Rev Port Cardiol. 2020;39(7):367–373

Revista Portuguesa de Cardiologia
Portuguese Journal of Cardiology
www.revportcardiol.org

ORIGINAL ARTICLE

Quality of life in adults living in the community with previous self-reported myocardial infarction

Ana Teresa Timóteo[a,*], **Sara Simões Dias**[a,b], **Ana Maria Rodrigues**[a], **Maria João Gregório**[a], **Rute Dinis Sousa**[a], **Helena Canhão**[a]

[a] *EpiDoC Unit – CEDOC, Nova Medical School – Universidade Nova de Lisboa, CHRC, Comprehensive Health Research Unit, Lisbon, Portugal*
[b] *ciTechCare – Center for Innovative Care and Health Technology, School of Health Sciences, Polytechnic of Leiria, Leiria ESSLei-IPLeiria, Leiria, Portugal*

Received 16 April 2019; accepted 29 September 2019
Available online 29 June 2020

KEYWORDS
Myocardial infarction;
Quality of life;
Portugal;
Outcome

Abstract
Aim: Quality of life (QoL) is one of the most important patient-reported outcomes in chronic diseases. Using a population-based cohort, our objective was to assess health-related QoL in individuals with a previous myocardial infarction (MI).
Methods: This study was conducted on a large database representative of the adult Portuguese population aged 18 years or over, living in the community. Participants were assessed through telephone interview. A standardized questionnaire was applied to every individual about self-reported chronic diseases, including previous MI. QoL was assessed with the EQ-5D-3L version of EuroQol. The prevalence of previous MI was calculated and linear regression analysis was performed.
Results: The estimated prevalence of previous MI in the adult Portuguese population was 1.1%. These patients were older and more often male, had lower income and lower education levels, and were more often from urban areas. Respondents with self-reported MI assigned a lower self-perception to their health status in all domains, particularly in mobility and anxiety/depression. The mean EQ-5D-3L score in patients with MI was 0.73±0.34, significantly lower than in patients without MI (0.78±0.29). Also, the number of chronic diseases was significantly higher in patients with MI (5.0±2.2 vs. 1.7±1.8). Previous MI was not independently associated with QoL, which was related to age, gender and number of comorbidities.
Conclusions: Adults with previous MI have a worse self-perceived health status and QoL. Previous MI was not an independent predictor of health-related QoL after controlling for age, gender and associated chronic diseases.

* Corresponding author.
E-mail address: ana_timoteo@yahoo.com (A.T. Timóteo).

https://doi.org/10.1016/j.repc.2019.09.013

PALAVRAS-CHAVE
Enfarte do miocárdio;
Qualidade de vida;
Portugal;
Resultados

Qualidade de vida em doentes em comunidade, com enfarte miocárdio prévio autorreportado

Resumo
Introdução: A qualidade de vida (QOL) é um dos mais importantes resultados reportados por doentes em doenças crónicas. Utilizando uma coorte baseada na população, foi nosso objetivo avaliar a qualidade de vida relacionada com a saúde em doentes com enfarte do miocárdio (EM) prévio.
Métodos: Estudo realizado numa grande base de dados representativa da população portuguesa adulta com $\geq$ 18 anos, a viver na comunidade. Os participantes foram avaliados por entrevista telefónica e foi aplicado um questionário estandardizado a cada indivíduo sobre doenças crónicas autotreportadas, incluindo EM no passado. A QOL foi avaliada com a ferramenta EuroQol (EQ-5D-3L).
Resultados: A prevalência estimada de EM prévio foi de 1,1%. Estes doentes são mais idosos e mais homens, com menor rendimento e nível de educação e mais frequentemente de áreas urbanas. Os indivíduos com EM prévio têm pior perceção do seu estado de saúde em todos os domínios, em particular na mobilidade e ansiedade/depressão. O índice EQ-5D-3L médio foi 0,73$\pm$0,34, significativamente inferior quando comparado com doentes sem EM (0,78$\pm$0,29). O número de doenças crónicas é significativamente superior em doentes com EM (5,6$\pm$2,2 *versus* 1,7$\pm$1,8). O EM prévio não se associa de forma independente à QOL, estando esta relacionada com idade, género e número de comorbilidades associadas.
Conclusões: Adultos com EM prévio apresentam uma pior percepção da sua saúde e QOL. O EM prévio não é preditor independente de QOL após controlo para idade, género e doenças crónicas associadas.

Introduction

Non-communicable chronic diseases are the leading cause of death worldwide, including Portugal, where they accounted for 86% of all deaths in 2016. Of these, cardiovascular disease is the main cause, responsible for 29% of all deaths.[1] The latter also represents an important burden for the national health service, with more than 12 000 admissions per year in 2015 for myocardial infarction (MI).[2]

In recent decades, various preference-based instruments for measuring health-related quality of life (HRQoL) have been developed and validated in different countries. One such instrument is the EuroQol Five-Dimensional Questionnaire, Three-Level Version (EQ-5D-3L), developed by the EuroQol Group, validated for the Portuguese population and with published norms.[3–7] Like many other diseases, cardiovascular disease can reduce patients' ability to perform their usual activities, which will also have an economic impact. No studies have been published reporting HRQoL in a large populational sample of Portuguese patients with previous MI, although there have been several such reports for other diseases including rheumatoid arthritis, asthma, cataracts and chronic obstructive pulmonary disease.[8]

In 2011, a prospective population-based closed cohort study, the Epidemiology of Chronic Diseases (EpiDoC) study, was conducted in Portugal to estimate the national prevalence of rheumatic diseases, which also enabled the study of other non-communicable chronic diseases. A large population database was thus created for health-related research in Portugal, using a representative sample of the Portuguese population. This first wave of data collection was subsequently followed by two other waves, the last in 2015-2016. This included specific information on diagnoses of cardiovascular disease, enabling patients with previous MI to be identified. In this wave, HRQoL measurements were also obtained using the EQ-5D-3L instrument.

The main purpose of the present study was to assess HRQoL in patients with a previous self-reported MI and to explore the association between health status and sociodemographic variables.

Methods

Study design

The EpiDoC cohort was composed of randomly selected adults ($\geq$18 years old) who were non-institutionalized and living in private households in the Portugal mainland and islands (Azores and Madeira). Three study waves were completed. Baseline assessment (EpiDoC 1) was performed through a face-to-face interview, with localities being selected as the primary sampling unit according to the 2001 Census and households being selected randomly. For the follow-up waves (EpiDoC 2 and 3), data were collected using a structured questionnaire administered by computer-assisted personal telephone interviews. In each wave, a core questionnaire on socioeconomic status, chronic diseases, quality of life (QoL), and healthcare resource consumption

was employed to gather longitudinal data. Each wave also included specific questions on other health and health-related issues, enabling the collection of cross-sectional and longitudinal data. Details of the EpiDoC cohort are described elsewhere.[9] The final sample size of EpiDoC 1 was 10 661 subjects. Although the primary objective of this study was to estimate the prevalence of rheumatic and musculoskeletal diseases, the methods used for household selection meant that the sample was representative of the Portuguese population. All participants enrolled in EpiDoC 1 were invited to participate in the follow-up studies. EpiDoC 2 collected data between March 2013 and July 2015 and included 7591 participants. The present study uses data from the third wave (EpiDoC 3), which took place between September 2015 and July 2016, with 5653 participants. The participation rate declined for reasons that are observed in other population-based studies and there were no significant differences between the three waves in any category of variables.[10,11] Sociodemographic data, including gender, age, ethnicity, years of education and education level, and marital status, were collected only in EpiDoC 1, based on the assumption that these characteristics would not change over time.

Measurement tool

Self-perception of health status was assessed in the EpiDoC 3 sample with the EQ-5D-3L instrument. This tool includes the EQ-5D descriptive system and the EQ visual analog scale (VAS). The EQ-5D system consists of the following five dimensions: mobility, self-care, usual activities, pain/discomfort and anxiety/depression.[3,4] Each dimension has three severity levels: absence of health problems (level 1), some problems (level 2) and extreme problems (level 3). The digits from the five dimensions can be combined into a 5-digit number that describes the patient's health state. This creates a total of 243 possible combinations of different health states.[3,4] With the use of econometric models, preference values (utilities) are assigned for each heath state, which constitute the EQ-5D utility index.[6] Country-specific value sets have been published, including for Portugal.[6] This instrument was validated in Portugal in a selected sample who responded to the Portuguese version of the questionnaire and the resulting value set was used to compute the Portuguese EQ-5D-3L index.[4,5] Normative values have been published from this random sample of Portuguese adult individuals[6] and can be used as a reference to analyze the effects of healthcare, determine the burden of disease and enable comparisons between regions and countries. The results of our study can thus be compared to the Portuguese reference values.

Compliance with ethical standards

Informed consent was obtained from all patients. The EpiDoC study protocol conforms to the principles established by the ethical guidelines of the 1975 Declaration of Helsinki. Ethical approval was obtained from the National Data Protection Commission (CNPD) and the NOVA Medical School ethics committee. Ethics committees of regional health authorities also approved the study.

Statistical analysis

Prevalence estimates of previous MI were computed as weighted proportions taking sampling design into account, as described elsewhere.[12] To confirm the representativeness of the sample concerning the Portuguese population (mainland and islands), we first compared participants and non-participants of the EpiDoC 3 study with respect to their demographic, socioeconomic, and health status characteristics. Based on this comparison, the weights were adjusted according to stratification by Nomenclature of Territorial Units for Statistics II (NUTS II) region, gender, and age group. Extrapolation weights were computed and used in the subsequent statistical analysis. These were obtained by calibrating the extrapolation weights originally designed for the EpiDoC 1 study sample.[13] Weighted proportions were used to summarize categorical variables. Continuous variables were described as weighted mean values and standard deviations. The weights were included in the analysis to extrapolate the results to the Portuguese population.

Groups and samples were compared with the Student's t test and the chi-square test, as appropriate. Linear regression analysis was used in the complete cohort to identify factors associated with HRQoL. Variables with a p-value <0.10 were included in a multivariate model.

The analysis was performed with IBM SPSS version 21. A p-value <0.05 was considered statistically significant.

Results

Characteristics of the study sample

In our sample, 70 patients self-reported a previous MI, 9.3 (8.3) years before the assessment. This represents an adjusted prevalence of 1.1% in the overall population. Table 1 summarizes the main characteristics of the EpiDoC 3 sample compared directly with data from the Portuguese general population.[14] Patients with a previous MI were significantly less often female, older, with lower income and fewer years of education. According to NUTS II distribution, they were more frequently from urban areas, particularly the Lisbon area. Patients with MI had more associated chronic diseases than those without MI (5.0±2.2 vs. 1.7±1.8, p<0.001).

Health-related quality of life data and comparison with population norms

Respondents with self-reported MI had a lower self-perception of their health status compared to the Portuguese general population and to the sample without self-reported MI (Table 2). These differences were significant for all dimensions. However, it was higher in mobility and anxiety/depression. There was also a ceiling effect, with few patients placing themselves at level 3 of the five dimensions. In fact, for all dimensions, more than half of the respondents with self-reported MI still placed themselves at level 1, with no limitations. Self-perceived heath status as indicated by the VAS was significantly lower in patients with MI, as was the EQ-5D-3L index. This difference was

Table 1 Characteristics of the study sample and the Portuguese population aged 18 years or over.

	EpiDoC 3 (n=5653)	Portuguese general population[a] (n=8 657 240)	Self-reported MI (n=70)	No self-reported MI (n=5583)
Women, %[b]	52.5	53.0	51.0	52.5
Mean age, years[b]	49.6 (18.1)	49.4 (18.5)	66.9 (11.8)	49.4 (18.1)
18-49, %	52.8	53.3	7.7	53.3
50-69, %	29.6	29.9	31.6	29.6
≥70, %	17.6	16.8	60.7	17.1
Net monthly income in euros, %[a]		n.a.		
<500	12.2		19.2	12.1
500-2000	77.3		78.1	77.2
>2000	10.5		2.7	10.7
≤9 years of education, %[b]	30.8	n.a.	58.5	30.4
NUTS II region, %[b]				
North	36.4	34.7	28.8	36.5
Center	23.2	22.4	18.2	23.3
Lisbon	24.8	26.6	40.9	24.7
Alentejo	7.2	7.3	6.6	7.2
Algarve	3.8	4.3	2.4	3.7
Azores	2.2	2.2	1.6	2.2
Madeira	2.4	2.5	1.5	2.4

MI: myocardial infarction; n.a.: not available; NUTS: Nomenclature of Territorial Units for Statistics.
[a] Source: Statistics Portugal.[14]
[b] p<0.001 in MI patients vs. non-MI.

Table 2 EQ-5D-3L results in the study sample and comparison with the Portuguese norms.

	General population[a]	Self-reported MI	No self-reported MI
Mobility, %[b]			
No problems	83.3	70.7	82.2
Some problems	16.2	27.3	17.5
Extreme problems	0.5	2.0	0.3
Self-care, %[b]			
No problems	95.2	80.3	88.1
Some problems	4.4	18.6	11.2
Extreme problems	0.4	1.0	0.7
Usual activities, %[b]			
No problems	83.7	79.3	84.8
Some problems	13.9	15.9	14.4
Extreme problems	2.4	4.8	0.7
Pain/discomfort, %[b]			
No pain or discomfort	55.3	73.4	69.4
Moderate pain or discomfort	40.0	16.5	26.7
Extreme pain or discomfort	4.7	10.1	3.9
Anxiety/depression, %[b]			
Not anxious or depressed	65.6	69.8	79.2
Moderately anxious or depressed	30.1	24.3	17.6
Extremely anxious or depressed	4.3	5.9	3.2
EQ-5D-3L index[b]	0.76	0.73±0.34	0.78±0.29
EQ VAS[b]	74.9	65.3±21.1	76.2±17.2

MI: myocardial infarction; VAS: visual analog scale.
[a] Source: Ferreira et al.[6]
[b] p<0.001 in MI patients vs. non-MI.

Table 3 EQ-5D-3L index and visual analog scale results in the study sample compared to the general population.

	EQ-5D index		EQ-5D-VAS	
	General population[a]	MI patients	General population[a]	MI patients
Overall	0.76	0.73	74.9	65.3
Gender				
Female	0.72	0.73	72.8	64.3
Male	0.80	0.73	77.1	66.4
Age group				
18-29 years	0.86	n.a.	84.3	n.a.
30-49 years	0.82	0.86	79.8	72.8
50-69 years	0.69	0.71	68.5	76.7
≥70 years	0.60	0.72	62.1	58.1
NUTS II region				
North	0.76	0.63	74.9	69.0
Center	0.74	0.70	72.2	66.8
Lisbon	0.77	0.85	76.3	63.8
Alentejo	0.71	0.52	73.2	50.7
Algarve	0.81	0.72	74.5	67.2
Azores	0.80	0.66	82.8	63.3
Madeira	0.81	0.35	83.0	48.0
Educational level				
Low	0.69	0.74	69.1	59.2
Medium	0.83	0.71	80.1	71.8
High	0.84	0.78	82.0	79.8
Net monthly income in euros, %[a]				
<500	0.65	0.66	65.6	67.6
500-999	0.79	0.80	76.9	60.5
1000-2000	0.82	0.64	80.0	68.7
>2000	0.85	0.99	80.3	88.3
Occupational status				
Employed	0.83	0.79	79.9	76.7
Unemployed	0.74	0.44	74.8	51.2
Retired	0.62	0.73	64.0	63.0

MI: myocardial infarction; VAS: visual analog scale.
[a] Source: Ferreira et al.[6]

more marked in men (−9%), patients from the islands and the Alentejo (−17%, −57% and −27%, respectively), patients with an income between 1000 and 2000 euros (−22%), and unemployed individuals (−41%) (Table 3).

Factors associated with health-related quality of life

In the multivariate linear regression model, the main determinants of EQ-5D-3L index were age, gender and number of chronic diseases (Table 4). Although in univariate analysis MI was a predictor (beta=−0.046, p=0.001), it was no longer a predictor after adjustment.

Discussion

In recent years, preference-based instruments have been increasingly used to measure HRQoL, particularly for cost-utility analysis. These instruments are indirect methods for measuring utilities that can be used to calculate quality-adjusted life years, as an alternative to more complex, time-consuming and costly direct methods of valuation. Because these instruments, particularly EQ-5D-3L, are easily and rapidly administered, their use has grown worldwide and they are now applied to almost all types of diseases.[8] EQ-5D assesses health status and provides a measure of health for clinical and economic studies.[3–5] Patients' own reporting of their functional status, well-being and HRQoL has been rarely studied, particularly in Portugal. Such reporting is however important to inform decision-making by health policy makers and the medical community. By this means, patients can be directly involved in assessing the impact of MI on QoL. This type of analysis is also recommended in international guidelines on acute MI for evaluating quality of care.[15]

The estimated prevalence of previous MI in our study was 1.1%, which is slightly lower than in previous reports from the last National Health Surveys, applied in 2005/2006 and then in 2014, which were implemented jointly by the

Table 4 Estimates from multiple linear regression analysis to explain the EQ-5D-3L index.

Variables	Standardized beta coefficient	p
Age	−0.232	<0.001
Male gender	0.125	<0.001
Number of diseases	−0.278	<0.001
Myocardial infarction	0.004	0.742

National Health Institute Doutor Ricardo Jorge and Statistics Portugal.[16,17] The first survey reported 1.5% and the second 1.7%, but they used a broader term, ''MI and its complications'', which thus probably includes other situations.

As expected, respondents with self-reported MI had a lower self-perception of their health status than those with no self-reported MI and the Portuguese general population. A ceiling effect was also observed, as was previously observed with this instrument in other types of populations.[8] The health domains mostly affected were mobility and anxiety/depression. After MI, patients tend to reduce their activities. This is an important problem that should be addressed in comprehensive cardiac rehabilitation programs, but unfortunately these are not available for most patients with MI. Also, chronic diseases are frequently associated with anxiety and/or depression, and some patients might even require psychological support. The limitations in QoL found in the present study highlight the need for wider application of cardiac rehabilitation after MI, and this is indeed a class I recommendation in the European guidelines on MI.[15] These programs include not only physical exercise but also nutrition counseling, close surveillance and control of all cardiovascular risk factors (including smoking cessation), and when necessary, psychological assessment and counseling.

As with many other conditions, the outcomes of chronic diseases are also affected by existing comorbidities, as we observed in the present study. This emphasizes the need for assessment of comorbidities in all studies dealing with HRQoL.

Limitations

This study has some limitations that should be acknowledged. Firstly, possibly the main limitation is that MI was self-reported and therefore classification errors may arise. The same is true for other comorbidities that were also self-reported. It is sometimes difficult for an individual to clearly state whether they have a specific disease; particularly for MI, other types of cardiovascular disease might be incorrectly classified as MI by a layperson. However, the methodology we used for data collection was similar to that of other large population-based surveys, in which the collected data reflects the self-assessment that each person makes for the variable that characterizes her/his health status, with no clinical data available to confirm patients' self-report. This population-based survey is in accordance with Commission Regulation (EU) No. 141/2013, the European Union regulation on statistics based on the European Health Interview Survey, which is a major requirement for enabling international comparisons of the results. This limitation could have been partly overcome by asking respondents specifically about different types of cardiovascular disease, such as MI, stable angina, arrhythmia, valve diseases, heart failure, hypertrophic cardiomyopathy and stroke, which could have helped to obtain more accurate information. Secondly, analysis of the associations between specific factors and HRQoL is limited by the cross-sectional nature of the study.

Conclusions

Adults with previous MI had a worse self-perceived health status and QoL. They assigned a lower self-perception to their health status in all domains, particularly in mobility and anxiety/depression, with a mean EQ-5D-3L index of 0.73, significantly lower than in patients without MI. Previous MI was not an independent predictor of health-related QoL after controlling for age, gender and associated chronic diseases.

Funding

No specific funding was obtained for the present manuscript. However, the original EpiDoC study received several sources of financial support. EpiDoC 1 and 2 were supported by grants from the Portuguese Directorate-General for Health and sponsorships from Fundação Calouste Gulbenkian, Fundação Champalimaud, Fundação AstraZeneca, Abbot, Merck Sharp & Dohme, Pfizer, Roche, Servier, Bial, D3A Medical Systems, Happybrands, Centro de Medicina Laboratorial Germano de Sousa, CAL-Clínica, Galp Energia, Açoreana Seguros and individual rheumatologists. EpiDoC 3 was supported by the Public Health Initiatives Programme (PT06) financed by the EEA Grants Financial Mechanism 2009-2014.

Conflicts of interest

The authors have no conflicts of interest to declare.

References

1. Causas de morte 2016. I.P. Lisboa, Portugal: Ed. Instituto Nacional de Estatistica; 2018. https://www.ine.pt [accessed 02.01.19].
2. Direção Geral Saúde - Programa Nacional para as doenças cerebro-cardiovasculares. Portugal – Doenças cerebro-cardiovasculares em números – 2015; 2017. https://www.dgs.pt/em-destaque/portugal-doencas-cerebro-cardiovasculares-em-numeros-201511.aspx [accessed 02.01.19].

3. EuroQol Group. EuroQol – a new facility for the measurement of health-related quality of life. Health Policy. 1990;16:199–208.
4. Ferreira PL, Ferreira LN, Pereira LN. Contribution for the validation of the Portuguese version of EQ-5D. Acta Med Port. 2013;26:664–75.
5. Ferreira LN, Ferreira PL, Pereira LN, et al. The valuation of the EQ-5D in Portugal. Qual Life Res. 2014;23:413–23.
6. Ferreira LN, Ferreira PL, Pereira LN, et al. EQ-5D Portuguese population norms. Qual Life Res. 2014;23:425–30.
7. Janssen MF, Szende A, Cabases J, et al. Population norms for the EQ-5D-3L: a cross-country analysis of population surveys for 20 countries. Eur J Health Economics. 2018, http://dx.doi.org/10.1007/s10198-018-0955-5.
8. Ferreira LN, Ferreira PL, Pereira LN. Comparing the performance of the SF-6D and the EQ-5D in different patient groups. Acta Med Port. 2014;27:236–45.
9. Dias SS, Rodrigues AM, Gregorio MJ, et al. Cohort profile: the Epidemiology of Chronic Diseases Cohort (EpiDoC). Int J Epidemiol. 2018;47:1741–2.
10. Krokstad S, Langhammer A, Hveem K, et al. Cohort profile: the HUNT study, Norway. Int J Epidemiol. 2013;42:968–77.
11. Galea S, Tracy M. Participation rates in epidemiologic studies. Ann Epidemiol. 2007;17:643–53.
12. Gregório MJ, Rodrigues AM, Graça P, et al. Food insecurity is associated with low adherence to the Mediterranean diet and adverse health conditions in Portuguese adults. Front Public Health. 2018, http://dx.doi.org/10.3389/fpubh.2018.00038.
13. Rodrigues AM, Gouveia N, da Costa LP, et al. EpiReumaPt – the study of rheumatic and musculoskeletal diseases in Portugal: a detailed view of the methodology. Acta Rheumatol Port. 2015;40:110–24.
14. Statistics Portugal. Census 2011 resultados definitivos. Lisbon, Portugal: Instituto Nacional Estatistica; 2012. https://www.ine.pt [accessed 02.01.19].
15. Ibanez B, James S, Agewell S, et al. 2017 ESC Guidelines for the management of acute myocardial infarction in patients presenting with ST-segment elevation. Eur Heart J. 2018;39:119–77.
16. Instituto Nacional de Estatistica I.P., Instituto Nacional de Saúde Doutor Ricardo Jorge I.P. Inquérito Nacional de Saúde 2005/2006; 2009. www.2.insa.pt/sites/INSA/Portugues/Publicacoes/outros/Documents/Epidemiologia/INS_05_06.pdf [accessed 02.01.19].
17. Inquérito Nacional de Saúde 2014. Lisboa: Instituto Nacional de Estatistica I.P.; 2016. https://www.ine.pt [accessed 02.01.19].