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Prevalence and prognosis of anxiety, insomnia, and type D personality in patients with myocardial infarction: A Spanish cohort

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Abstract

Background: *It has been suggested that patients with myocardial infarction and non-obstructive coronary arteries (MINOCA) have more psycho-emotional disorders than patients with obstructive coronary artery disease (MICAD). The aim of this study is to compare the prevalence of anxiety, insomnia, and type D personality between MINOCA and MICAD and their impact on prognosis.*

Methods: *Patients with myocardial infarction undergoing coronary angiography were prospectively enrolled. Psychological questionnaires were completed by each patient during admission.*

Results: *Among a total of 533 patients, 56 had MINOCA and 477 had MICAD. There were no differences in the prevalence of anxiety and insomnia between both groups: trait anxiety median value (M) MINOCA = 18 (11–34) vs. MICAD M = 19 (12–27), p = 0.8; state anxiety MINOCA M = 19 (11–29) vs. MICAD M = 19 (12.2–26), p = 0.6; and insomnia MINOCA M = 7 (3–11) vs. MICAD M = 7 (3–12), p = 0.95. More MINOCA patients had type D personality (45.0% vs. 28.5%, p = 0.03). At 3-year follow-up, there were no differences in mortality between MINOCA and MICAD (hazard ratio [HR] 0.78, 95% confidence interval [CI] 0.28–2.17) in major adverse cerebral or cardiovascular events (MACCE) (HR 0.71, 95% CI 0.38–1.31). Scores of trait anxiety and negative affectivity were significantly associated with MACCE (HR 1.65, 95% CI [1.05–2.57]; HR 1.75, 95% CI [1.11–2.77], respectively). High insomnia levels were associated with greater mortality (HR 2.72, 95% CI [1.12–6.61]).*

Conclusions: *Anxiety and insomnia levels were similar between patients with MINOCA and those with MICAD, whilst the prevalence of type D personality was higher in the MINOCA than in the MICAD group. Higher scores in trait anxiety, insomnia, and negative affectivity were related to a worse prognosis at 3-year follow-up.* (Cardiol J 2024; 31, 2: 261–270)

Keywords: anxiety, infarction, insomnia, myocardial infarction and non-obstructive coronary arteries (MINOCA), type D personality

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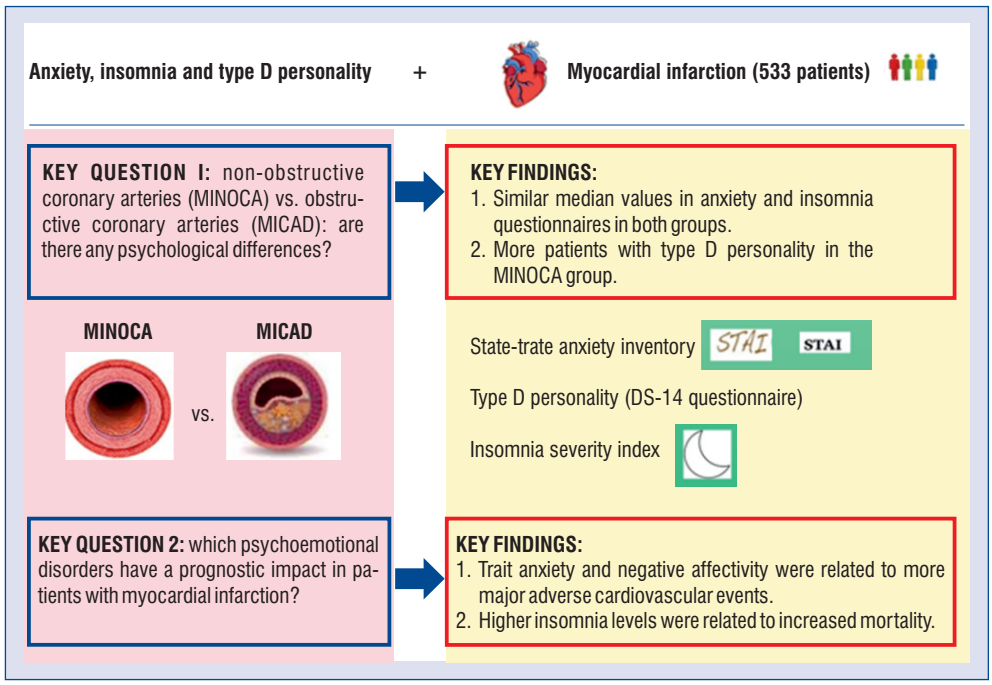

Central illustration. Anxiety, insomnia, and type D personality must be studied both in patients with myocardial infarction with non-obstructive coronary arteries (MINOCA) and in patients with myocardial infarction with coronary artery disease (MICAD), in order to identify those who might benefit from psychological attention.

Introduction

Myocardial infarction (MI) is related to atherosclerotic plaque rupture, ulceration, fissuring, erosion, or dissection with resulting intraluminal thrombus in one or more of the coronary arteries, leading to decreased myocardial blood flow. The patient may have underlying obstructive coronary artery disease (MICAD), but sometimes non-obstructive or no coronary artery disease is found at angiography (MINOCA). This type of MI can represent as much as 5–11% of the total MI according to different series [1–3].

Although some studies suggest a relationship between mental health and cardiovascular disease [4, 5], the initial approach of patients with MI does not usually include the evaluation of psychological disorders.

There are studies that correlate insomnia and type D personality with heart failure [6, 7], and there is a well-established relationship between depression and coronary heart disease [8, 9]. However, there is controversial evidence regarding MI and its relationship with anxiety, insomnia, and type D personality [10–13].

It has been suggested that patients with MINOCA have more emotional stress than patients with MICAD. These data are difficult to interpret because of the heterogeneity of MINOCA definitions, which have continuously changed in the past few years [14, 15]. Also, there is no evidence regarding which psychological questionnaires may have prognostic value in patients with MINOCA. To the best of our knowledge, this is the first study that compares psycho-emotional disorders in MICAD and MINOCA patients with standardized questionnaires.

The objectives were as follows: 1) to compare levels of anxiety, insomnia, and type D personality through validated questionnaires between patients with MINOCA and MICAD and 2) to determine if any of these psycho-emotional disorders were related to significant differences in prognosis. The main prognostic variable was the combination of major adverse cerebral and cardiovascular events (MACCE), which included stroke, MI, cardiovascular readmission, or death from any cause (Central illustration).

Methods

All consecutive patients admitted to Getafe University Hospital (Madrid, Spain), who underwent coronary angiography for MI between July 2017 and December 2021 were prospectively enrolled.

Inclusion criteria were as follows: being 18 years of age or older, fulfilling the MI criteria according to the 4th Universal Definition of Infarction [16], and undergoing a coronary angiography during admission. The exclusion criterion was the inability to sign informed consent.

The diagnosis of MINOCA was made according to the following criteria: 1) MI according to the 4th Universal Definition of Infarction [16]; 2) non-obstructive coronary arteries on angiography (no coronary artery stenosis ≥ 50%); and 3) no specific alternate diagnosis for the clinical presentation. The latest European and American guideline definitions were used [17, 18], therefore excluding patients with myocarditis and takotsubo.

The study protocol complied with the Declaration of Helsinki, and it was approved by the local institutional review committee.

Procedure

The questionnaires referring to anxiety, insomnia, and type D personality were completed by each patient (self-administrated test) during hospitalization. The three questionnaires are presented below:

— **State-Trait Anxiety Inventory (STAI)** adapted and validated in Spanish [19]. STAI is a self-report assessment device that includes separate measures of state of anxiety (STAI-S) and trait anxiety (STAI-T). The STAI-S measurement assesses how the individual feels "right now". Subjects were asked to rate the intensity of their anxious feelings on a 4-point scale regarding their experience of feelings as follows: not at all, somewhat, moderately so, or very much so. The STAI-T explains how the individuals generally feel by rating themselves on a 4-point scale as follows: almost never, sometimes, often, or almost always. Each type of anxiety has its own scale of 20 different questions. Scores range from 0 to 60, with higher scores correlating with greater anxiety;

— **The Type D Scale-14 (DS-14)** adapted and validated in Spanish [20]. Type D personality is characterized by two personality traits: negative affectivity (NA) and social inhibition (SI). NA is the tendency to experience negative emotions and feelings of dysphoria, anxiety, irritability, and apprehension, including vulnerability to anxiety and depression. SI is the tendency to inhibit the expression of emotions, paired with interpersonal stress and the failure to adapt. Participants respond to each item on a 5-point Likert scale (0 = false, 1 = rather false, 2 = neutral, 3 = rather true, 4 = true). The NA and SI scales can be scored (0–28 points) to assess these personality traits independently. A score of 10 or more on both scales is used to classify the patient as having a type D personality (type D = NA ≥ 10 + IS ≥ 10);

— **Insomnia Severity Index (ISI)** adapted and validated in Spanish [21, 22]. It is a 7-item questionnaire assessing the nature, severity, and impact of insomnia. The usual recall period is the "last month" and the dimensions evaluated are as follows: severity of sleep onset, sleep maintenance, early morning awakening problems, sleep dissatisfaction, interference of sleep difficulties with daytime functioning, noticeability of sleep problems by others, and distress caused by the sleep difficulties. A 5-point Likert scale is used to rate each item (0 = no problem; 4 = very severe problem), yielding a total score ranging from 0 to 28 points. The total score is interpreted as follows: absence of insomnia (0–7 points); subthreshold insomnia (8–14 points); moderate insomnia (15–21 points); and severe insomnia (22–28 points).

Statistical analysis

Qualitative variables were represented as a percentages (%). Differences between groups were calculated with the χ^2 test. The scores obtained in the questionnaires were presented as medians (p25–p75), and the differences between groups were calculated with the Mann-Whitney U test. Normal continuous variables were presented as mean ± standard deviation, and the differences between groups were established with Student's test. Events at follow-up were analyzed and represented with Cox regression and Kaplan-Meier method using the log-rank test for comparison between both groups. Median time at follow-up was 942 days (511–1375).

Results

There was a total of 546 patients with MI undergoing coronary angiography, and 533 signed the informed consent. Of them, 56 presented with MINOCA (10.5%) and 477 presented with MICAD (89.5%). The different questionnaires were completed as follows: STAI 60.8% (324 patients, 43 MINOCA and 281 MICAD), ISI 61.3% (327 patients, 43 MINOCA and 284 MICAD), and DS-14 59.5% (317 patients, 40 MINOCA and 277 MICAD).

Table 1. Baseline characteristics: personal background.

	MINOCA (n = 56)	MICAD (n = 477)	P
Women	31 (55.4%)	111 (23.4%)	< 0.01
Age [years]	66.8 ± 13.7	66.5 ± 13.7	0.88
Smokers	13 (26%)	169 (41.2%)	0.03
Diabetes mellitus	13 (23.2%)	150 (31.5%)	0.20
Dyslipidemia	31 (56.4%)	255 (53.7%)	0.70
Hypertension	41 (73.2%)	276 (58%)	0.03
Myocardial infarction	6 (10.7%)	79 (16.7%)	0.21
Heart failure	3 (5.4%)	23 (4.8%)	0.72
Stroke	4 (7.1%)	30 (6.3%)	0.71
Peripheral vascular disease	3 (5.4%)	39 (8.2%)	0.60
Chronic kidney disease	4 (7.1%)	52 (10.9%)	0.38
Chronic lung disease	6 (10.7%)	52 (10.9%)	0.96
PCI	2 (3.6%)	55 (11.6%)	0.06
AF/atrial flutter	9 (16.1%)	35 (7.4%)	0.03
Cancer	6 (10.7%)	51 (10.7%)	1
Allergies	10 (17.9%)	44 (9.2%)	0.04
Psychiatric disease	8 (14.3%)	50 (10.5%)	0.40
Previous treatment:			
Acetylsalicylic acid	12 (21.4%)	122 (25.6%)	0.52
Other antiplatelet therapy	3 (5.4%)	30 (6.3%)	1
Beta-blockers	11 (19.6%)	106 (22.3%)	0.61
ACE inhibitors	21 (37.5%)	134 (28.2%)	0.15
ARB	10 (17.9%)	79 (16.6%)	0.82
Statins	26 (46.4%)	197 (41.6%)	0.48
Nitrates	3 (5.4%)	36 (7.6%)	0.78

Values expressed as number (%) or mean value ± standard deviation; ACE — angiotensin-converting enzyme; AF — atrial fibrillation; ARB — angiotensin receptor blocker; MICAD — myocardial infarction with coronary artery disease; MINOCA — myocardial infarction with non-obstructive coronary arteries; PCI — percutaneous coronary intervention

Table 2. Characteristics at admission and during hospitalization.

	MINOCA (n = 56)	MICAD (n = 477)	P
Angina	37 (66.1%)	386 (80.9%)	< 0.01
Heart rate [bpm]	78.8 ± 16.8	79.4 ± 19.1	0.80
SBP [mmHg]	151.1 ± 28.1	140.8 ± 30.0	0.01
Troponin T hs [ng/L]	748.9 ± 1893.1	2419.8 ± 5960.5	< 0.01
Creatinine kinase [U/L]	320.2 ± 366.6	908.3 ± 1185.3	< 0.01
Hemoglobin [g/dL]	13.9 ± 1.7	14.2 ± 1.9	0.18
Cholesterol [mg/dL]	170.2 ± 41.9	164.1 ± 45.1	0.35
Creatinine [mg/dL]	1.3 ± 1.9	1.2 ± 1.5	0.72
Electrocardiogram:			
AF/atrial flutter	10 (17.9%)	28 (5.9%)	< 0.01
ST segment elevation or depression	13 (23.2%)	292 (62.3%)	< 0.01
Killip I	54 (98.1%)	424 (89.8%)	0.04
Pulmonary edema, reinfarction, hemorrhage	1 (1.8%)	33 (6.9%)	0.21
Primary angioplasty	6 (10.7%)	230 (48.2%)	< 0.01
Ejection fraction < 40%	3 (5.4%)	75 (15.8%)	0.04

All values express number (%) or mean value ± standard deviation; AF — atrial fibrillation; MICAD — myocardial infarction with coronary artery disease; MINOCA — myocardial infarction with non-obstructive coronary arteries; SBP — systolic blood pressure; Troponin T hs: Elecsys test (Roche), cut-off value 14 ng/L

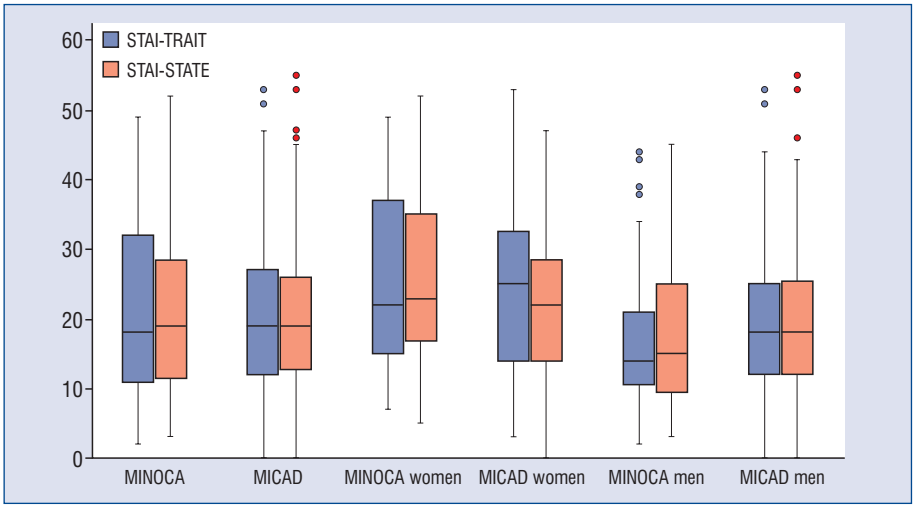

Figure 1. State-trait anxiety inventory (STAI) median score in all groups. Box plot. The boxes on the left (blue) represent the median score value for the trait anxiety component of the STAI questionnaire. The boxes on the right (red) represent the median score value for the state anxiety component of the STAI questionnaire. The boxes cover the interquartile interval, where 50% of the data are found. No significant differences were found between patients with myocardial infarction with non-obstructive coronary arteries (MINOCA) and patients with myocardial infarction with coronary artery disease (MICAD). Also, there were no differences when analyzing both groups by sex.

Characteristics at baseline and during admission are presented in Tables 1 and 2.

There were more women in the MINOCA group (55.4% vs. 23.4%, $p < 0.01$), but the age was similar in both groups: MINOCA 66.8 ± 13.7 and MICAD 66.5 ± 13.6, $p = 0.9$. Regarding traditional cardiovascular risk factors, there were more smokers in the MICAD group (41.2% vs. 26%, $p = 0.03$) and MINOCA patients had more hypertension (73.2% vs. 58%, $p = 0.03$). There were no differences in diabetes (31.5% vs. 23.2%, $p = 0.2$) or dyslipidemia (53.7% vs. 56.4%, $p = 0.7$).

The principal mechanisms underlying MINOCA were unknown (48.2%), followed by type II MI (19.6%) and vasospasm (10.7%). Disruption of plaque comprised 8.9% of the cases. The least common mechanisms were coronary dissection (8.1%) and emboli (4.5%). Although not all patients were able to complete the questionnaires, there were no differences in baseline characteristics between those who completed the questionnaires and those who did not. However, there were significant differences in their clinical course, so that patients with a poorer prognosis could not complete as many questionnaires as the rest of patients: worse Killip classification (95.7% vs. 15.5%, $p < 0.01$); higher levels of biomarkers (troponin T [ng/L] 1832.9 ± ± 3931.0 vs. 2989.1 ± 7938.1, $p = 0.04$; creatinine kinase [U/L] 721.4 ± 968.8 vs. 1079.3 ± 1378.7, $p < 0.01$); ejection fraction below 40% (9.9% vs. 22.8%, $p < 0.01$); more in-hospital complications (3.9% vs. 10.6%, $p < 0.01$); and more ST segment alterations (52.1% vs. 68%, $p < 0.01$).

Anxiety

The median (M) score value in STAI was similar in both groups: MINOCA STAI-T M = 18 (11–34) vs. MICAD M = 19 (12–27), $p = 0.8$; MINOCA STAI-S M = 19 (11–29) vs. MICAD M = 19 (12.2-26), $p = 0.6$ (Fig. 1).

Because women had higher punctuation levels than men, data were analyzed separately without finding statistical differences between sexes: STAI-T in women with MINOCA M = 22 (13–27) vs. women with MICAD M = 25 (13–32); $p = 0.9$. STAI-S in women with MINOCA M = 23 (16–37) vs. women with MICAD M = 21 (13.5–28.5), $p = 0.2$. In a similar way, there were no differences between men: STAI-T in men with MINOCA M = 14 (10–21) vs. men with MICAD M = 18 (12–25), $p = 0.48$; STAI-S in men with MINOCA M = 15 (9–25) vs. men with MICAD M = 18 (12–26), $p = 0.35$.

Insomnia

There were no differences in insomnia levels between both groups: MINOCA M = 7 (3–11) vs. MICAD M = 7 (3–12), $p = 0.95$ (Fig. 2).

Analyzing it by sex, the scores remained similar: women with MINOCA M = 9 (3.5–11.5)

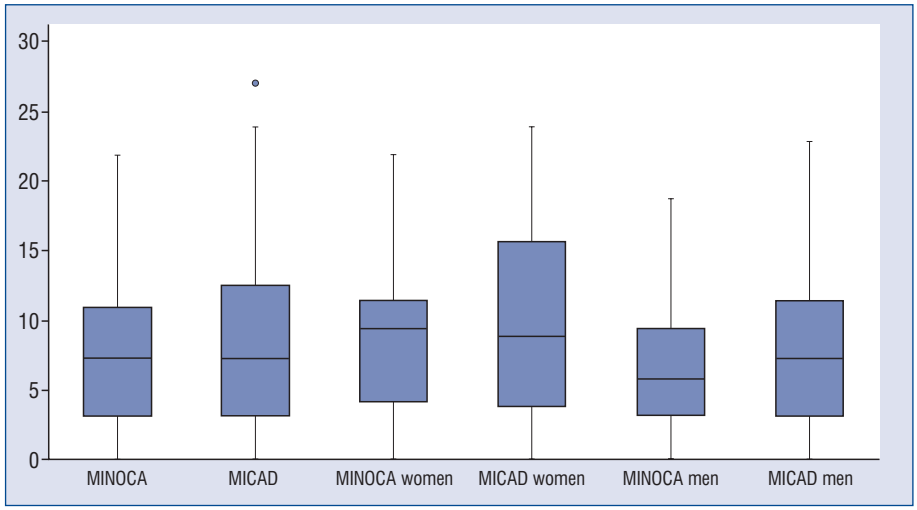

Figure 2. Insomnia severity index (ISI) median score in all groups. Box plot. The boxes (blue) represent the median value obtained in the ISI score in each subgroup. The boxes cover the interquartile interval, where 50% of the data are found. No significant differences were found between patients with myocardial infarction with non-obstructive coronary arteries (MINOCA) and patients with myocardial infarction with coronary artery disease (MICAD). Also, there were no differences when analyzing both groups by sex.

vs. women with MICAD M = 8 (3.2–15), p = 0.6; men with MINOCA M = 5 (3–9.7) vs. men with MICAD M = 7 (3–11), p = 0.77.

Type D personality

The proportion of patients with type D personality was higher in the MINOCA than in the MICAD group (45.0% vs. 28.5%, p = 0.03). 55% of women with MINOCA had type D personality vs. 31.3% of women with MICAD (p = 0.05). In the group of men with MINOCA, 35% had type D personality vs. 27.7% in the group of men with MICAD (p = 0.48) (Fig. 3).

There were no significant differences when the two personality traits that comprise the scale were analyzed: NA in MINOCA M = 13 (8–19.8) vs. MICAD M = 11 (6–17), p = 0.2; SI in MINOCA M = 8 (4–14.8) vs. MICAD M = 8 (4–13), p = 0.36.

Prognosis

From the total group of patients with MI (n = 533), 12 died during hospitalization (2.1%). Follow-up was lost in 7 (1.3%) patients, and 514 were followed, of whom 55 had MINOCA and 459 MICAD. There were no significant differences in the follow-up between the groups. The median follow-up was 942 days (MINOCA 938 and MICAD 950, p = 0.78), and cases were censored at 1095 days (3 years).

There were no differences in mortality between MINOCA and MICAD at 3 years follow-up (hazard ratio [HR] 0.78, 95% confidence interval [CI] 0.28–2.17, p = 0.63), or in MACCE (HR 0.71, 95% CI 0.38–1.31, p = 0.27) (Figs. 4, 5). The incidence of MI, stroke, and cardiovascular readmission was also similar between both groups (HR 2.04, 95% CI 0.69–6.07, p = 0.20; HR 1.19, 95% CI 0.15–9.65, p = 0.87; and HR 0.68, 95% CI 0.35–1.36, p = 0.28, respectively).

In the total group of patients with MI, we analyzed if the score in STAI-T had any relationship with MACCE at follow-up. For that, we considered two groups according to their median score values (24 points in women and 17 in men). A total of 321 patients were analyzed, 160 of whom were above the median value. This group had more MACCE (HR 1.65, 95% CI 1.05–2.57, p = 0.03), but there were no differences in mortality (HR 1.61, 95% CI 0.67–3.89, p = 0.28).

In the STAI-S questionnaire, the median score was 18 points for men and 22 for women. There was no relationship between a higher score and survival (HR 1.22, 95% CI 0.52–2.88, p = 0.64) or MACCE (HR 0.86, 95% CI 0.55–1.33, p = 0.50).

The median score in the ISI questionnaire allowed us to differentiate two groups of patients: those without insomnia (n = 165) and those with some grade of insomnia (mild, moderate, or severe insomnia; n = 159). Patients with some grade of insomnia had higher mortality (HR 2.72, 95% CI 1.12–6.61, p = 0.02), but there

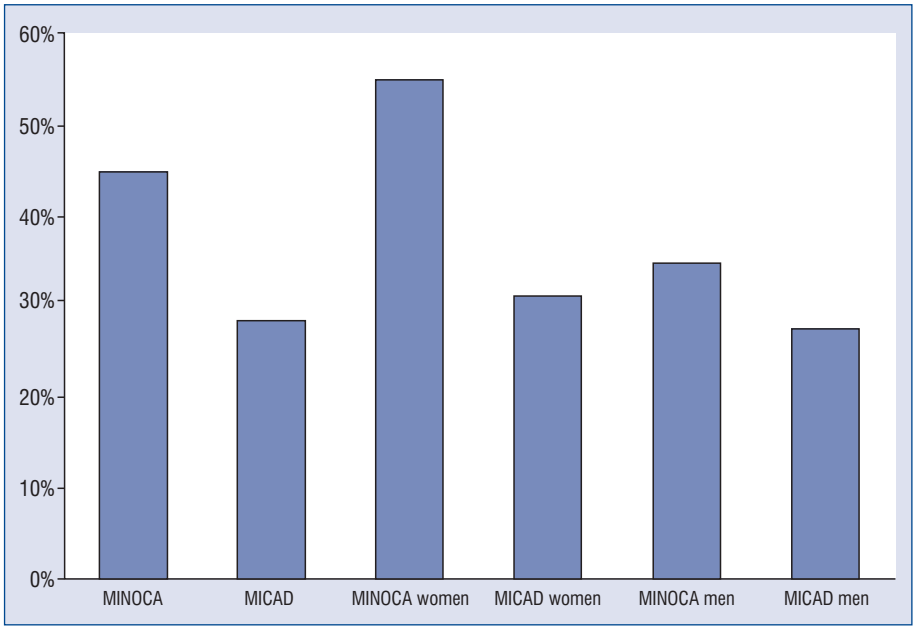

Figure 3. Patients with type D personality. Each column (blue) represents the percentage of patients with type D personality in each group. There were more patients with type D personality in the myocardial infarction with non-obstructive coronary arteries (MINOCA) group (45%) compared to the myocardial infarction with coronary artery disease (MICAD) group (28.5%), p = 0.03. Also, there were more women with MINOCA and type D personality (55%) than women with MICAD and type D personality (31.3%), p = 0.05. There were no statistically significant differences between men in both groups.

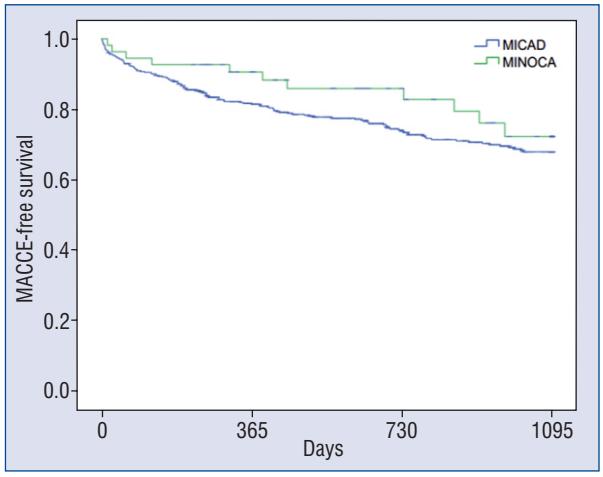

Figure 4. Major adverse cerebral and cardiovascular event (MACCE)-free survival in patients with myocardial infarction with non-obstructive coronary arteries (MINOCA) vs. myocardial infarction with coronary artery disease (MICAD). The graphic represents the Kaplan-Meier curves of MACCE during 3 years of follow-up. There were no differences between patients with MINOCA and patients with MICAD (hazard ratio 0.71, 95% confidence interval 0.38–1.31, p = 0.27).

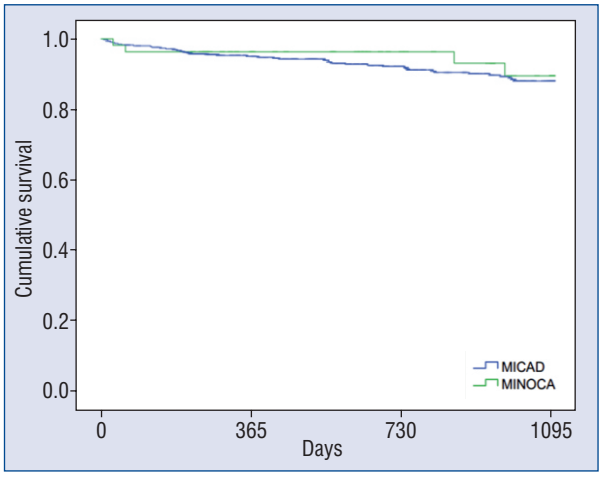

Figure 5. Cumulative survival in patients with myocardial infarction with non-obstructive coronary arteries (MINOCA) vs. myocardial infarction with coronary artery disease (MICAD). The graphic represents the Kaplan-Meier curves of cumulative survival in patients with MINOCA and in patients with MICAD. No differences were found (hazard ratio 0.78, 95% confidence interval 0.28–2.17, p = 0.63).

were no differences in MACCE (HR 1.03, 95% CI 0.67–1.58, p = 0.89).

There were no differences in mortality between patients with type D personality (n = 96) vs. those without type D personality (n = 218) (HR 0.88, 95% CI 0.34–2.25, p = 0.79), nor in MACCE (HR 0.89, 95% CI 0.54–1.45, p = 0.64). Patients with more than 10 points in the NA scale (n = 172) had more MACCE than those with less than 10 points (n = 142) (HR 1.75, 95% CI 1.11–2.77, p = 0.02), but there were no differences in mortality (HR 1.01, 95% CI 0.43–2.33, p = 0.98).

Discussion

There is controversy in the literature about the relationship between anxiety and MI, and there are very few data about psycho-emotional disorders in MINOCA. The fact that takotsubo was initially included in the MINOCA group may explain the results of some studies in which higher levels of anxiety were found. The relationship between emotional or physical stress and myocardial injury in takotsubo syndrome has been widely studied [23, 24].

Pais et al. [15] initially described some statistically significant differences in the variable "stress" between MINOCA and MICAD patients. However, those data were registered as a single dichotomous variable (yes/no), and no standardized questionnaires were used. Now that the latest consensus documents establish that patients with takotsubo do not belong to the MINOCA group, there is no evidence that MINOCA patients have more emotional disorders. Only Domínguez-Rodríguez et al. [25] studied anxiety in MINOCA patients in Spain excluding takotsubo. Even in that context, the only significant result was that women with MINOCA had more phobic anxiety than men, without finding any differences in global anxiety by sex.

The SA-45 questionnaire was used in that study, which collected information about anxiety and other psycho-behavioral aspects, but with no references to state or trait anxiety, in contrast to the STAI questionnaire. Also, the patients with MINOCA were not compared to patients with MICAD.

In our study, it is interesting that state anxiety does not correlate with a worse prognosis. This means that the anxiety levels during an acute event do not define more MACCE at follow-up. It is the anxiety trait component that gives information about the patient's baseline anxiety, and it seems to be more important in the development of MACCE. It is the first time that the distinction between both types of anxiety shows prognostic value in patients with MI, regardless of the presence or absence of coronary obstruction.

Regarding type D personality, although the first Denollet studies [26, 27] suggested that it was related to an increase in cardiovascular disease and a worse prognosis [28, 29], there are subsequent studies that do not prove its association with ischemic heart disease. Findings across studies are inconsistent; several studies have failed to find any associations between type D personality and cardiovascular outcomes and provided ambiguous evidence regarding whether type D personality can predict cardiovascular heart disease. The most significant study is the one performed by Meyer's group [30], in which patients with coronary disease and a coronary angiography completed the DS-14 questionnaire. They were classified as "type D" and "not type D", and there were no prognostic differences at 5-year follow-up between the groups. Even when analyzing NA and SI, they observed that a higher score in each of them did not correlate with a worse prognosis. In fact, there was a tendency of SI to be a "protective factor" in MACCE. This is similar to our study, in which there was no relationship between type D personality and worse prognosis.

However, more MACCE was observed with a score over 10 points in the NA item. This is similar to the study of Han et al. [31], in which patients with MI had more MACCE with higher levels of NA.

Regarding insomnia, there are no gathered data on MINOCA patients in Spain. A meta-analysis of Sofi et al. [32] reflects the fact that there is a relationship between patients with insomnia and a higher incidence of cardiovascular disease, and Aastebøl Frøjd et al. [33] correlated insomnia with more MACCE in patients with coronary heart disease.

The study of Zhu [34] showed an association between sleep disorders in MINOCA patients and greater mortality and MACE. However, each study used a different questionnaire to diagnose insomnia.

Hence, this study demonstrates the need to use more structured and standardized questionnaires in every hospital to have more realistic prognostic data. It can be helpful to formalize the registration of psycho-emotional disorders during admission. In that way, the most useful data could be used in cardiac rehabilitation programs to improve secondary prevention.

It may be more effective to present an individualized strategy depending on each patient's profile. A multicenter study will be necessary because the patients with cardiovascular risk factors and who also associate high levels of trait anxiety, insomnia, or negative affectivity will probably benefit from a specific plan with a mental health professional.

Limitations of the study

The main limitation in this study is the small number of patients with MINOCA. This can be explained by the strict inclusion criteria according to the latest guidelines. This was an insufficient sample size for some subgroup analyses and more patients will be needed for concrete results.

Another inherent limitation was the selection bias regarding in-hospital evolution between patients who completed the questionnaires and those who did not. In a significant way, those who could not complete the questionnaires had a more severe MI: ST segment alterations, worse Killip class, worse ejection fraction, more in-hospital complications, and higher myocardial damage markers. There were two reasons that could explain this fact: first, the patients who were more critically ill may not have been physically able to complete the questionnaires. Second, our hospital does not have a 24-hour service for primary angioplasty, and some patients had to be transferred to another hospital for intervention. Although in most cases they came back to our center, sometimes this could not be done due to in-hospital complications, so some of them did not have the opportunity to complete our questionnaires. The inherent selection bias to self-administered questionnaires during hospital admission for an MI was minimized in two ways: 1) If the patient was weak or had vision problems (such as in elderly people), they could receive help from a family member to write the answers down. Under no circumstances could hospital staff help or influence any patient when completing the questionnaires; 2) The inherent nature of the questionnaires used in this study (trait vs. state anxiety and specific instructions at the top of the questionnaires) allow differentiation between the patient's psychological state during admission and during their everyday life.

Conclusions

After performing an exhaustive analysis with standardized questionnaires, we did not find any differences in the prevalence of anxiety and insomnia between patients with MINOCA and those with MICAD. There were more patients with type D personality in the MINOCA than in the MICAD group. In patients with MI, a higher score in the trait anxiety, insomnia, and negative affectivity questionnaires was related to a worse prognosis at 3-year follow-up.

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