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# Physical and mental component summaries score of the SF-36 in coronary patients

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## Abstract

*Background*: The aim of the study was to determine the clinical and sociodemographic factors related to the physical and mental components of the health-related quality of life (HRQL) in coronary patients. *Methods*: We studied 132 patients diagnosed with Acute Myocardial Infarction (AMI) and unstable angina admitted to a cardiology unit over a period of 18 months. The HRQL was assessed with the Short Form 36 Health Questionnaire (SF-36) and the presence of possible mental disorders was measured using the General Health Questionnaire (GHQ-28). In order to study the variables related to both physical and mental summary components of the SF-36, two multiple linear regression models were constructed with the physical (PCS) and the mental component summary (MCS) as outcome variables. *Results*: The GHQ-28 score $\geqslant 6$ was the variable most associated with the lowest PCS in the patients studied. Moreover in the patients with a personal history of coronary heart disease (CHD), age tended to increase the PCS of the HRQL, whereas in those with no such history, age diminished the PCS score. For the MCS, not being married, being of female sex, having GHQ-28 scores $\geqslant 6$ and being of younger age were the four variables most related to the lowest MCS score in the patients studied. *Conclusion*: Age, sex, marital status, personal history of CHD and the presence of a possible mental disorder were the factors most related to HRQL in the coronary patients studied. Focusing medical attention on these groups could contribute to improving their quality of life.

**Key words:** Coronary heart disease, Health-related quality of life, Mental component summary (MCS), Physical component summary (PCS), SF-36

## Introduction

The increase observed in the survival of patients with coronary heart disease (CHD), together with the effect of the disease on the social, professional and family lives of those suffering it, have led researchers to consider that the traditional ways of assessing the potential benefits of health care interventions based on morbidity and mortality need to be complemented by other ways of measuring health. For this reason in recent years the concept of health-related quality of life (HRQL) has emerged as a new criterion for monitoring the health care outcome in these patients [1].

HRQL is a multidimensional concept reflecting the overall condition of the physical and mental welfare of the individual [2], which is a consequence not only of the disease but also of the family and social conditions forming the environment of the patient [3].

The SF-36 Health Survey is an generic questionnaire for assessing HRQL which was originally

developed in the United States and has been translated and adapted for use in various countries according to the protocol of the International Quality of Life Assessment (IQOLA) Project. This questionnaire has recently been validated in Spain in patients with CHD [4], and has been found to be a valid and reliable scale in patients with different manifestations of this pathology.

The questionnaire has eight dimensions of HRQL that can be grouped into two summary or global dimensions: the physical component summary (PCS) and the mental component summary (MCS). These global scores provide the clinician with information on the patient's HRQL summarized in just two values, thereby reducing the number of statistical analyses needed and offering easier interpretation of the data. In the same way, the PCS and MCS have been demonstrated to have good discriminant validity for identifying differences between clinically meaningful groups [2, 5].

Using different multidimensional measures, poorer HRQL has been observed in patients with AMI and angina pectoris than in other populations, and these differences have been related to low social class [6], female sex [7], presence of mental disorders [8] and the severity of the clinical condition [9–11]. Nevertheless, the relationship between the sociodemographic and clinical variables and the global components of the HRQL (PCS and MCS) of the SF-36 has received little attention.

For these reasons, the present study sought to determine the clinical and sociodemographic factors related to HRQL as measured by the PCS and MCS in patients who have suffered an episode of coronary heart disease.

## Patients and methods

A cross-sectional study was carried out in the cardiology unit of a University Hospital in the south of Spain, where from June 1996 to November 1997 all 132 patients admitted over a period of 18 months for an acute episode of coronary disease were selected. The patients were diagnosed as having myocardial infarction or unstable angina on the basis of clinical, biochemical and electrocardiographic criteria described elsewhere [4].

The number of patients studied was based on the number of subjects calculated to be necessary to detect differences in HRQL between the two groups of patients (AMI and unstable angina) used to validate SF-36 questionnaire in this pathology [4].

Health-related quality of life was assessed using the eight specific dimensions and the two combined or global values of the SF-36 Health Questionnaire.

For each of the dimensions of the questionnaire, the items are coded, aggregated and transformed into a scale from 0 (the worst state of health for that dimension) to 100 (the best state of health). The summary indices (PCS and MCS) are calculated by standardizing each of the dimensions using the means and standard deviations of the Spanish population for its subsequent aggregation and transformation [12].

Mental health was measured using the GHQ-28 (General Health Questionnaire), an instrument developed as a method of screening to detect psychiatric non-psychotic disorders. The 28-item version was translated into Spanish and validated by Lobo et al. [13] and it has already been validated as a means of detecting problems in cardiology patients [8]. The score in the scale runs from 0 to 28 points, in which a higher score indicates a higher probability of mental disorders. The cut-off point recommended for the questionnaire is $\geqslant 6$ points, thus providing a sensitivity of 76.9% and a specificity of 90.2% [14].

The sociodemographic and clinical data of the patients were obtained from the clinical records and a structured questionnaire, and the classification of the Spanish Society for Epidemiology was utilized to determine social class [15].

The existence of comorbidity was recognized when the clinical record referred to the presence of another chronic pathology (of digestive, respiratory, osteomuscular, neurological or other character) in addition to that specified as the reason for admission to hospital or their risk factors.

A single previously trained interviewer, who was not the cardiologist who made the clinical evaluation, obtained the information during the period of hospitalization, once the patient was clinically stable. Before inclusion in the study, all the patients were asked for their informed consent and all agreed to participate.

The ethical basis of the study was approved by the Research Committee of the Hospital.

In order to explore the relationship between HRQL and sociodemographic and clinical variables, the hypothesis adopted was that the HRQL in the population studied would be associated inversely with the patient's age, with lower socioeconomic level, with a worse mental health condition (GHQ $\geqslant$ 6), with the chronicity of the CHD (unstable angina vs. AMI), with the severity of the illness (stenosis in the catheterization and duration of the pain), and with the presence of other pathologies (comorbidity) or cardiovascular risk factors. Moreover, based on other studies [16], it was considered that HRQL would show relatively worse results for female patients.

Before analyzing the data, a factorial analysis was conducted to check the behavior of the eight dimensions of the SF-36 questionnaire in our sample. After Varimax rotation, a two-factor solution similar to that found by Ware et al [2, 5, 17] was found to account for 58% of the variation (data not shown).

To analyze the data, the means and standard deviations were calculated for each of the specific dimensions and for the two global values (PCS and MCS) of the SF-36.

For the bivariate analysis, a parametric test (*t*-test, one-way ANOVA or Pearson correlation) was conducted for the dimensions showing a normal distribution, and a non-parametric test was applied (Mann–Whitney *U* test, Kruskal–Wallis test or Spearman correlation) for those with a non-normal distribution.

To study the variables related to PCS and MCS, two multiple linear regression models were constructed in which the dependent variables were the PCS and MCS and the independent variables to be included in the two models (age, sex, marital status, social class, diagnostic group, GHQ-28 score, diabetes, high blood pressure, history of CHD, comorbidity and stenosis) were selected following a stepwise method.

Based on previous studies, the possible interactions were tested and the models were checked to make sure they met the conditions of application, i.e. linearity, normality, homoscedasticity and independence.

The analysis was performed using the SPSS.v10 program.

## Results

A total of 132 patients were studied of whom 77.3% were males. The mean age was 60.7 years (SD = 10.4) with a range from 33 to 82 years and most were married (80.3%). Of the total, 56.1% were manual or unskilled workers (groups IV and V of the SEE classification) [15].

Among the vascular risk factors studied, the most frequent were the use of tobacco and the presence of high blood pressure. The presence of comorbidity was frequent (41.7%) and nearly half of the patients presented a personal history of CHD. The mean duration of pain was 82.26 min (SD: 108.9; median: 60) and of the 84 patients who underwent a catheterization, 76 (90.5%) presented stenosis of one or more blood vessels.

Also significant was the high percentage of patients with GHQ scores of $\geqslant$6 (49.2%) (Table 1).

The highest scores were obtained in the dimensions of physical functioning (mean = 76.1, SD = 26.0) and social functioning (mean = 80.0, SD = 25.9), whereas that of general health was the dimension with the lowest mean score (mean = 57.7, SD = 19.5). Moreover, the scores on the dimensions of physical role and emotional role varied greatly (SD = 41.2 and 46.6, respectively).

In the global dimensions, the MCS presented a slightly lower score than the PCS (43. 6 SD: 14.5 vs. 47.6 SD: 9.8), and in both cases less variability was observed than in the specific dimensions.

The analysis of association between HRQL and sociodemographic variables shows that females presented worse scores on the physical dimensions than males, especially in physical functioning and physical role. Married patients had better scores than unmarried ones on all the physical dimensions, although this difference did not reach statistical significance. In relation to age, only physical functioning demonstrated a relationship with this variable (Table 2).

Among the clinical factors, it should be noted that both the diagnostic group and the GHQ-28 score were significantly associated with all the dimensions of the PCS. Thus, patients with unstable angina presented a worse HRQL than those diagnosed with acute myocardial infarction (IAM), and those with GHQ-28 scores $\geqslant$6 had a worse HRQL than those who presented lower scores (Table 2).

**Table 1.** Sociodemographic and clinical characteristics of the population studied

| | Mean | SD (%) |
|---|---|---|
| *Sociodemographic variables* | | |
| Age (N = 132) | | |
| Years | 60.7 | 10.4 |
| Sex (N = 132) | | |
| Male | | 77.3 |
| Female | | 22.7 |
| Marital status (N = 132) | | |
| Married | | 80.3 |
| Unmarried | | 19.7 |
| Social class (1) (N = 130) | | |
| Housewives | | 18.5 |
| I and II | | 7.7 |
| III | | 17.7 |
| IV and V | | 56.1 |
| *Clinical variables* | | |
| Diagnostic group (N = 132) | | |
| Acute myocardial infarction | | 47.0 |
| Unstable angina | | 53.0 |
| GHQ-28 score (N = 132) | | |
| GHQ < 6 | | 50.8 |
| GHQ ⩾ 6 | | 49.2 |
| Use of tobacco (N = 131) | | |
| Smoker | | 55.7 |
| Non-smoker | | 44.3 |
| Diabetes (N = 131) | | |
| Yes | | 34.4 |
| No | | 65.6 |
| Hypercholesterolemia (N = 131) | | |
| Yes | | 38.2 |
| No | | 61.8 |
| High blood pressure (N = 131) | | |
| Yes | | 51.9 |
| No | | 48.1 |
| Obesity (N = 127) | | |
| Yes | | 29.9 |
| No | | 70.1 |
| History of coronary heart disease (N = 132) | | |
| No | | 59.8 |
| Yes | | 40.2 |
| Comorbidity (N = 132) | | |
| Yes | | 41.7 |
| No | | 58.3 |
| Catheterization (N = 132) | | |
| Yes | | 68.9 |
| No | | 31.1 |
| Stenosis found in catheterization (N = 84) | | |
| Yes | | 90.5 |
| No | | 9.5 |

SD: standard deviation. (1) I: senior managers, professionals; II: managers, technically qualified, and trades people; III: supervisory and administrative; IV: skilled manual workers; V: unskilled manual workers. GHQ: General Health Questionnaire.

The duration of the pain was not significantly correlated with any of the dimensions nor with the global scores (PCS and MCS) of the SF-36. There were no significant differences in the global scores of the questionnaire, between the patients with coronary stenosis and those without (Tables 2 and 3).

Among the vascular risk factors, it is notable that smokers presented a better HRQL on the dimension of physical functioning ($p < 0.05$) and the presence of diabetes was associated with worse physical functioning, physical role, and a poor PCS (Table 2).

With regard to emotional dimensions (Table 3), females, unmarried patients and housewives perceived a worse HRQL. Again, those patients with unstable angina and GHQ ⩾ 6 perceived a worse HRQL than those with IAM and with lower GHQ-28 scores.

In the analysis of the variables related to PCS, the variables included in the best multiple linear regression model were GHQ-28 score ⩾6, personal history of CHD, age and the interaction between age and personal history of CHD. Hence, the effect of age was different in those patients who had a personal history (in that for each additional year of age, HRQL increased by 0.13 (0.40–0.27) points on average), compared with those without a personal history of CHD (in whom quality of life diminished by 0.27). The fact of having a personal history of CHD caused HRQL to fall by 5 points on average compared with those having no personal history of CHD, whereas the fact of having GHQ-28 scores ⩾6 caused a decrease of 5.57 points in this component of HRQL (Table 4).

Similarly, the variables included in the multiple linear regression model for the MCS were GHQ-28 score ⩾6, marital status, age and sex. The pres-

**Table 2.** Relationship between physical dimensions of health-related quality of life and variables studied

| | PF[a] | | RP[a] | | BP[a] | | GH[b] | | PCS[b] | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | Mean | SD | Mean | SD | Mean | SD |
| *Sociodemographic variables* | | | | | | | | | | |
| Sex | | | | | | | | | | |
| Male | 80.6 | 23.0 | 73.0 | 39.1 | 68.5 | 31.2 | 58.9 | 19.8 | 48.2 | 9.8 |
| Female | 60.8 | 29.8 | 52.5 | 45.6 | 68.2 | 31.1 | 53.6 | 18.0 | 45.3 | 9.5 |
| Significance | 0.001 | | 0.029 | | 0.873 | | 0.221 | | 0.257 | |
| Social class (1) | | | | | | | | | | |
| Housewives | 61.6 | 30.0 | 48.9 | 46.3 | 67.1 | 31.4 | 53.6 | 17.7 | 44.9 | 8.8 |
| Class I and II | 97.5 | 4.2 | 92.5 | 16.8 | 83.3 | 27.7 | 75.3 | 14.3 | 54.2 | 6.6 |
| Class III | 75.8 | 23.6 | 63.0 | 44.5 | 66.6 | 29.9 | 52.8 | 20.0 | 47.0 | 11.1 |
| Class IV and V | 78.3 | 24.5 | 72.2 | 39.2 | 67.7 | 31.5 | 58.4 | 19.3 | 47.7 | 9.7 |
| Significance | 0.001 | | 0.047 | | 0.434 | | 0.013 | | 0.074 | |
| Marital status | | | | | | | | | | |
| Married | 77.7 | 25.8 | 71.2 | 40.3 | 68.5 | 31.0 | 59.3 | 18.4 | 47.6 | 9.8 |
| Unmarried | 69.4 | 26.2 | 56.7 | 44.4 | 68.4 | 31.8 | 51.3 | 22.5 | 47.4 | 9.7 |
| Significance | 0.077 | | 0.082 | | 0.962 | | 0.094 | | 0.769 | |
| Age | | | | | | | | | | |
| $\leqslant 54$ | 84.2 | 21.7 | 76.3 | 37.2 | 65.1 | 33.3 | 56.6 | 22.7 | 49.7 | 10.6 |
| 55–64 | 77.0 | 25.7 | 69.8 | 43.3 | 76.0 | 27.7 | 56.1 | 19.4 | 48.5 | 8.9 |
| $\geqslant 65$ | 70.1 | 27.6 | 62.0 | 42.3 | 65.4 | 31.3 | 59.5 | 17.4 | 45.5 | 9.6 |
| Significance | 0.009 | | 0.225 | | 0.198 | | 0.657 | | 0.105 | |
| *Clinical variables* | | | | | | | | | | |
| Diagnostic group | | | | | | | | | | |
| Acute infarction | 83.0 | 23.4 | 76.2 | 37.7 | 74.5 | 30.2 | 64.6 | 18.1 | 50.5 | 8.8 |
| Unstable angina | 69.9 | 26.7 | 61.4 | 43.5 | 63.1 | 30.9 | 51.7 | 18.7 | 44.9 | 9.9 |
| Significance | 0.000 | | 0.044 | | 0.029 | | 0.000 | | 0.001 | |
| GHQ-28 score | | | | | | | | | | |
| GHQ $< 6$ | 87.6 | 17.3 | 82.0 | 34.2 | 75.1 | 30.2 | 66.5 | 16.5 | 50.6 | 8.2 |
| GHQ $\geqslant 6$ | 64.1 | 28.0 | 54.2 | 43.6 | 61.6 | 30.5 | 48.5 | 18.1 | 44.3 | 10.3 |
| Significance | 0.000 | | 0.000 | | 0.009 | | 0.000 | | 0.000 | |
| History of CHD | | | | | | | | | | |
| No | 84.1 | 21.4 | 76.2 | 37.7 | 72.8 | 28.5 | 60.3 | 20.3 | 50.0 | 9.3 |
| Yes | 64.0 | 27.6 | 56.6 | 44.1 | 61.9 | 33.6 | 53.8 | 17.7 | 43.8 | 9.3 |
| Significance | 0.000 | | 0.010 | | 0.058 | | 0.055 | | 0.000 | |
| Use of tobacco | | | | | | | | | | |
| Smoker | 80.2 | 23.9 | 69.5 | 40.2 | 70.9 | 30.7 | 60.0 | 19.4 | 49.0 | 10.1 |
| Non-smoker | 71.5 | 27.5 | 66.3 | 43.3 | 66.2 | 31.1 | 55.3 | 19.3 | 45.9 | 9.1 |
| Significance | 0.035 | | 0.739 | | 0.355 | | 0.171 | | 0.065 | |
| Diabetes | | | | | | | | | | |
| Yes | 69.1 | 26.1 | 58.3 | 42.3 | 65.0 | 32.8 | 53.4 | 18.6 | 44.8 | 9.4 |
| No | 80.2 | 24.9 | 73.2 | 40.3 | 70.8 | 29.8 | 60.2 | 19.6 | 49.1 | 9.6 |
| Significance | 0.010 | | 0.044 | | 0.361 | | 0.058 | | 0.016 | |
| H. blood pressure | | | | | | | | | | |
| Yes | 72.1 | 26.4 | 59.5 | 44.6 | 65.2 | 32.0 | 53.4 | 18.3 | 45.7 | 9.6 |
| No | 81.0 | 24.5 | 77.3 | 35.8 | 72.6 | 29.4 | 62.7 | 19.6 | 49.7 | 9.4 |
| Significance | 0.028 | | 0.024 | | 0.209 | | 0.003 | | 0.034 | |
| Comorbidity | | | | | | | | | | |
| Yes | 70.0 | 24.2 | 67.7 | 41.0 | 64.8 | 30.9 | 55.4 | 20.0 | 46.2 | 8.9 |
| No | 80.3 | 26.4 | 68.8 | 41.9 | 71.0 | 31.0 | 59.3 | 19.0 | 48.5 | 10.3 |
| Significance | 0.002 | | 0.733 | | 0.277 | | 0.256 | | 0.286 | |

**Table 2.** (*Continued*)

| | PF[a] | | RP[a] | | BP[a] | | GH[b] | | PCS[b] | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | Mean | SD | Mean | SD | Mean | SD |
| Stenosis | | | | | | | | | | |
| Yes | 79.1 | 25.1 | 70.1 | 41.2 | 69.9 | 29.5 | 57.4 | 19.2 | 47.7 | 10.1 |
| No | 68.1 | 33.8 | 43.7 | 49.5 | 59.6 | 37.7 | 49.7 | 20.5 | 44.4 | 7.6 |
| Significance | 0.259 | | 0.096 | | 0.362 | | 0.290 | | 0.375 | |

PF: physical functioning; RP: physical role; BP: body pain; GH: general health. PCS: physical component summary; SD: standard deviation.

[a] Non-parametric tests were applied (Mann–Whitney *U*-test or Kruskal–Wallis test).

[b] T-test or ANOVA were applied.(1) I: senior managers, professionals; II: managers, technically qualified, and trades people; III: supervisory and administrative; IV: skilled manual workers; V: unskilled manual workers. GHQ: General Health Questionnaire. CHD: coronary heart disease.

ence of mental illness produced on average a decrease of 9.11 points in HRQL in this component. Also, not being married and being female produced a decrease in HRQL. However, for each additional year of age, an increase of 0.22 points in the MCS was observed (Table 5).

## Discussion

The identification of the sociodemographic and clinical variables related to the physical and mental health in patients with CHD provides useful information for the follow-up and treatment of these subjects. Therefore, in this study, we set out to determine these factors in the patients studied.

Among the results obtained, the most significant are the differences in the effect of age on each of the two global components studied, and the influence of mental disorders on the PCS and MCS of HRQL.

Several authors exploring the physical functioning dimension have found a decrease in scores in relation to age [16, 18, 19], but no similar decrease in other dimensions. We observed that the effect of age on the PCS was directly affected by the patient's previous history of CHD, with perceived HRQL decreasing with increasing age in patients who had no previous history, but increasing in those who did. This finding could be explained by the relationship existing between life expectancy and perceived quality of life as described by the Group WHOQOL [20]. In this view, patients who have a previous history of CHD might consider their life expectancy to be shorter, so each year 'added' to their life might be interpreted subjectively as better quality of life. In contrast, in those patients who have not previously suffered from CHD, and therefore who probably have higher expectations for their life than the first group, the shock of suffering such a serious event might diminish their perception of their HRQL.

Furthermore, with regard to the effect of age on the MCS, it is notable that the scores increased with age. These results are consistent with those obtained by Mishra et al in their study conducted in Australia [18] and in the Whitehall II study [16], in which the authors attribute their findings to a cohort effect, in the sense that successive generations have a greater tendency to perceive and describe their health adversely.

The probable presence of mental disorders among the patients was the most important variable conditioning their HRQL. In this respect, several authors have reported a greater incidence of anxiety and depression among patients with coronary diseases, this being associated with a worse response to treatment, with increased health care utilization and with a higher mortality rate [21]. Thus, authors such as Spitzer et al. [22] have demonstrated that mood disorders account for considerably more of the impairment in all HRQL domains than do medical problems, and that frequently these psychiatric disorders are not diagnosed by the physician or are inappropriately attributed to physical diseases [23].

Owing to the characteristics of this study in which the evaluation of mental health and HRQL were performed at the same time, it is difficult to

**Table 3.** Relationship between emotional dimensions of health-related quality of life and variables studied

| | VT[a] | | SF[a] | | RE[a] | | MH[a] | | MCS[a] | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | Mean | SD | Mean | DE | Mean | SD |
| *Sociodemographic variables* | | | | | | | | | | |
| Sex | | | | | | | | | | |
| Male | 68.3 | 21.4 | 82.7 | 25.1 | 65.0 | 44.5 | 69.2 | 23.2 | 45.6 | 14.0 |
| Female | 52.8 | 25.9 | 70.8 | 27.1 | 36.6 | 47.4 | 55.2 | 25.3 | 37.1 | 14.2 |
| Significance | 0.002 | | 0.019 | | 0.003 | | 0.007 | | 0.003 | |
| Social class (1) | | | | | | | | | | |
| Housewives | 54.8 | 25.0 | 68.7 | 28.0 | 31.9 | 46.6 | 59.0 | 24.2 | 37.4 | 14.4 |
| Class I and II | 79.0 | 17.2 | 96.2 | 6.0 | 83.3 | 36.0 | 81.6 | 16.6 | 51.3 | 10.2 |
| Class III | 64.3 | 23.5 | 82.0 | 25.2 | 57.9 | 47.3 | 63.8 | 22.7 | 42.8 | 14.3 |
| Class IV and V | 66.9 | 22.3 | 80.4 | 26.2 | 63.0 | 44.9 | 67.3 | 25.3 | 44.8 | 14.6 |
| Significance | 0.031 | | 0.035 | | 0.008 | | 0.049 | | 0.042 | |
| Marital status | | | | | | | | | | |
| Married | 69.1 | 21.8 | 83.9 | 22.4 | 64.1 | 44.7 | 69.8 | 22.4 | 46.2 | 13.0 |
| Unmarried | 47.1 | 20.9 | 63.9 | 32.8 | 35.8 | 48.0 | 50.4 | 26.9 | 33.3 | 15.4 |
| Significance | 0.000 | | 0.005 | | 0.007 | | 0.001 | | 0.000 | |
| Age | | | | | | | | | | |
| $\leqslant 54$ | 62.3 | 26.6 | 76.7 | 28.9 | 61.2 | 46.8 | 62.4 | 29.8 | 41.1 | 16.7 |
| 55–64 | 69.8 | 22.0 | 81.1 | 26.4 | 55.5 | 47.9 | 68.4 | 21.6 | 44.1 | 14.0 |
| $\geqslant 65$ | 62.9 | 21.7 | 81.4 | 23.8 | 58.9 | 46.2 | 66.8 | 22.3 | 45.0 | 13.1 |
| Significance | 0.290 | | 0.747 | | 0.866 | | 0.775 | | 0.652 | |
| *Clinical variables* | | | | | | | | | | |
| Diagnostic group | | | | | | | | | | |
| Acute infarction | 70.3 | 21.4 | 83.0 | 22.9 | 63.4 | 46.2 | 70.6 | 23.2 | 44.9 | 13.5 |
| Unstable angina | 59.9 | 24.0 | 77.3 | 28.2 | 54.2 | 46.8 | 62.0 | 24.8 | 42.5 | 15.2 |
| Significance | 0.013 | | 0.410 | | 0.315 | | 0.041 | | 0.406 | |
| GHQ-28 score | | | | | | | | | | |
| GHQ $< 6$ | 75.4 | 20.8 | 90.8 | 20.1 | 72.1 | 42.8 | 77.6 | 17.9 | 49.3 | 11.9 |
| GHQ $\geqslant 6$ | 53.8 | 20.6 | 68.8 | 26.7 | 44.6 | 46.5 | 54.0 | 24.5 | 37.6 | 14.5 |
| Significance | 0.000 | | 0.000 | | 0.001 | | 0.000 | | 0.000 | |
| History of CHD | | | | | | | | | | |
| No | 70.1 | 23.0 | 83.3 | 23.4 | 64.5 | 44.4 | 68.6 | 24.0 | 44.8 | 14.3 |
| Yes | 56.8 | 21.7 | 75.0 | 28.7 | 49.6 | 48.7 | 62.2 | 24.7 | 41.9 | 14.6 |
| Significance | 0.001 | | 0.111 | | 0.102 | | 0.158 | | 0.311 | |
| Use of tobacco | | | | | | | | | | |
| Smoker | 66.9 | 22.1 | 78.9 | 27.8 | 56.1 | 46.1 | 68.0 | 25.6 | 43.1 | 15.0 |
| Non-smoker | 62.5 | 24.6 | 81.2 | 23.7 | 60.9 | 47.6 | 63.9 | 22.9 | 44.2 | 13.9 |
| Significance | 0.284 | | 0.909 | | 0.619 | | 0.203 | | 0.822 | |
| Diabetes | | | | | | | | | | |
| Yes | 60.5 | 23.0 | 77.5 | 26.5 | 59.2 | 45.9 | 62.5 | 24.9 | 43.1 | 13.6 |
| No | 67.3 | 23.2 | 81.2 | 25.8 | 57.7 | 47.2 | 68.0 | 24.1 | 43.8 | 15.0 |
| Significance | 0.111 | | 0.363 | | 0.974 | | 0.230 | | 0.723 | |
| H. blood pressure | | | | | | | | | | |
| Yes | 61.3 | 23.9 | 77.5 | 27.2 | 56.3 | 47.5 | 62.1 | 24.6 | 42.4 | 14.9 |
| No | 69.0 | 22.1 | 82.5 | 24.6 | 60.3 | 45.9 | 70.6 | 23.6 | 44.8 | 14.0 |
| Significance | 0.062 | | 0.229 | | 0.618 | | 0.022 | | 0.348 | |
| Comorbidity | | | | | | | | | | |
| Yes | 63.4 | 22.4 | 79.3 | 26.8 | 52.1 | 47.9 | 67.4 | 22.4 | 43.2 | 14.4 |
| No | 65.7 | 24.0 | 80.5 | 25.5 | 63.2 | 45.4 | 65.0 | 25.8 | 43.9 | 14.5 |
| Significance | 0.550 | | 0.974 | | 0.187 | | 0.860 | | 0.768 | |

**Table 3.** (*Continued*)

| | VT[a] | | SF[a] | | RE[a] | | MH[a] | | MCS[a] | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | Mean | SD | Mean | DE | Mean | SD |
| Stenosis | | | | | | | | | | |
| Yes | 68.8 | 22.4 | 83.4 | 23.2 | 65.3 | 45.0 | 67.2 | 23.3 | 45.7 | 13.8 |
| No | 59.3 | 21.9 | 64.1 | 28.7 | 29.1 | 45.2 | 58.5 | 24.4 | 36.8 | 15.7 |
| Significance | 0.256 | | 0.031 | | 0.034 | | 0.317 | | 0.092 | |

VT: vitality; SF: social functioning; RE: emotional role; MH: mental health; MCS: mental component summary; SD: standard deviation.
[a]Non-parametric tests were applied (Mann–Whitney U-test or Kruskal–Wallis test).(1) I: senior managers, professionals; II: managers, technically qualified, and trades people; III: supervisory and administrative; IV: skilled manual workers; V: unskilled manual workers; GHQ: General Health Questionnaire; CHD: coronary heart disease.

**Table 4.** Multiple linear regression model for the physical component summary (PCS)

| | Coefficients | Standard error | Significance |
|---|---|---|---|
| Constant | 51.746 | 1.210 | 0.000 |
| Personal history of coronary heart disease | −5.062 | 1.670 | 0.003 |
| GHQ-28 score $\geqslant 6$ | −5.575 | 1.557 | 0.000 |
| Age | −0.270 | 0.095 | 0.005 |
| Personal history × age | 0.404 | 0.162 | 0.014 |

GHQ: General Health Questionnaire.
Reference categories: NO personal history and GHQ-28 score $< 6$. Age in years, centered on the mean (60.7).
Coefficient of determination of the model: $R^2 = 0.228$. Significance = 0.000.

**Table 5.** Multiple linear regression model for the mental component summary (MCS)

| | Coefficients | Standard error | Significance |
|---|---|---|---|
| Constant | 66.158 | 4.304 | 0.000 |
| GHQ-28 score $\geqslant 6$ | −9.115 | 2.257 | 0.000 |
| Marital status | −9.743 | 2.848 | 0.001 |
| Sex | −5.147 | 2.726 | 0.061 |
| Age | 0.227 | 0.106 | 0.035 |

GHQ: General Health Questionnaire.
Reference categories: GHQ-28 score $< 6$, married and male sex. Age in years, centered on the mean (60.7).
Coefficient of determination of the model: $R^2 = 0.282$. Significance = 0.000.

establish whether the worse state of mental health found in patients was the cause or the consequence of the lower SF-36 scores obtained. Despite this, we consider that the detection and the correct treatment of mental problems should be approached systematically in these patients.

Another variable independently associated with the MCS was the sex of the patient, females being more predisposed to presenting lower HRQL. On this aspect, most studies on HRQL in patients with CHD suggest that women do not cope physically or psychosocially as well as men [24]. However, there is no consensus on this point and it remains unclear why gender-related differences in HRQL exist among CHD patients. Theoretical explanations for this concern the severity of the illness, with females having a lower premorbid level and worse CHD-related recovery, yet these explanations remain hypothetical and are probably not mutually exclusive. In a recent paper, Van Jaarsveld et al. pointed out that females constitute a vulnerable group with more physical limitations, more distress and more social limitations than males [25].

On the other hand, cardiovascular risk factors were part of the bivariate analysis and were significantly associated with the dimensions of the PCS, but were not related variables when adjusted for other factors. Thus, it might be that both age and the existence of a personal history act as confounding factors in the relationship between these variables.

Although various authors have reported that diabetes [26] or high blood pressure [27] are associated with a reduction in HRQL, it is not clear whether this is a direct effect or the consequence of increasing age, at a time when the prevalence of these factors also increases [28].

In addition, a similar effect to that described above was noted in respect of the diagnostic group variable. Although this was associated with the PCS in the bivariate analysis, it was observed that when adjusting for the other factors, age and

personal history were confounding factors since they predisposed patients to presenting a more serious clinical condition [29].

Further, the presence of coronary stenosis was not associated with lower scores of the SF-36, which is contrary to what one would expect. This could be explained by the finding that 81.6% of the patients suffered stenosis in only 1 or 2 vessels, which may have had relatively little adverse impact on their HRQL; those factors linked to chronicity of the illness, such as the existence of antecedents of the illness, may be more important in their perception of health.

Finally, with regard to the methodology utilized in this study, it should be underlined that using the two global components of the SF-36 offers practical advantages in that fewer statistical comparisons need to be made, and a measure with less variability than the specific dimensions is obtained [17]. Moreover, Rumsfeld et al. [30] emphasized the importance of these summary measures and they recommend their use to stratify the risk involved and to take clinical decisions in coronary patients.

In conclusion, the identification of those groups of patients who are shown to be predisposed to having a lower HRQL and the determination of whether the physical, mental, or both spheres of life are affected, would allow health professionals to form an overall view of the patient's condition in their approach to treatment, with the objective not only of prolonging life but also of relieving symptoms and improving the patient's functioning and participation in relevant activities.

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