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HEALTH BEHAVIOR AND HEALTH-RELATED QUALITY OF LIFE IN PATIENTS WITH A HIGH RISK OF CARDIOVASCULAR DISEASE

ZDRAVSTVENE NAVADE IN Z ZDRAVJEM POVEZANA KAKOVOST ŽIVLJENJA PRI BOLNIKIH Z VISOKIM TVEGANJEM ZA NASTANEK BOLEZNI SRCA IN OŽILJA

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ABSTRACT

Keywords:
high risk, cardiovascular diseases, HRQoL, risk factors

Background: Health-related quality of life (HRQoL) is measuring a patient's experience of his health status and represents an outcome of medical interventions. Existing data proves that a healthy lifestyle is positively associated with HRQoL in all age groups. Patients with a high risk for cardiovascular disease typically led an unhealthy lifestyle combined with risk diseases. We aimed to analyse these characteristics and their reflection in HRQoL.

Methods: A cross-sectional study in 36 family practices, stratified by location and size. Each practice invited 30 high-risk patients from the register. Data were obtained from medical records and patient questionnaire. The EQ-5D questionnaire and the VAS scale were used for measuring the patient's HRQoL as an independent variable.

Results: 871 patients (80.6% response rate) were included in the analysis. 60.0% had 3-4 uncontrolled risk factors for CVD. The average VAS scale was 63.2 (SD 19.4). The correlation of EQ-5D was found in the number of visits in the practice (r=-0.31, p<0.001), the socioeconomic status (r=-0.25, p=0.001), age (r=-0.27, p=0.001) and healthy diet (r=0.20, p=0.006). In a multivariate model, only physical activity among lifestyle characteristics was an independent predictor of HRQoL (p=0.001, t=3.3), along with the frequency of visits (p<0.001, t=-5.3) and age (p=0.025, t=-2.2).

Conclusion: This study has been performed on a specific group of patients, not being "really sick", but having less optimal lifestyle in many cases. Encouragement to improve or keep healthy lifestyle, especially physical activity, is important, not only to lower the risk for CVD, but also to improve HRQoL.

IZVLEČEK

Ključne besede:
visoko tveganje, bolezni srca in ožilja, z zdravjem povezana kakovost življenja, dejavniki tveganja

Izhodišča: *Z zdravjem povezana kakovost življenja (HRQoL) meri bolnikovo lastno izkušnjo njegovega zdravstvenega stanja in je eden od izidov zdravstvenih intervencij. Številne raziskave potrjujejo, da je zdrav življenjski slog v vseh starostnih skupinah povezan z boljšo kakovostjo življenja. Značilno je, da imajo bolniki z visoko ogroženostjo za nastanek bolezni srca in ožilja nezdrav življenjski slog, ob prisotnih sočasnih tako imenovanih boleznih tveganja, kot je npr. arterijska hipertenzija. V predstavljeni raziskavi so analizirane značilnosti življenjskega sloga, z namenom ugotoviti, ali se te odražajo v bolnikovi kakovosti življenja.*

Metode: *Presečna raziskava je bila izvedena v 36 ambulantah družinske medicine, stratificiranih glede na lokacijo (mesto, podeželje) in velikost (do dva oz. več polno zaposlenih zdravnikov na lokaciji). Vsaka ambulanta je k sodelovanju povabila 30 bolnikov iz registra visoko ogroženih za nastanek bolezni srca in ožilja (BSO) po Framinghamski tabeli ogroženosti. Ustrezni podatki so bili pridobljeni iz zdravstvenih kartotek in s pomočjo vprašalnikov za bolnike. Z zdravjem povezana kakovost življenja je bila merjena s petdimenzionalnim EQ-5D vprašalnikom in z VAS lestvico kakovosti življenja, ki sta predstavljala neodvisni spremenljivki.*

Rezultati: *V analizo je bilo vključenih 871 bolnikov (80,6 % vseh vabljenih). Od teh je 60,0 % imelo 3-4 prisotne dejavnike tveganja za nastanek BSO. Povprečna vrednost VAS lestvice je bila 63,2 (SE 0,72). Ugotovljena je bila korelacija med EQ-5D in pogostostjo obiskov bolnika v enem letu v ambulanti (r=-0,31, p<0,001), socialnoekonomskim statusom bolnika (r=-0,25, p=0,001), starostjo bolnika (r=-0,27, p=0,001) in zdravim načinom prehranjevanja (r=0,20, p=0,006). Med vsemi spremenljivkami so bili v multivariatnem modelu neodvisni napovedni dejavniki HRQoL telesna aktivnost (p=0,001, t=3,3), pogostost obiskov bolnika v ambulanti (p<0,001, t=-5,3) in starost bolnika (p=0,025, t=-2,2).*

Zaključek: *Raziskava o kakovosti življenja je bila opravljena v specifični skupini oseb z visokim tveganjem za nastanek BSO, ki niso »pravi« bolniki, pogosto pa imajo neustrezen življenjski slog. Spodbujanje k zdravemu življenjskemu slogu, posebej k telesni aktivnosti, je pomembno ne le za zniževanje tveganja za nastanek BSO, ampak tudi za izboljšanje z zdravjem povezane kakovosti življenja.*

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1 INTRODUCTION

Health-related quality of life (HRQoL) is the multidimensional concept of measuring patients' unique experience of their health and the outcomes of health interventions. It covers a variety of domains, including physical and mental health, symptoms, functional status and the overall perception of health (1-3). It represents a clinical indicator of the patient's wellbeing, as reflected by patients' perceived health, effects of the disease and treatment consequences (4). It is also influenced by organisational care-delivery models, such as structured chronic care (4).

We can find studies proving that lifestyle positively influences QoL in healthy patients of all age groups. Physically more active older patients have higher QoL in the physical and mental domain, compared to patients who are less physically active (5,6). The same is shown in younger age groups (7) and also in chronic patients (6). Physical activity improves HRQoL in cancer patients (8, 9) and patients with diabetes mellitus. Even patients with a high risk of diabetes have a better HRQoL if their lifestyle is improved (10).

High-risk patients for cardiovascular disease (CVD) typically have risk factors, which include so called "risk diseases", such as arterial hypertension and hyperlipidaemia, in combination with a poor lifestyle. Medical intervention is directed toward the treatment of risk diseases and the improvement of lifestyle. HRQoL in patients with isolated risk diseases, such as obesity, also profit from interventions directed toward the improvement of lifestyle (11). Even arterial hypertension, a silent disease, showed an influence on the quality of life in some studies (12).

In our survey, patients with a high risk for CVD were defined by the criteria of the Framingham score system, which provides scores from 0->40, the high-risk group having ≥20 % of absolute risk for a cardiovascular event in the next 10 years due to modifiable risk factors (the level of systolic blood pressure, cholesterol, fasting blood glucose level, smoking) and non-modifiable risk factors – gender and age of the patient (13). In these patients, risk-lowering strategies include lifestyle advice and treatment of risk diseases.

In our study of patients with a high risk of CVD, we aimed to research the relationship between demographic characteristics, health behaviour, lifestyle features and high-risk CVD patients' quality of life, as his/her own perception.

2 METHODS

We present national results, which are part of the observational cross-sectional study: EPA-Cardio (European practice assessment for cardiovascular patients). The detailed protocol is described elsewhere (14). The ethical approval was obtained from the National Committee for Medical Ethics (No. 87/11/07). All the necessary permissions for the questionnaires used in the study were obtained within the international part of the study.

2.1 Participants

36 out of 56 (response rate 64%) randomly selected practices in the country, stratified by the size of the practice (small practices with 1-2 full-time (FTE) working GPs at the same location and large ones with more than two FTE physicians) and location of the practice (urban - 30 000 inhabitants or more, rural - less than 30 000 inhabitants); each practice invited 30 high-risk patients to participate in the study. High-risk was defined by the Framingham risk score and patients were selected randomly from the register of high-risk patients for CVD, mandatorily kept by each practice. The patients with already established CVD and patients with diabetes mellitus type 2 were not eligible for participation. The patients were contacted by the practice nurse by phone, in person or in writing, and received the questionnaire after giving the informed consent for cooperation.

2.2 The Questionnaire

2.2.1 Independent Variables

The data for this analysis were gathered by a questionnaire filled out by the patients and by an AUDIT for data extraction from the patients' medical records. The questionnaire consisted of several parts. In this analysis, we used the following: demographic characteristics of the patients, health services using behaviour (the frequency of practice attendance on the scale 0-3, 4-7, >7 per year). The data on their lifestyle was collected by the two validated questionnaires: on the diet REAP-S (15) and on physical activity RAPA 2 (16). REAP-S questionnaire contained 12 questions on healthy diet habits, where each question is worth 1 point if the diet habit is bad, 2 points for occasional inappropriate behaviour and 3 points for healthy eating. The RAPA questionnaire asks patients about several levels of their physical activity. We defined adequate aerobic physical activity by the requirements of healthy lifestyle, i.e. at least 30 minutes of moderate or heavy physical activity at least 5 times per week. For the smoking status we asked if the patient is a current smoker or not. The number of additional chronic illnesses was obtained from the check-list of the diseases that each patient could choose from (AH, depression, hypercholesterolemia).

We also obtained data on the regularity of taking medication - Morisky questionnaire (17) - and the patients' evaluation of the practice by the Europep questionnaire (18).

From the AUDIT of the medical record, we obtained information on the level of cholesterol, fasting blood glucose and average blood pressure of the last three measures (all data from the last 15 months).

2.2.2 The Outcome

Quality of life was measured by the EQ-visual analogue scale (0-100) and self-assessed EQ-5D questionnaire, which is a widely used tool to measure HRQoL and contains five dimensions, namely: mobility, self-care, usual activities, pain/discomfort and anxiety/depression. Every dimension has three levels of severity: no problems, some/moderate problems and severe problems (19-21). The questionnaire is evaluated through the single summary index by applying a formula that attaches weights to every level in every dimension and is country validated (22). This common index shows the patient's perceived HRQoL.

2.3 Statistical Analysis

We used the statistical package IBM SPSS Statistics version 21 for Windows (IBM Corp., Armonk, NY). Demographic data and risk factors for CVD were presented by frequencies and percentages. To explain the effect of lifestyle and other characteristics of the patients on their HRQoL, we calculated the multivariate linear model with the statistical significance at $p<0.05$. Some independent variables were dichotomized according to the goal – if the goal was attained, the variable received 1 point, if it was not attained, it received 0 points (blood pressure <140/80 mm Hg, fasting blood glucose –<6.0 mmol/L, BMI<30kg/m2). We constructed the composite variable of regulated risk factors by the sum of the attained goal for a specific risk factor/disease (regulated blood pressure, value of cholesterol, smoking, physical activity and BMI).

3 RESULTS

871 patients were included (80.6% of the aimed sample). The average age was 63.3 years (SD 8.8). Other patient characteristics are presented in Table 1.

Nutritional habits: The average value of the questionnaire below, 1.5 points (bad habits), was received only by 2.8% of the patients; from 1.5-2.0 points (occasional errors in healthy diet, medium habits) were received by 29.9% of the patients; >2.0-2.5 points were received by 62.6% (good habits) of the patients; very good diet habits with the average answers worth ≥2.5 points were received by 4.7% of the participants.

Table 1. Demographic characteristics of patients with a high risk for CVD.

Characteristics (N of the sample)		N (%)
Gender (men) (N=837)		539 (64.4)
Marital status (married or cohabitating) (N=871)		610 (70.0)
Ethnical group (predominant) (N=871)[1]		707 (81.2)
Education (secondary school or more) (N=757)[2]		478 (63.1)
Income (yes) (N=784)[3]		724 (92.3)
Social class (N=750)[4]	**lower**	164 (21.9)
	middle	559 (74.5)
	high	27 (3.6)
Frequency of attendance of the practice/year (N=782)	**0-3**	266 (34.0)
	4-7	413 (52.8)
	8 or more	103 (13.2)

Legend:
[1] the predominant ethnical group (Slovenian) vs. ethnical minorities
[2] secondary school or more vs. primary school
[3] any form of regular income (salary, pension)
[4] self-assessed social class: low, medium, high

Physical activity: In the questionnaire, 305 (N=712) (42.8%) patients answered that they perform an adequate level of physical activity (exercising at least 5 times/week for at least 30 minutes with moderate or heavier exercise).

659 (84.9%) patients have prescribed regular medication (N=776). Adherence to medication was measured by the Morisky questionnaire. On the scale of 4 points (low adherence) to 8 points (high adherence), 4-5 points were received by 39 (5.9%) participants, 6-7 points by 356 (54.0%) and 8 points by 264 (40.1%) of participants.

The practice evaluation by the Europep questionnaire showed the average value of 4.52 (SD 0.52) on the scale of 1-5 (1=poor, 5=excellent). The part of the questionnaire evaluating the quality of the practice showed the mean value of 4.8 (SD 0.69), whereas the evaluation of its organisation showed the mean value of 4.43 (SD 0.60).

The percentage of patients with regulated risk factors for CVD is shown in Table 2.

Table 2. Risk factors for CVD, dichotomised according to target level.

Risk factor		N (%)
Cholesterol <5 mmol/L (N=745)		202 (27.1)
Healthy diet[1] (>18 points)[1] (N=691)		19 (2.7)
BMI2 <30 kg/m[2] (N=597)		350 (58.6)
Glu <6 mmol/L (6 or less) (N=758)		612 (80.7)
RR <140/90 mm Hg (N=871)		303 (34.8)
Non-smoker (N=778)		604 (N=77.6)
Physical activity[3] (N=712)		305 (42.8)
Uncontrolled risk factors (N=487)[4]	**1-2**	168 (34.5)
	3-4	292 (60.0)
	5	27 (5.5)

Legend:
[1] according to the REAP-S questionnaire
[2] body mass index
[3] the adequate physical activity according to RAPA questionnaire
[4] blood pressure, value of cholesterol, smoking, BMI, physical activity

72.4% of the participants had arterial hypertension, 61.1% of the participants had hypercholesterolemia and 15.2% stated that they have depression. 320 (50.7%) patients stated that they have at least two chronic diseases from the list.

Table 3. Descriptive results on HRQoL for each dimension and each level.

	Mobility (N, %) N=778	Self care (N, %) N=773	Usual activities (N, %) N=771	Pain- discomfort (N, %) N=769	Anxiety/ depression (N, %) N=764
Without problems	460 (59.1)	734 (95.0)	500 (64.9)	250 (32.5)	503 (65.8)
Moderate problems	318 (40.9)	36 (4.7)	254(32.9)	476 (61.9)	353 (33.1)
Severe problems	0	3 (0.4)	17 (2.2)	43 (5.6)	8 (1.0)

The results of measuring the Quality of life on the VAS scale (range 1-100) showed the mean value of 63.2 (SD 19.4), while the composite index of HRQoL was 0.72 (SD 0.19).

Pearson correlation showed significant correlations of HRQoL with: males ($r=0.14$, $p=0.042$), the number of visits in the practice ($r=-0.31$, $p<0.001$), socioeconomic status ($r=-0.25$, $p=0.001$), age ($r=-0.27$, $p=0.001$), healthy diet ($r=0.20$, $p=0.006$). The correlation of HRQoL and patients' evaluation of the practice and quality of care were both significant, but weak ($p=0.001$, $r=0.18$; $p<0.001$, $r=0.12$). There were other weak positive correlations with education and having regular income.

In the multivariate linear analysis, we included the following independent predictors of HRQoL: demographic characteristics of the patients (age, sex, education, marital status, regular income), lifestyle (physical activity, diet habits), physical health represented by the number of chronic diseases from the list, the number of non-regulated risk factors for CVD, the number of visits of the practice per year, the regularity of taking medication and patient evaluation of the practice from the organizational and clinical aspects. The multivariate model is represented in Table 4.

Table 4. Predictors of HRQoL in patients with a high risk for CVD.

Model	B	SE for B	p value	95.0% CI for B
(Constant)	63.795	10.697	<0.001	(42.776, 84.815)
Age	**-0.645**	**0.287**	**0.025**	**(-1.209, -0.081)**
Sex (male)	-1.694	1.085	0.119	(-3.827, 0.438)
Education[1]	1.401	1.140	0.205	(-0.769, 3.570)
Marital status (married)	0.499	1.224	0.683	(-1.905, 2.904)
Income[2]	0.368	1.895	0.846	(-3.356, 4.092)
Healthy diet[3]	-0.813	1.798	0.651	(-4.347, 2.720)
Physical activity[4]	**3.292**	**0.986**	**0.001**	**(1.354, 5.229)**
N0 of chronic diseases	0.284	0.221	0.825	(-2.243, 2.811)
N0 non-regulated risk factors (diseases)[5]	-0.335	0.499	0.502	(-1.316, 0.645)
Freq visits[6]	**-4.245**	**0.795**	**<0.001**	**(-5.807, -2.682)**
Regular medication	0.856	0.577	0.138	(-0.277, 1.989)
Europep (organization)	0.940	1.207	0.436	(-1.432, 3.313)
Europep (clinical care)	0.936	1.140	0.412	(-1.303, 3.176)

R^2 adj=0.107, F=5.49, p=<0.001
Dependent Variable: Summary index of HRQoL questionnaire
Legend
[1] secondary school or more vs. primary school
[2] any form of regular income (salary, pension)
[3] healthy diet according to the REAP-S questionnaire
[4] the adequate physical activity according to RAPA questionnaire
[5] blood pressure, value of cholesterol, smoking, BMI, physical activity
[6] the frequency of visits in the practice per year

The multivariate model for HRQoL explained 10.7% of the variation. Independent predictors for higher HRQoL in high-risk patients for CVD were lower age, less visits to the practice and adequate, regular physical activity, among lifestyle determinants.

4 DISCUSSION

In the group of high-risk patients for CVD, we looked for HRQoL as an outcome measure. The first important result of our study is somehow surprisingly a low average HRQoL in this group of patients. Secondly, among lifestyle characteristics, only adequate physical activity was associated with better HRQoL. A positive predictor was also a lower frequency of visits in the practice, while a higher age of the patient was expected negative predictor of HRQoL.

In our sample, men prevailed, which was not surprising, as the participants were chosen in the group of high-risk patients, where gender represents one determinant of the CVD risk. In our sample, most of the patients made occasional errors in their diet, and less than half of them were adequately physically active. Most of the patients were average practice attendees according to their frequency of visits; they had an average socioeconomic status and gave their practice a high evaluation. A substantial number of risk factors was not controlled (3-4 uncontrolled risk factors in 60% of the participants).

Typical patient characteristics, associated with worse HRQoL in other studies, are older patients, women, less educated and living alone, and being frequent attenders. The average age of participants in our study was over 60 years, when the association between age and HRQoL is even more expected. We found a correlation between lower HRQoL and women, and a weak correlation with higher education and income.

The composite index of EQ-5D was 0.72 (SD 0.19), which is lower than in the international analysis of high-risk patients in the EPA-Cardio study, where it was found to be 0.78 (SD 0.19) (23) and lower than in other studies, even for CVD patients (24). On the other hand, coronary patients in the national analysis of Epa-Cardio data showed lower HRQoL in coronary patients, measured by EQ-5D VAS scale (58.6±19.9) (25), compared to high risk patients in

our study (63.2±19.4) . It is also lower than in the sample of patients from the general practice of the Wang study (69.2) (26). We cannot explain what the reason for this difference could be, as the sampling of these studies was different from ours.

The association of isolated risk diseases, such as hypertension, is conflicting and shows no relationship with HRQoL (26, 27) or contributes to a lower HRQoL (28). In the cited literature, obesity has been shown to influence HRQoL in specific categories of HRQoL (29-31), and associated with the socioeconomic status (32). The relationship between cardio-metabolic risk factors/ diseases and HRQoL is controversial and not found in some of the other studies (33). Our results could not prove these associations with the overall HRQoL either.

In testing lifestyle characteristics, we found a weak bivariate correlation of HRQoL with a healthy diet and a significant association with physical activity in the multivariate model. Randomised trials of patients with metabolic syndrome showed that an improved lifestyle with a healthy diet and regular physical activity improved HRQoL (34-35) and self-rated health (36). The results of Imayama on postmenopausal women showed the same (37). Physical activity has several positive effects on similar outcomes, such as lowering the stress and improving satisfaction with life (38). Adequate physical activity has been shown to be a positive predictor of HRQoL for middle-aged and older people in several other studies (31, 37-39), specifically pointing out that not only aerobic activity is important, but also building body strength and flexibility (39-41). We described the level of physical activity only by aerobic exercise, which is also the most advised in patient counselling. In the future, we have to address all aspects of physical activity, since it has been shown that they are all needed, not only for a better HRQoL, but also to prevent falls and help keep balance in the older population. Studies show that even suboptimal physical fitness is important for HRQoL in older persons with mild hypertension (42). Increased fitness is even more important than normal body weight (43). Fewer studies can be found directed to the influence of the physical programme on HRQoL for high-risk CVD patients. Gidlow showed some evidence that programmes are specifically effective for high-risk groups. But although he found that reducing risk factors and the risk score were both significant, the differences in HRQoL were small (44). We could not prove the association between HRQoL and patients' evaluation of the practice in the multivariate model, but we found correlations in the bivariate model for patient's evaluation of the practice and clinical care. Other studies support the fact that there probably is an association (23, 45-46).

Moreover, we could not prove the importance of multimorbidity in our sample. We believe that the reason could be the fact that we included only "risk diseases" for CVD and depression as an important mental disorder which influences HRQoL. Multimorbidity was shown to be a strongly associated factor for HRQoL, especially in combination with specific diseases, such as gastrointestinal, neurological, psychiatrical, musculoskeletal, nephrological and cardiovascular diseases (47-49). Furthermore, the inclusion of the severity of the disease according to the multimorbidity index shows a stronger association with HRQoL than simply counting the number of diseases (50).

4.1 Limitations of the Study

The variables included in the model showed weak prediction of HRQoL. Some variables, such as multimorbidity (42), should be better specified by the stage and functional limitations of the diseases and by more chronic diseases that can affect HRQoL, such as chronic pain, gastrointestinal disease, lung disease, etc., and should be included in the list. We also noticed that the validated questionnaires for healthy diet and physical activity might have been cognitively demanding for the participants, resulting in more missing values than expected.

Also, we believe that the frequency of visits is probably not a "pure" independent variable but potentially a confounding variable. Logically thinking, the correlation of frequency of visits and HRQoL needs to be interpreted as a reverse causality, as low HRQoL may predict high frequency of patients' visits in the practice and not the opposite.

5 CONCLUSION

Among lifestyle characteristics, regular exercise seems to be the most important independent predictor for a patient's perceived overall HRQoL, Healthy diet was correlated to HRQoL, too. Encouragement of high-risk patients for CVD to improve or keep healthy lifestyle is important, not only to lower the risk for CVD, but also to improve quality of life. Specific aspects of HRQoL need to be tested in defined categories of patients.

CONFLICTS OF INTEREST

The authors declare that no conflicts of interest exist.

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ETHICAL APPROVAL

The study was approved by the Republic of Slovenia National Medical Ethics Committee at the Ministry of Health, No. 87/01/11.

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