BRIEF REPORT

# Different Psychological Profiles in Non-Cardiac Chest Pain and Coronary Artery Disease: a Controlled Study

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The objective of the study was to identify clinical characteristics that enable non-cardiac chest pain to be differentiated from coronary artery disease. An observational case-control study was carried out in 40 patients with non-cardiac chest pain and a control group of 40 patients with coronary artery disease. Sociodemographic, medical, and psychological variables were assessed. There was no difference in personality except in "emotional control," which was less in patients with non-cardiac chest pain. These patients had greater alexithymia and more frequently used coping strategies, such as religion and seeking medical help. Multivariate analysis showed that a predictive model comprising four variables (ie, alexithymia, quality of life, and coping based on religion and seeking medical help) had a sensitivity of 85.4% and a specificity of 80.0%. This predictive model could be used as a screening test to discriminate between the two conditions.

**Key words:** *Non-cardiac chest pain. Coronary artery disease. Psychology.*

## Perfil psicológico diferencial entre dolor torácico de causa no cardiológica y enfermedad coronaria: un estudio controlado

El objetivo del trabajo es identificar variables que permitan diferenciar el dolor torácico de causa no cardiológica (DTCNC) de la enfermedad coronaria (EC). Se realizó un estudio observacional, de casos (pacientes con DTCNC, n = 40) y controles (pacientes con EC, n = 40). Se analizaron variables sociodemográficas, médicas y psicológicas. No existían diferencias en personalidad, excepto en el rasgo «control emocional», menor en DTCNC. Estos enfermos presentaron mayor alexitimia y empleaban más frecuentemente dos estrategias de afrontamiento: la religión y la búsqueda de ayuda médica. Cuando se realizó un análisis multivariable, el modelo compuesto por las siguientes cuatro variables: alexitimia, calidad de vida y afrontamientos basados en la religión y en la búsqueda de ayuda médica muestra una sensibilidad del 85,4% y una especificidad del 80%. Este modelo predictivo podría emplearse como test de screening para diferenciar ambos trastornos.

**Palabras clave:** *Dolor torácico de causa no cardiológica. Enfermedad coronaria. Psicología.*

## INTRODUCTION

Non-cardiac chest pain (NCCP) is defined as a pain in the chest similar to that experienced in angina, but occurring in patients in whom heart disease has been ruled out.[1] The literature shows that NCCP is associated with more psychiatric problems, [2] inadequate coping strategies,[3] and neurosis[4] than coronary heart disease (CHD). Although recent years have seen the undertaking of studies into NCCP and its related psychological factors[5] and psychiatric comorbidity,[6] much is still to be learned. The aim of the present work was to determine whether any psychological variables exist that might allow one to distinguish between NCCP and CHD.

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This controlled, cross-sectional study involved patients attending the Hospital Clínico Universitario de Zaragoza for cardiology consultations between 2003 and 2005. Two groups of patients were established, those with NCCP consulting with regard to cardiac symptoms but who the attending cardiologist determined not to have heart disease (NCCP group), and patients with CHD attending the clinic owing to cardiac symptoms which the attending physician regarded as being of a cardiac nature (control [CHD] group). The tests used to confirm NCCP or CHD were blood analysis (for cardiac enzymes), an electrocardiogram, stress tests and coronary angiography, following the recommendations outlined in current clinical practice guidelines.[7,8]

The sample size for each group (n=40) was determined for a power of 80% with significance set at $P$=.05, two tails, and to detect a difference between groups in the psychological variables studied of 20%. A withdrawal rate of 10% was assumed. The initial sample size required was thus determined to be n=45, considering an expected refusal rate of 10%.

Sociodemographic information was collected from each subject, as well as a medical history including information on psychosocial variables: *a)* hostility (ICM-R9 Scale); *b)* personality (the Big Five Questionnaire,[10] which records energy, affability, tenacity, emotional stability, and open-mindedness); *c)* coping (revised Coping Strategies Scale)[11]; *d)* alexithymia (Spanish adaptation of the Toronto Alexithymia Scale)[12]; *e)* psychosocial problems (Social Problems Scale)[13]; and *f)* quality of life (Quality of Life Scale).[14]

Quantitative variables were compared using the Student $t$ test for paired samples when the distribution was normal, and the Friedman non-parametric test when not. Qualitative variables were analyzed via the calculation of the McNemar statistic (dichotomous variables). The remaining variables were analyzed using the $\chi^2$ test, employing the Yates correction when necessary. The variables that differentiated the patient groups were identified by binary logistic regression calculating the area under the receiver-operator characteristics (ROC) curve. All calculations were performed using the Statistical Package for the Social Sciences v.14.0.

This study was performed as part of wider research into functional somatic symptoms,[15,16] and was approved by the Aragonese Clinical Research Ethics Committee (*Comité Ético de Investigación Clínica de Aragón*).

## RESULTS

A total of 367 patients were examined to find 45 eligible patients with NCCP. Of these, 5 (11.1%) declined to take part in the study. The control patients with CHD, sex- and age-matched for the NCCP subjects, were also recruited from this initial group. A total of 50 patients with CHD were identified, but 10 (20%) declined to take part. No

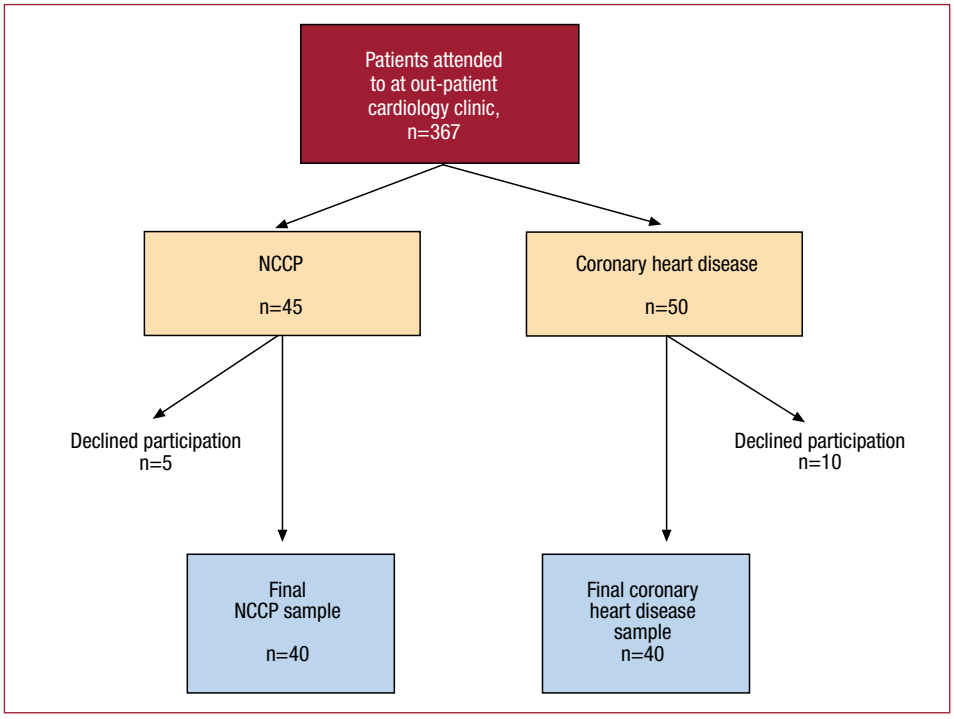


**Figure 1.** Flow diagram describing study. NCCP indicates non-cardiac chest pain.

TABLE 1. **Sociodemographic and Medical Characteristics of the 2 Patient Groups**

| Characteristic | NCCP Group (n=40) | CHD Group (n=40) | *P* |
|---|---|---|---|
| Women, n (%) | 25 (62.5) | 20 (50) | .259 |
| Age, mean (SD), y | 51.2 (13.2) | 49.2 (12.4) | .48 |
| Europeans, % | 100 | 100 | |
| Married patients, n (%) | 22 (55) | 25 (62.5) | .495 |
| Level of education, n (%) | | | .11 |
| Primary | 24 (60) | 22 (55) | |
| Secondary | 12 (30) | 15 (37.5) | |
| University | 4 (10) | 3 (7.5) | |
| Occupation, n (%) | 5 (12.5) | 6 (15) | .745 |
| Surgical or percutaneous cardiovascular intervention, n (%) | 4 (10) | 18 (45) | <.01 |
| Background of ischemic heart disease, n (%) | 5 (12.5) | 22 (55) | <.01 |
| Background of myocardial infarction, n (%) | 3 (7.5) | 14 (35) | <.01 |
| Quality of life (total), mean (SD) | 117.1 (24) | 130.7 (21.2) | <.01 |

CHD indicates coronary heart disease; NCCP, non-cardiac chest pain.DTCNC: dolor torácico de causa no cardiaca; EC: enfermedad coronaria.

significant sociodemographic differences were seen between the subjects who declined to take part and those who did take part. Figure shows a flow diagram describing the study.

Table 1 shows the sociodemographic characteristics of both patient groups; no significant differences were seen between them. However, the CHD patients had more medical antecedents than the NCCP patients, while the latter had a lower quality of life. Table 2 describes the psychological variables recorded. No differences were seen between the patient groups with respect to hostility, social problems or searching for social support, but alexithymia was increased among the NCCP subjects. With respect to personality, the NCCP patients had lower emotional control scores, and in terms of coping, these patients relied more on religion and sought medical help more commonly than the CHD patients. Table 3 shows the logistic regression model, in which the following psychosocial variables proved to be predicitive: coping through religion, coping through seeking professional help, alexithymia and quality of life. This model allowed 82.7% of the subjects (sensitivity, 85.4%; specificity, 80%) to be correctly classified. The ROC curve value was 0.901.

## DISCUSSION

This is the first study to analyze the differences in psychosocial characteristics between patients with NCCP and those with CHD. The main limitation of this study is the sample size, which was small for a multivariate study; the results should therefore be considered preliminary. Further, these findings need to be confirmed in a prospective study in another population, in order to validate the discriminatory test.

No significant differences were seen between the 2 groups of patients in terms of sociodemographic variables. However, the quality of life of the NCCP patients was significantly poorer than that of the CHD patients. It has previously been reported that the quality of life of these patients is poorer than in any other somatic disorder.[1]

Although hostility appears to be a key factor associated with the development of CHD,[17] it has also been shown to appear in patients with functional abnormalities,[18] thus its presence does not allow one to distinguish between CHD and NCCP. No differences were seen between the patient groups in terms of their seeking social support or in terms of social problems. However, alexithymia was greater in the NCCP patients; this was expected since alexithymia is a risk factor for psychosomatic disorders.[19]

No difference was seen between the NCCP and CHD groups in terms of the Big Five score. Only the points scored on the emotional control subscale were different (lower in the NCCP subjects). With respect to coping, the NCCP subjects used two strategies more than the CHD patients: seeking medical help (in agreement with that reported by other authors),[5] and reliance on religion, which leads to passivity in terms of dealing with their disease. It has been reported that in somatizing patients suffering chronic pain[20] both these strategies are associated with uncontrollability and a perception of low self-efficacy, which in turn is related to a poorer quality of life and increased levels of physical and psychological incapacity.

The results of the multivariate analysis suggest a model for distinguishing between NCCP and CHD based on the variables alexithymia, coping via religion and coping via the seeking of medical help (sensitivity, 85.4%; specificity, 80%); this model

TABLE 2. **Psychological Characteristics of Non-Cardiac Chest Pain and Coronary Heart Disease**

| Variables | NCCP Group (n=40) | CHD Group (n=40) | *P* |
|---|---|---|---|
| Hostility, mean (SD) | 44.3 (7.1) | 47 (8.4) | .14 |
| Personality | | | |
| Dimension: energy | | | |
| Dynamism | 19.2 (3.6) | 20.1 (3.6) | .265 |
| Dominance | 17.8 (3) | 18.3 (2.8) | .44 |
| Dimension: affability | | | |
| Empathy | 21.7 (2.7) | 22.7 (3) | .15 |
| Cordiality | 19.4 (3.2) | 20.6 (3.3) | .08 |
| Dimension: tenacity | | | |
| Scrupulousness | 20.4 (3.6) | 19.5 (3.7) | .84 |
| Perseverance | 19.4 (3.7) | 20.6 (3.9) | .15 |
| Mental stability | | | |
| Emotional control | 17.7 (3.2) | 19.4 (4.4) | .04[a] |
| Control of impulses | 16.1 (3.8) | 16.5 (4.6) | .64 |
| Dimension: open mindedness | | | |
| Openness to culture | 18.7 (4.1) | 20.6 (4.5) | .06 |
| Openness to experience | 17.7 (3.7) | 17.7 (4.01) | .95 |
| Alexithymia | 76.7 (9.3) | 67.4 (11.2) | <.01[b] |
| Social problems | | | |
| Work | 1.5 (1) | 1.8 (1.2) | .32 |
| Economic 1.7 (0.8) | 1.6 (0.6) | .42 | |
| Social contracts | 1.4 (0.3) | 1.4 (0.4) | .76 |
| Marital | 1.6 (0.9 | 1.6 (0.6) | .67 |
| Seeking of social support | 11.8 (6.9) | 10 (6.22) | .21 |
| Coping | | | |
| Use of religion | 13.3 (6.8) | 3.9 (4) | <.01[b] |
| Seeking medical help | 10.9 (8.1) | 7.2 (6.8) | <.05[a] |
| Focus on a situation or problem | 13.7 (5.8) | 13.5 (5.2) | .861 |
| Negative self-focusing | 10.9 (3.7) | 9.7 (3.8) | .13 |
| Self-control | 13.7 (3.1) | 12.6 (4.6) | .22 |
| Cognitive restructuring | 12.2 (5) | 12.2 (4.4) | .98 |
| Emotional expression | 8.2 (6.2) | 6.8 (4.1) | .12 |
| Avoidance | 8.8 (4.5) | 7.6 (4) | .22 |

[a]*P*<.05.
[b]*P*<.01.

TABLE 3. **Differential Predicitive Model for Non-Cardiac Chest Pain and Coronary Heart Disease**

| Predictors | $R_2$ | B | ET | Wald | P | Exp (B) |
|---|---|---|---|---|---|---|
| Constant | – | –2.757 | 3.326 | 0.687 | .407 | 0.064 |
| Coping (religion) | 0.625 | 0.289 | 0.073 | 15.523 | <.001 | 1.335 |
| Quality of life | – | –0.042 | 0.016 | 6.612 | .01 | 0.958 |
| Coping (seeking medical help) | – | 0.110 | 0.048 | 5.181 | .023 | 1.116 |
| Alexithymia | – | 0.070 | 0.032 | 4.631 | .031 | 1.072 |

Sensitivity, 85.4%; specificity, 80%; correctly classified, 82.7%.

correctly classified 82.7% of the patients. This is the first study to establish a method with high sensitivity and specificity that can distinguish between patients with these conditions. The specificity and sensitivity values described are similar to those of other psychological tests such as the Mini-Mental State Examination, which is widely used in the early detection of dementia. The use of the present test could help physicians make a differential diagnosis between NCCP and CHD cheaply and quickly (the test only requires about 5 minutes to perform). Patients positive for NCCP could be quickly referred for mental health care, helping to avoid chronification problems and reducing costs, in many cases the

confirmation of such a diagnosis by a psychiatrist would avoid the need for expensive complementary tests not free of iatrogenic risks. More studies should be performed to further develop this tool and to test its usefulness in everyday practice.

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