFs/PMs knowledge.

DISCUSSION

The overall level of adequate HL (54.4%), measured by the NVS test, in the adult Polish population in 2014 was noticeably higher than the level of adequate HL (42.2%) in the HLS-EU in 2011 [12]. The increasing percentage of adults with adequate HL appears to be a good prognosis for the future, also compared to other European countries. A meta-analysis of low HL in Europe showed the middle position of Poland among European countries with low HL of 45% (95% CI, 41%–48%) against the highest level of low HL of 62% (95% CI, 59%–65%) in Bulgaria and the lowest level of low HL of 29% (95% CI, 26%–32%) in the Netherlands [13].

The percentage of participants without CVD who did not know any RFs changed from 20.8% to 37.1% in the subgroups with adequate and inadequate HL, respectively. Our results are consistent with those of the Brazilian study [14], where one-third of the respondents were unable to identify at least one CVD RF. The results of other Polish studies also confirm the low level of health knowledge, especially in people with CVD or at risk of CVD [15].

A little knowledge of the impact of DM on CVD and the relationship between cholesterol fractions and CVD was also observed, whereas, at that time, 8.4% and 67.1% of Polish adults were affected by DM or hypercholesterolemia, respectively [16, 17].

In general, knowledge of CVD PMs and RFs seemed to be closely related, but it was not reflected in everyday life. In our study, more than 50% of respondents with inadequate HL and more than 60% with adequate HL knew that regular physical activity could reduce CVD risk, but only 27.3% of men and 28.7% of women participated in recommended physical activity (exercises lasting ≥30 min/day at least 5 times per week) [18]. Furthermore, the focus on one PM does not result in compliance with other recommendations: knowledge of recommended daily sodium intake and/or harmful use of excessive amounts of sodium contributed to the control of dietary salt intake but did not affect awareness of other PMs [19].

The knowledge of CVD RFs/PMs was found to be related to HL, CVD status, and education, as previously demonstrated by other researchers [5, 6]. In Poland, better-educated patients (>11 years) who participate in cardiac rehabilitation within comprehensive, coordinated care after myocardial infarction achieve more effective results compared to non-participants [20].

The relationship between HL and education requires additional attention. The final level of formal education is an attribute acquired by a person at a young adult age. When HL was based on the concept of traditional and functional literacy, there was a simple dependence: adults with limited functional literacy skills had difficulties in maintaining well-being.

Nowadays, general HL refers to personal "knowledge, motivation and competencies to access, understand, appraise and apply information to make judgments and take decisions in everyday life concerning healthcare, disease prevention, and health promotion to maintain and improve quality of life during the life course" [5]. The broadening of HL definition and the rapid development of medical science and technology in the 21st century mean that yesterday's knowledge may be outdated and insufficient today.

Living in a medium size community may be pivotal for good and very good level of CVD RFs/PMs knowledge. We suppose that in large communities, the fast pace of life does not encourage mutual integration and active participation

Table 2. Predictors of CVD risk factors or non-pharmacological CVD prevention methods knowledge

	Model 1			
Level of knowledge	**Risk factors**		**Prevention methods**	
Very good, n (%)	410 (14.5)		275 (9.8)	
Good, n (%)	618 (21.9)		719 (25.4)	
Moderate, n (%)	839 (29.7)		1216 (43.0)	
Poor, n (%)	960 (33.9)		617 (21.8)	
	Ordinal logistic regression			
Predictor	**OR (95% CI)**	***P*-value**	**OR (95% CI)**	***P*-value**
Sex				
Female	1 [Reference]	—	1 [Reference]	—
Male	0.90 (0.78–1.04)	0.14	0.93 (0.80–1.07)	0.28
Age, years				
20–44	1 [Reference]	—	1 [Reference]	—
45–59	1.47 (1.23–1.74)	<0.001	1.10 (0.93–1.31)	0.26
60–74	1.10 (0.90–1.35)	0.36	0.96 (0.78–1.18)	0.68
≥75	0.84 (0.60–1.19)	0.32	0.58 (0.41–0.81)	0.002
Education				
Higher	1 [Reference]	—	1 [Reference]	—
Secondary	0.48 (0.40–0.58)	<0.001	0.55 (0.46–0.67)	<0.001
Basic vocational	0.30 (0.24–0.37)	<0.001	0.38 (0.30–0.47)	<0.001
Primary	0.17 (0.13–0.23)	<0.001	0.18 (0.13–0.23)	<0.001
Size of the place of residence[a]				
Large	1 [Reference]	—	1 [Reference]	—
Medium Very Good	1.74 (1.38–2.20)	<0.001	1.86 (1.42–2.44)	<0.001
Medium Good	1.17 (0.97–1.41)	0.11	1.48 (1.23–1.79)	<0.001
Medium Moderate	0.99 (0.81–1.20)	0.89	1.28 (1.02–1.60)	0.04
Small	0.80 (0.67–0.96)	0.01	1.05 (0.88–1.26)	0.57
CVD status				
Non-CVD	1 [Reference]	—	1 [Reference]	—
CVDH(-)	1.48 (1.12–1.94)	0.005	1.65 (1.26–2.17)	<0.001
CVDH(+)	1.62 (1.30–2.04)	<0.001	1.32 (1.05–1.66)	0.02
Health literacy				
Adequate	1 [Reference]	—	1 [Reference]	—
Inadequate	0.49 (0.42–0.57)	<0.001	0.52 (0.44–0.61)	<0.001
	MODEL 2			
Level of knowledge	**Risk factors**		**Prevention methods**	
Satisfactory	622 (22.0)		541 (19.1)	
Unsatisfactory	2205 (78.0)		2286 (80.9)	
	Binary logistic regression			
Predictor	**OR (95% CI)**	***P*-value**	**OR (95% CI)**	***P*-value**
Sex				
Female	1 [Reference]	—	1 [Reference]	—
Male	0.91 (0.75–1.10)	0.32	0.91 (0.75–1.12)	0.38
Age, years				
20–44	1 [Reference]	—	1 [Reference]	—
45–59	1.41 (1.13–1.77)	0.003	1.15 (0.91–1.46)	0.24
60–74	0.89 (0.66–1.20)	0.46	0.94 (0.70–1.28)	0.70
≥75	0.80 (0.46–1.39)	0.42	0.63 (0.34–1.16)	0.14
Education				
Higher	1 [Reference]	—	1 [Reference]	—
Secondary	0.52 (0.41–0.65)	<0.001	0.49 (0.39–0.63)	<0.001
Basic vocational	0.30 (0.22–0.41)	<0.001	0.40 (0.29–0.54)	<0.001
Primary	0.18 (0.12–0.27)	<0.001	0.21 (0.13–0.33)	<0.001
Size of the place of residence				
Large	1 [Reference]	—	1 [Reference]	—
Medium	1.43 (1.15–1.79)	0.002	1.81 (1.43–2.30)	<0.001
Small	0.98 (0.76–1.26)	0.86	1.28 (0.98–1.67)	0.07
CVD status				
non-CVD	1 [Reference]	—	1 [Reference]	—
CVDH(-)	1.35 (0.93–1.95)	0.12	1.49 (1.02–2.16)	0.04
CVDH(+)	1.85 (1.35–2.53)	<0.001	1.16 (0.83–1.64)	0.39
Health literacy				
Adequate	1 [Reference]	—	1 [Reference]	—
Inadequate	0.50 (0.40–0.62)	<0.001	0.56 (0.45–0.71)	<0.001

Abbreviations: CI, confidence interval; CVD, cardiovascular disease; OR, odds ratio; PM, prevention method; RF, risk factor; SE, standard error; other abbreviations and definitions — see Table 1

[a]Levels of CVD RFs/PMs knowledge: very good ≥6 RFs/PMs; good 4–5 RFs/PMs; moderate 2–3 RFs/PMs; poor 0–1 RFs/PMs; satisfactory ≥5 RFs/PMs; unsatisfactory 0–4 RFs/PMs

in CVD prevention programs, while in small communities, public access to expert knowledge and preventive programs is not as common as in larger centers. Some sociological studies indicate that environmental and cultural factors, and social capital, are the reasons for differences between municipalities in Poland. Mantaj et al. [21] observed similar dependencies: self-monitoring of health and intensity of preventive examinations were the highest in medium cities (<50 000) compared to rural areas and larger cities (>50 000), respectively, 72.7% vs. 43.8% and 44.7%. However, this interesting phenomenon would require further in-depth research.

Undeniably, the crucial findings of our study were the differences between persons with different CVD status within HL subgroups. Among respondents with adequate HL, the lowest percentage of participants who had poor knowledge of CVD RFs was in CVDH(-) respondents, which could suggest a good implementation of primary prevention. In turn, among the respondents with inadequate HL, the lowest percentage of participants who had poor knowledge of CVD RFs was in CVDH(+) respondents, which could suggest that they acquired and/or deepened their knowledge in secondary prevention.

People, even those who participate in prevention programs, do not comply with the advice they receive from healthcare professionals. Moreover, older patients (65+ years) are 50% less likely to recollect information compared to younger patients [22]. Probably, in patients with inadequate HL, this percentage would be higher. Therefore, optimal patient-doctor communication, adapted to the patient's HL and actual perception capacity, becomes an urgent need. Furthermore, age-related and HL-dependent individual cognitive competence [23] leads to higher mortality in people with lower HL [24].

There was a verification of the usefulness of HL during the COVID-19 pandemic. The growing threat of SARS-CoV-2 infection, high morbidity, and mortality due to COVID-19 disease limited access to traditional medical care and created the need for e-health and telemedicine systems. Higher HL significantly impacted user satisfaction and ease of use of remote visits in Polish patients (OR, 1.12; 95% CI, 1.08–1.16 and OR, 1.18; 95% CI, 1.14–1.22, respectively) [25].

Knowledge of CVD RFs and PMs was of particular importance during the pandemic. Smoking and obesity, and CVD itself significantly increased COVID-19 mortality (OR, 2.24; 95% CI, 1.4–3.58; OR, 2.28; 95% CI, 0.76–6.90 and OR, 7.87; 95% CI, 2.12–28.57 at maximum estimate, respectively) [26]. The high prevalence of CVD RFs in the Polish population and decreased attention to CVD prevention during the COVID-19 pandemic led to the development of modern prevention programs.

In conclusion, it seems that patients' HL may be a key determinant of CVD prevention, development, treatment, and positive health outcomes [27], also in Poland. Initial evaluation of patient HL will allow for personalized and tailored doctor-patient contact and choice of an appropriate way of providing medical information, especially for patients from vulnerable groups (i.e., with low educational level, advanced age, and poor handling of new technologies). This is particularly important in aging societies accompanied by a progressive increase in non-communicable diseases. Therefore, HL screening is recommended in primary cardiac care to better understand patients' needs, provide adequate medical care, and reduce health inequalities.

Our conclusions are in line with the findings of a systematic review of HL measurement in CVD patients by Elbashir et al. [4] and their suggestion that healthcare professionals should consider HL assessment as a routine practice in CVD patients. Furthermore, necessary actions should still be taken to intensify health promotion and improve the quality of primary CVD prevention. We believe that our findings can facilitate future actions, especially since taking HL into account in creating social environments by both national and local authorities has been recommended in the 2021 ESC Guidelines on CVD prevention in clinical practice [28].

Our study has several limitations. First, it was a cross-sectional study; therefore, we could not investigate the relationship between HL and CVD status. Second, only 8 of 16 voivodeships and only some of the diseases classified as CVD were included in the study, so we cannot generalize the results to the entire population of Poland. However, the main strength of our study is the large number of participants and the simultaneous consideration of many factors that affect CVD knowledge (sex, age, education level, place of residence, HL, CVD status).

Supplementary material

Supplementary material is available at https://journals.viamedica.pl/kardiologia_polska.

Article information

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