ORIGINAL ARTICLE

Correlation Between Physical Activity and Clinical Variables in Patients with Acute Myocardial Infarction

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Abstract

Background: Physical activity reduces the risk of coronary heart disease, one of the leading causes of death in the world.

Objectives: This study intends to correlate physical activity and clinical variables of the patients hospitalized in public hospitals of Santa Catarina after the first acute myocardial infarction.

Methods: The selected patients answered a questionnaire on different clinical variables. Physical activity was measured using the Baecke's questionnaire. Data were tabulated and analyzed using the SPSS 13.0 for Windows software. Normality was assessed using the Kolmogorov-Smirnov test. Correlations between two quantitative variables were evaluated by Pearson's correlation. Values of $p < 0.05$ were considered statistically significant.

Results: The study showed a weak positive correlation between the Baecke score and years of schooling ($r = 0.361$; $p = 0.001$). There was a weak negative correlation between the Baecke score and the PHQ9 depression score ($r = -0.252$; $p = 0.009$). The study also showed a weak negative correlation between the PHQ9 depression score and the Mini Mental score ($r = -0.258$; $p = 0.007$), as well as a weak negative correlation between PHQ9 and schooling years with ($r = -0.199$, $p = 0.039$).

Conclusions: There is a positive correlation between physical activity and years of schooling in hospitalized patients with first acute myocardial infarction. Negative correlations were found between physical activity and depression, between depression and the Mini-Mental State Examination, and between depression and years of schooling in these patients. (Int J Cardiovasc Sci. 2018;31(1)22-25)

Keywords: Exercise; Myocardial Infarction; Coronary Artery Disease / prevention & control; Physical Fitness.

Introduction

Myocardial ischemia is the initial step in the development of acute myocardial infarction, and results from an imbalance between oxygen supply and demand. It is mainly caused by coronary artery disease, which is the leading cause of mortality and morbidity in the world.[1]

Studies suggest that changes in lifestyle are of paramount importance for individuals of both sexes and all ages, from all geographic regions, and belonging to the main ethnic groups. Practice of moderate physical activity should be one of the priorities in the prevention of coronary artery disease in all populations worldwide.[2]

Several studies have shown the benefits of physical activities in the reduction of the risks of coronary disease. Sedentary lifestyle is an independent risk factor for acute myocardial infarction, and is directly related to low HDL-cholesterol levels, weight gain, increase in blood pressure and in coagulation factors.[3]

There is evidence indicating a dose-dependent, inverse relationship between physical activity and cardiovascular events. Aerobic physical activity from moderate-to-vigorous intensity is recommended, on average, from three to four times a week, with 40-minute duration.[4]

The present study aims to correlate physical activity, measured by the Baecke questionnaire, with other clinical variables in inpatients after a first acute myocardial infarction at public hospitals in Santa Catarina, Brazil.

Methods

This was an analysis of Catarina Heart Study, a cohort, prospective study that intends to evaluate 1,426 patients by the year 2020. A convenience sample of consecutive patients, attending public hospitals in Santa Catarina, diagnosed with first acute myocardial infarction, answered a questionnaire on clinical, laboratory, electrocardiographic, echocardiographic and angiographic variables between July and December 2016.

Physical activity was assessed by the Baecke questionnaire, composed of 16 questions that encompassed three scores of habitual physical activity in the last 12 months: score of occupational physical activity (eight questions), score of physical activity during leisure time (four questions), and score of leisure- or transport-related physical activity (four questions). In this study, we used the scores of physical activity during leisure time, and the score of leisure- or transport-related physical activity, validated for the Brazilian population; the sum of these two scores yielded the total score.[5]

Depression was assessed by the PHQ9, consisting of a nine-question questionnaire that evaluates the presence of each of the symptoms of major depression, described in the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV). The nine symptoms were depressed mood, anhedonia, sleeping problems, tiredness or loss of energy, appetite or weight change, psychomotor agitation or retardation, suicidal ideation.[6]

Inclusion criteria were the following: age older than 18 years, precordial pain suggestive of acute myocardial infarction associated with new ST elevation at the J-point in two contiguous leads of > 0.1 mV in all leads other than leads V2-V3. For leads V2-V3, the following cut points were apply: ≥ 0.2 mV in men ≥ 40 years, ≥ 0.25 mV in men < 40 years, or ≥ 0.15 mV in women; or presence of precordial pain suggestive of acute myocardial infarction associated with elevation or troponin I or CK-MB above the 99th percentile of normal. Exclusion criteria included previous acute myocardial infarction, and disagreement of consent form and terms.

The primary outcome of the study was to assess the physical activity of inpatients with first infarction using the Baecke score, and its correlation with years of schooling. Secondary outcomes were the correlation of physical activity with depressive moods, evaluated by the PHQ9; the correlation of physical activity with mental state using the Mini-Mental State Examination, and the relation of depressive moods with years of schooling and the Mini-Mental State Examination.

In conformity with the 466/2012 resolution of the Brazilian National Health Council, all patients signed the informed consent form. The study was approved by the ethics committee of the institutions participating in the study.

Statistical analysis

A minimum sample size of 92 patients was calculated for a 0.3 correlation, power of 90% and alpha of 0.05. Data were tabulated and analyzed using the SPSS 13.0 software for Windows. Normality test was performed by the Kolmogorov-Smirnov test. Quantitative variables with normal distribution were expressed as mean ± standard deviation. Categorical variables were expressed as absolute number and percentage. Correlations between two quantitative variables were evaluated by the Pearson Correlation. A $p < 0.05$ was considered statistically significant.

Results

A total of 108 patients were assessed from July 2016 to December 2016, with mean age of 59.3 ± 11.6 years. Seventy-five patients (69.4%) were men. Fifty-one (47.2%) patients had ST-segment elevation myocardial infarction, and 57 (52.7%) patients had non-ST segment elevation myocardial infarction. The classical risk factors for coronary artery disease and potential risk factors in the study population are described in Table 1.

A weak, positive correlation between Baeck score and years of schooling was found ($r = 0.361$, $p = 0.001$).

The analyses revealed a weak negative correlation between Baecke's and PHQ9 depression scores ($r = -0.252$, $p = 0.009$). The study also showed a weak negative correlation between PHQ9 depression score and the Mini-Mental State Examination ($r = -0.258$, $p = 0.007$), as well as a negative correlation of PHQ9 score with years of schooling ($r = -0.199$; $p = 0.039$).

Table 1 – Characteristics of the study population	
Risk factors	**Values**
Age (years) *	59.3 ± 11.6
Male †	75 (69.4%)
Systemic arterial hypertension†	62 (57.4%)
Diabetes mellitus †	24 (22.2%)
Dyslipidemia †	35 (32.4%)
Smoking†	34 (31.5%)
Family history of coronary artery disease †	44 (40.7%)
Variables analyzed	
Baecke score *	4.9 ± 1.3
PHQ 9 *	6.9 ± 6.2
Mini-mental *	24.1 ± 4.5
Years of schooling*	6.1 ± 4.3

mean ± standard deviation; † - N (%);

Discussion

The present study showed a weak, positive correlation between physical activity and years of schooling. These data make this study original, since there were few studies in the literature correlating these variables in hospitalized patients with acute myocardial infarction. A longitudinal study carried out in Greece and published in 2016 evaluated the association between educational status in hospitalized patients with acute coronary syndrome and the prognosis of these patients. All-cause mortality and recurrent coronary events were higher in patients with lower education level. This study also showed that patients with higher education level were more physically active.[7]

Results of the present study indicate a weak negative correlation between physical activity and depression in inpatients with infarction. These results are in agreement with those of previous studies correlating these variables in other populations. Recent studies have suggested that moderate-to-vigorous physical activity is inversely associated with anxiety and depressive symptoms.[8] The correlation between physical activity and depression was also studied in other populations. In patients with Alzheimer's disease, for example, physical activity also showed a negative correlation with depressive symptoms.[9] In patients with major depression, sedentary habits were shown to be independent risk factors for cardiovascular diseases and early mortality.[10]

In addition, a weak negative correlation was found between depression scores and the Mini-Mental State Examination. A similar study conducted in the USA with 116 heart failure patients also showed a correlation between depression and cognitive dysfunction in these patients.[11]

This original study has some limitations that should be considered. The sample size of the study was small, although it had sufficient power to show significant correlations between these variables; these correlations did not prove a cause-effect relationship and may be just associations. Besides, the significant results may result from mere chance. These limitations, however, do not invalidate our findings, which gives a contribution to the Brazilian and international literature on cardiology.

Conclusions

There is a positive correlation between physical activity and years of schooling in hospitalized patients with acute myocardial infarction in Santa Catarina.

There is a negative correlation between physical activity and depression in these patients, and a negative correlation between depression and years of schooling, and between depression and Mini-Mental State Examination.

Author contributions

Conception and design of the research: Carvalho ATG, Duarte TF, Maiochi AS, Moreira DM, Silva RL. Acquisition of data: Carvalho ATG, Duarte TF, Maiochi AS, Silva RL, Fattah T. Analysis and interpretation of the data: Moreira DM, Silva RL, Fattah T. Statistical analysis: Moreira DM. Writing of the manuscript: Carvalho ATG, Duarte TF, Maiochi AS, Moreira DM, Silva RL, Fattah T. Critical revision of the manuscript for intellectual content: Moreira DM, Silva RL, Fattah T. Supervision / as the major investigador: Moreira DM.

Ethics approval and consent to participate

This study was approved by the Ethics Committee of the Instituto de Cardiologia de Santa Catarina under the protocol number N° 1.519.838, CAAE 55450816.0.1001.0113. All the procedures in this study were in accordance with the 1975 Helsinki Declaration, updated in 2013. Informed consent was obtained from all participants included in the study.

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