Evaluation of the prevalence of stress and its phases in acute myocardial infarction in patients active in the labor market

Avaliação da prevalência do estresse e suas fases no infarto agudo do miocárdio em pacientes atuantes no mercado de trabalho

Luciane Boreki Lucinda[1], MsC; Ana Claudia Merchan Giaxa Prosdócimo[1], MsC; Katherine Athayde Teixeira de Carvalho[2], PhD; Julio Cesar Francisco[1], PhD; Cristina Pellegrino Baena[1], MD, PhD; Marcia Olandoski[1], PhD; Vivian Ferreira do Amaral[1], PhD; José Rocha Faria-Neto[1], MD, PhD; Luiz César Guarita-Souza[3], MD, MsC, PhD

Abstract

Introduction: Acute myocardial infarction is a social health problem of epidemiological relevance, with high levels of morbidity and mortality. Stress is one of the modifiable risk factors that triggers acute myocardial infarction. Stress is a result of a set of physiological reactions, which when exaggerated in intensity or duration can lead to imbalances in one's organism, resulting in vulnerability to diseases.

Objective: To identify the presence of stress and its phases in hospitalized and active labor market patients with unstable myocardial infarction and observe its correlation with the life of this population with stress.

Methods: The methodology used was a quantitative, descriptive and transversal research approach conducted with a total of 43 patients, who were still active in the labor market, presenting or not morbidities. Data collection occurred on the fourth day of their hospitalization and patients responded to Lipp's Stress Symptom Inventory for adults.

Results: Thirty-one patients (72.1%) presented stress and twelve (27.8%) did not. In patients with stress, the identified phases were: *alert* - one patient (3.2%); *resistance* -twenty-two patients (71.0%); *quasi-exhaustion - six* patients (19.4%) and *exhaustion* - two patients (6.5%). All women researched presented stress.

Conclusion: The results suggest a high level of stress, especially in the resistance phase, in the male infarcted population, hospitalized and active in the labor market.

Descriptors: Stress. Myocardial infarction. Psychology.

Resumo

Introdução: O infarto agudo do miocárdio é um problema de saúde coletiva com altos índices de morbimortalidade com relevância epidemiológica. O estresse é um dos fatores de risco modificáveis desencadeantes do infarto agudo do miocárdio. O estresse é composto por um conjunto de reações fisiológicas que, se

[1]Pontifícia Universidade Católica do Paraná (PUCPR), Curitiba, PR, Brazil.
[2]Instituto de Pesquisa Pelé Pequeno Príncipe, Curitiba, PR, Brazil.
[3]InCor-Hospital das Clínicas da Faculdade de Medicina da Universidade de São Paulo(HCFMUSP), São Paulo, SP, Brazil, Pontifícia Universidade Católica do Paraná (PUCPR), Curitiba, PR, Brazil and Universidade Federal do Paraná (UFPR), Curitiba, PR, Brazil.

Correspondence address:
Luiz César Guarita-Souza
Pontifícia Universidade Católica do Paraná – PUCPR
Rua Imaculada Conceição, 1155 – Prado Velho, Curitiba, PR, Brazil
Zip code: 80215-901
E-mail: guaritasouzalc@hotmail.com

Abbreviations, acronyms & symbols	
AMI	Acute myocardial infarction
CAD	Coronary artery disease

exageradas em intensidade ou duração, podem levar a um dese-quilíbrio do organismo, propiciando vulnerabilidade às doenças.

Objetivo: Identificar a presença ou não do estresse e as fases do mesmo, em pacientes com infarto agudo do miocárdio, ativos no mercado de trabalho.

Métodos: Pesquisa de abordagem quantitativa, descritiva e transversal que analisou 43 pacientes com diagnóstico de infar-to agudo do miocárdio entre 21 e 65 anos, ativos no mercado de trabalho com ou sem comorbidades. A coleta de dados ocorreu no quarto dia de hospitalização; os pacientes responderam ao Inventário de Sintomas de Stress para adultos de Lipp.

Resultados: A média de idade foi de 50,3 anos. A incidên-cia de infarto agudo do miocárdio nos homens foi de 91% e nas mulheres de 9%. Em relação à escolaridade até o segundo grau entre homens e mulheres foi de 16% e com segundo grau completo ou mais, de 84%. Apresentaram estresse 31 pacientes (72,1%), não apresentaram estresse 12 (27,9%). Nos pacientes com estresse, as fases identificadas foram: alerta: 1 paciente (3,2%); resistência: 22 pacientes (71,0%); quase-exaustão: 6 pacientes (19,4%) e exaustão: 2 pacientes (6,5%). Todas as mul-heres da pesquisa apresentaram estresse.

Conclusão: Os resultados encontrados sugerem um eleva-do nível de estresse, principalmente na fase de resistência, na população de cardiopatas em infarto agudo do miocárdio ati-vos no mercado de trabalho.

Descritores: Estresse. Infarto do miocárdio. Psicologia.

INTRODUCTION

Acute myocardial infarction (AMI) affects about 100,000 people each year, causing 35,000 deaths, corresponding to one third of the deaths caused by cardiovascular disease in Brazil. The cumulative mortality rate by ischemic cardio-vascular disease for the Brazilian man, who is less than 65 years old, is 42%[1]. Cardiovascular diseases represent the first cause of mortality, being responsible for 30% of deaths and the fourth reason of hospital admission, corresponding to 10.22% in 2007[2].

The AMI is a serious event that requires immediate care, hospitalization and is based on the parameters of the medi-cal history, electrocardiographic analysis and tissue necrosis markers[3]. Some factor may trigger the AMI: acute emotional stress, significant elevation of the systemic arterial pressure, obesity, sedentary lifestyle and smoking, among others[4].

According to deVries & Wilkerson's studies[5], the World Health Organization and the World Bank estimate that neu-ro-psychiatric illnesses affect one in four people throughout the world, reaching 40% if we include disorders caused by stress. It is estimated that only 10% of cases are diagnosed and treated. The economic effects reach 120 billion of dollars in Europe and North America, with more than 60 million related to stress.

The cardiovascular system has broad participation in stress adaptation, and because of this it suffers the conse-quences of its exacerbation. The suspicion that conditions of mental stress are risk factors for higher morbid-mortality by cardiovascular disease is an old one. However, the appropri-ate scientific proof of this fact and its respective levels have just recently been obtained. Many professionals still face this association with a certain skepticism, finding it difficult to value in clinical practice, although mental stress is one of the main patients' complaints[6].

According to Shuterland & Cooper[7], the epidemiologi-cal studies have identified the existence of several risk factors for coronary heart disease, among them, genetic influences, high blood pressure, high cholesterol and lipoprotein level, smoking, obesity, glucose intolerance, sedentary lifestyle and certain social-cultural and psychological factors. However, in a study with thousands of American men with high blood pressure, high cholesterol levels and smokers, just 14% pre-sented a coronary heart disease during 10 years. These facts led some scientists to consider the need to finding other de-termining etiological factors, most likely related to profes-sional and psychosocial stress.

Stress is composed of a set of metabolical responses that, if too intense or too long may lead to the organism's imbal-ance, making it more vulnerable to diseases. The stress re-action is a biological attitude, necessary for the adaptation to new situations. They may manifest at a physical or psy-chological level. According to Lipp[8], increased sweating, gastric hyperacidity, muscular tension, high blood pressure, bruxism and nauseas may be identified as clinical manifes-tations. The psychological manifestations may be anxiety, anguish, and doubts regarding oneself, concentration diffi-culties, excessive concern and hypersensitivity.

The reaction to stress may be divided into phases, accord-ing to Selye: alert, resistance and exhaustion. Lipp[9] identi-fied another phase named as quasi-exhaustion. To clarify the process of stress development, it is necessary to consider that the symptomatic stress profile varies depending on its stage.

Objective

Thus, the aim of this study was to investigate the preva-lence or not of stress in patients in acute myocardial infarct, active in labor market, and in which phase of stress the pa-tient was in.

METHODS

This research project was submitted to the Research Ethics Committee of the Hospital Erasto Gaertner and approved under the nº. 1940 on December 15, 2009.

This research was performed with through a quantitative and non-experimental approach, through cross-sectional studies with 43 patients aged between 21 and 65 years, admitted to the hospital with AMI, active in the labor market and with our without comorbities. All patients signed the Free Informed Consent Form (FICF).

Diagnosis of AMI

The diagnosis of AMI was performed through clinical evaluation of with the presence of typical angina, electrocardiographic alteration with ST-segment positive or negative deflection and alteration in troponin values.

Psychological evaluation

The patients were addressed on the fourth day of their hospital admission. Within this scope, there was the intervention for the application of the Lipp's Inventory proposed in this research.

Two instruments were used for the evaluation:

- Questionnaire of sociodemographic characterization: information on professional and personal data such as age, gender, marital status, education and profession was collected;

- LIPP's Inventory of Stress-Related Symptoms for Adults: evaluates the prevalence or not of stress in patients in phases I, II and III. The questionnaire consists of tables, divided into symptoms in temporal form[10].

Phase I (Alert) for symptoms experienced in the last 24 hours, which correspond to the phase of contact with the stress agent, its typical sensations, when the organism loses balance and prepares itself to face the situation in order to adapt and survive. This is the positive phase of stress, when the human being automatically prepares him or herself for action. This is characterized by the production of adrenaline that makes the person more attentive, stronger and more motivated, in other words, the survival is preserved and a sensation of wholeness is frequently reached.

Phase II (Resistance) – if the alert phase continues for very long periods or if new stressors accumulate, the organism goes into action to hinder the total energy waste, which makes it to enter into the resistance phase, when it resists to stressors and it tries, inconsistently, to reestablish the inner balance (named homeostasis), which was broken during the alert phase. The productivity drops dramatically. This phase is characterized by the production of cortisol. The person's vulnerability and bacteria are pronounced. If the stressing factors persist in frequency or intensity, there is a breakdown in the person's resistance and he or she goes into the quasi-exhaustion phase.

Phase II (Quasi-exhaustion) when the tension exceeds the manageable limit, the physical and emotional resistance start

to break; there are still some moments, in which the person gets to think clearly, make decisions, and laugh at jokes and work. All this, however, is done with great effort and these moments of normal functioning are interspersed with moments of total discomfort. There is much anxiety in this phase. The person experiences an emotional seesaw. The cortisol is produced in larger quantity and starts having negative effect, destroying the immunological defenses. In this phase, the illness process starts and the organs what have increased genetic or acquired vulnerability start revealing signs of deterioration. If there is no stress relief by removing the stressors or using confrontation strategies, the stress reaches its final phase.

Phase III (Exhaustion) – This is the most negative phase of stress – the pathological one. A significant inner imbalance occurs at this moment. The person becomes depressed and he or she cannot concentrate or work. His or her decisions are, many times, thoughtless. Serious diseases may occur in the most vulnerable organs, such as infarction, psoriasis, ulcers, vitiligo, high blood pressure and others.

Statistical analysis

The results obtained in the study were expressed in averages, medians, maximum values and standard deviations (quantitative variables) or in percentages and frequencies (qualitative variables). To estimate the prevalence of patients with stress 95% confidence intervals were constructed. The data was analyzed with the software Statistica V.8.0.

RESULTS

Forty-three patients with AMI, defined from the clinical protocol, composed the sample. There was one death. The average age was 50.3 years. The AMI incidence in men was 91% and in women was 9%. In relation to schooling in both men and women: only 16% studied up to high school and the ones who completed high school or further totalized 84%.

Figure 1 presents the distribution of participants according to their occupation. This was part of the research inclusion criteria, as all participants should be active in the labor market. The business people and technical assistants' samples were the ones that presented higher incidence of stress.

50% of the sample were smokers and 50% were not. 2.5% declared themselves to be alcoholics and 97.5% declared themselves to be non-alcoholics.

82.1% were sedentary and only 17.9% confirmed to practice physical exercises regularly (Figure 2). Regarding the body mass index (BMI), the average was 26.4 with standard deviation of ±4.2. 72% of the patients presented criteria for inclusion in stress situations and 27% did not (Figure 3).

For the phases of stress, the results indicated were: alert phase in 3%, resistance phase in 71%, quasi-exhaustion phase in 19% and exhaustion phase in 7% of the sample (Figure 4).
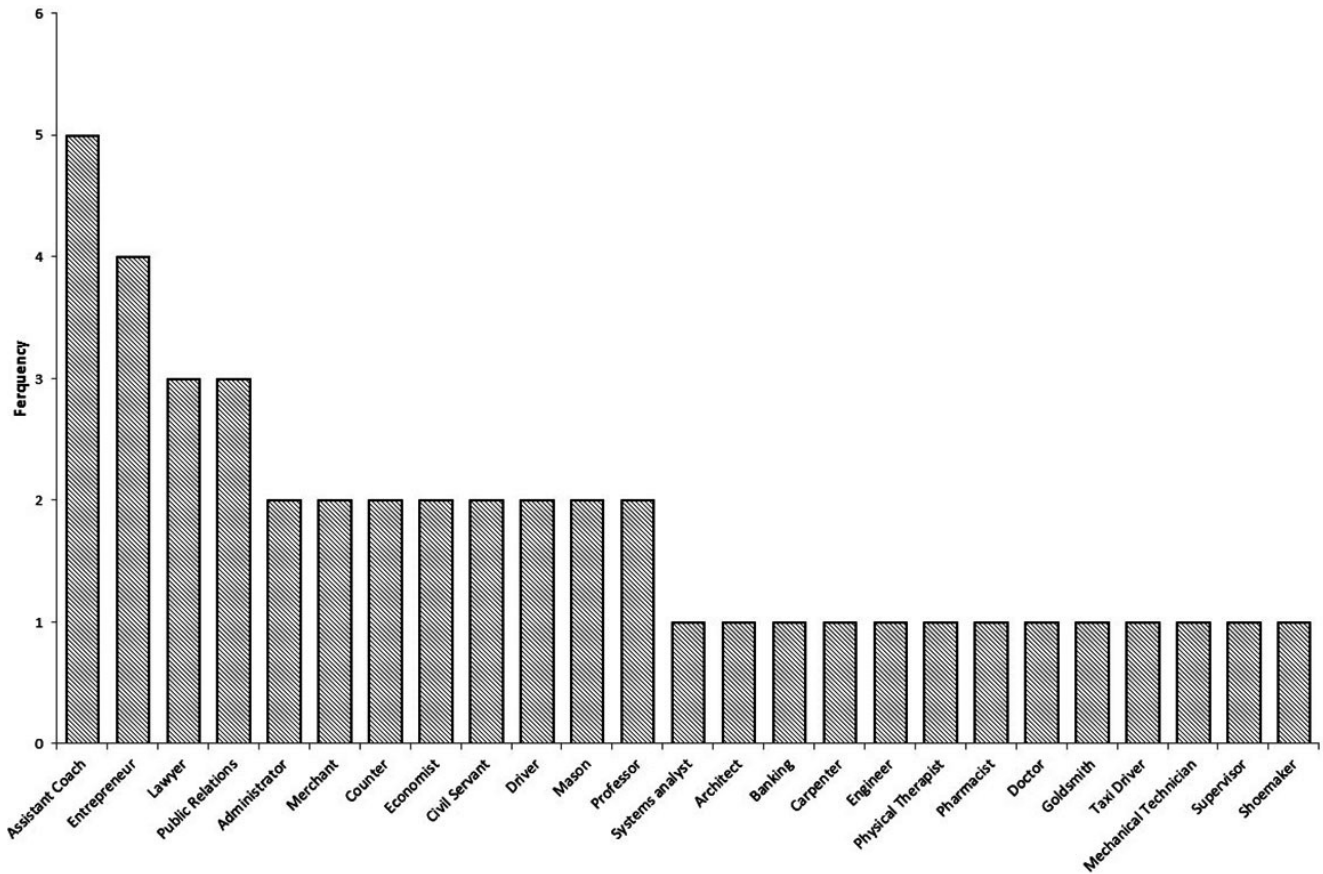
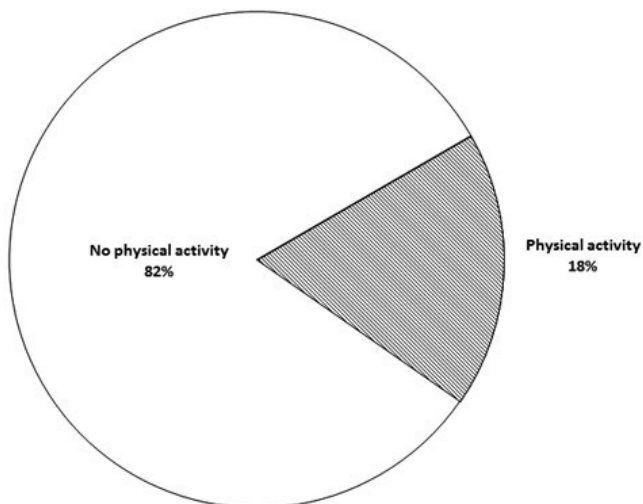*Fig. 1 - Distribution of participants according to their occupation.*

Fig. 2 - Graphic showing that 82.1% of the sample were sedentary and only 17.9% practice physical exercises regularly.
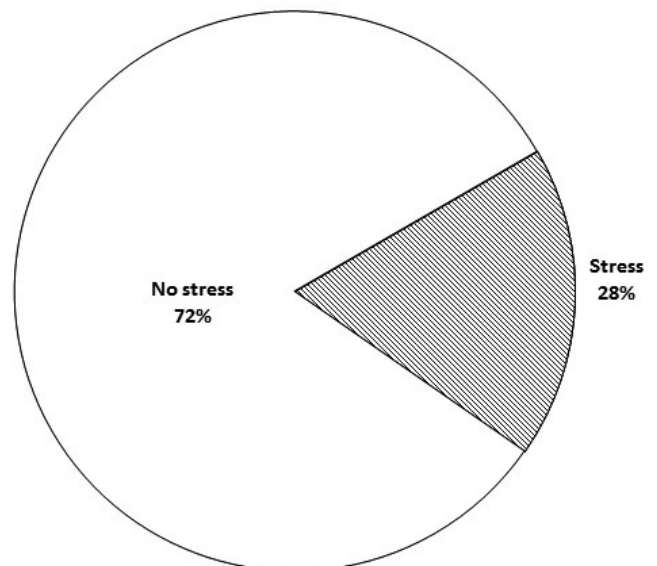

Fig. 3 - Graphic showing that the percentage of the patients presented criteria for inclusion in stress situations.
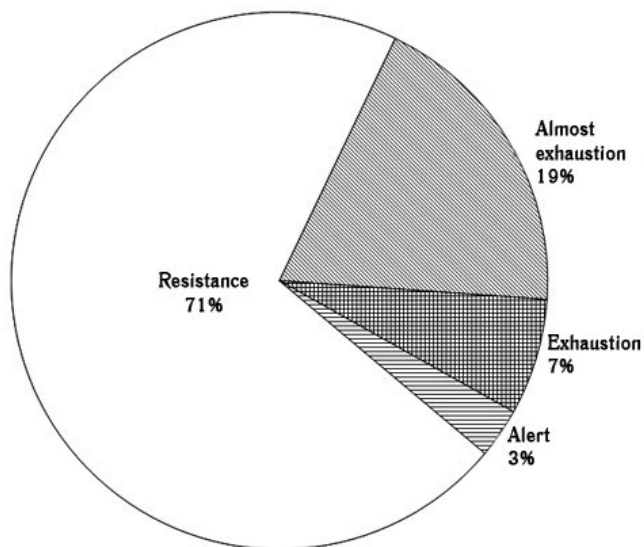
Fig. 4 - Phases of stress in the patients included in the study.

DISCUSSION

Some symptoms of stress, such as palmar sudoresis, quick breath, tachycardia, gastric hyperacidity, lack of appetite or headache, are easy to be identified Other symptoms are more subtle, such as interpersonal relationship difficulties, lack of interest in any activities that are not directly related to the reason of the cause of stress and the sensation of being sick, without the presence of any physical disturbances[11].

Emotionally, stress may produce a series of symptoms, such as apathy, depression, anger, emotive hypersensitivity, wrath, irritability, anxiety and it may cause psychotic disturbances in predisposed people. It is important to highlight that at a psychological level, the result of the stress response shall depend on individual, social and class differences and on cultural characteristics and adaptive behavior patterns[12].

The cardiovascular system is largely involved in adaptation to stress, therefore suffering, and the consequences from its exacerbation[6]. The cardiovascular system's answer to stress is usually an increase and its objective is to deliver glucose and oxygen to the needy tissues. The main mediator of this answer is in the sympathetic nervous system that raises the heartbeat and the blood pressure. The cardiovascular answer, when this condition persists for too long or outside the context in which it is physiologically useful, affects the cardiac muscle and the blood vessels, as well as facilitates the accumulation of atherosclerotic plaques[13].

When performing the characterization of the studied group, we observe a higher incidence of MAI in men. It is worth remembering that, in Brazil, around 50% of male deaths caused by coronary artery disease (CAD) occur in men aged under 65 years old, while in other countries (United States of America, Cuba and England) this proportion is around 25%[14].

Despite the lower female expressiveness, cardiovascular diseases are the main causes of death among women worldwide. In Brazil, there are three deaths caused by MAI for each death from breast cancer[15]. In our study, the age average of the studied population was 50.3 years old and it showed the MAI is manifesting itself in a population that is in the height of its professional productivity.

As for smoking, the data of this research indicated that 50% of the patients were smokers. According to the studies *"Interheart"* that were designed to assess the impact of conventional and emerging cardiovascular risk factors for MAI in several regions of the world, including South America, smoking was associated as high-risk factor[16]. In another study named *"Afirmar"*, smoking was also the risk factor of highest impact; a male smoker aged between 35 and 39 years had five times more probability of having a heart attack when compared to non-smokers[17]. There was no correlation identified between alcoholic patients and a higher risk of myocardial infarction.

83% of the patients stated they did not exercise regularly and this was verified in the studies "*Interheart",* in analysis restricted to the Brazilian sample and in *"Fricas",* where no meaningful preventive differences of MAI were observed regarding the practice of physical activities[15-17].

The "*Interheart" study* suggested that the risk of the population attributable to the relation waist-hip was higher than the risk attributable to the body mass index (BMI)[16]. The *"Fricas"* study confirmed the overweight as one of the risk factors for the occurrence of MAI[17]. In our study, the BMI, the average found was 26.4, characterizing patients as overweight and who presented a higher tendency to MAI. Recent studies stated the relation waist-hip is better to analyze the cardiovascular risk factor than the BMI for the prognosis of heart attack risk for several ethnic groups. If obesity was redefined according to the relation waist-hip instead of using BMI, the proportion of people with the risk of heart attack would triplicate.

Regarding these patients' education, the vast majority of the patients present a high intellectual level; the two categories with higher incidence were the businesspersons and the administrative assistants. It is possible to make an inference that these patients' stress level is related to appointments and higher pressures is directly related to their professional activities.

Regarding the stress analysis and its phases, the results identified in this study were meaningful. From the 42 infarcted patients, 31 (72.1%) presented stress in one of its phases. In a stressful situation, the human body redistributes its energy sources, anticipating an imminent aggression. This adaptation mechanism is advantageous if there is an imminent

risk. However, if this state persists for a long time, the damage will be irreversible[18].

Every meaningful change generates a need by the organism to adapt and this has an important role in the stress pathogenesis[19]. Drawin's studies convinced Piaget, father of the genetic epistemology, regarding two basic points for the construction of his evolutionary theory of knowledge, which are: the answer to the problem should come from an evolutionary analysis and the mutant adaptation to the mean mutant demands should be one of the keys. According to Piaget's theory, the adaptation is always the goal, which is, getting a suitable answer to the problems that the person faces at each moment, as he/she does not have the answer that allows him/her to solve the problem, the organism is unbalanced with regard to the environment; the process of finding new answers tries to restore the balance and improve, this way, the adaptation to the environment's demands.

As the maturation opens new possibilities, the environment exploitation presents new challenges and education presents new issues, the person in development finds himself/herself building new answers in order to get more and more elaborated adaptation levels, and benefitting from a continuous and growing tendency to balance[20].

Man naturally seeks balance through a process of constant adaptation, aiming to develop cognitively and emotionally, which fundamentally contributes to the evolution of stress. As with adaptation, the stress is a component of human development, as we grow and mature, we improve the way we deal with the unexpected. We learn to adapt our attitudes in our behavior through the identification of stressful situations with the perception of physical and/or psychological answers and the valorization of the identified context. This exercise is dynamic, it happens all the time and varies from person to person; many times a situation may be stressful to one person and not stressful at all to another. Comprehension is the healthiest way to handle this process adequately, which is an individual one. In our study, the patients presented several levels of clinical manifestations of stress and we may infer the stress had a direct participation on AMI.

In a stressful situation, the human body redistributes its energy sources, anticipating an imminent aggression. This adaptation mechanism is advantageous when there is real danger. However, if this state persists for a long time, the damage shall be irreversible. Every meaningful change generates a need to adapt from the body and this one has a significant role in the pathogenesis of stress[19].

The "*Interheart*" and "*Afirmar*" studies recognize that, within the nine risk factors identified for the AMI, psychosocial stress holds a prominent place. The main differences between the discoveries found in the "*Afirmar*" study and the population studied in "*Interheart*" were that central obesity, high blood pressure and stress presented higher impacts on the genesis of myocardial infarction in Latin America[16]. In both studies, the presence of psychosocial stressors is associated with increased risk of acute myocardial infarct, which suggests that approaches, which aim to control these factors suitably, should be developed.

Literature data suggests that the manifestation of the myocardial infarct may occur with higher frequency in patients who are in the exhaustion phase. However, analyzing data from our study, there was a higher incidence at the resistance phase and this was the most important data in this sample[21].

Similar data was identified in a study performed by Bezerra[22], in which the author verified the presence of stress in the cardiac population who would be submitted to revascularization surgery and identified that 65% of the patients evaluated presented stress symptoms and the most prevailing phase was the resistance one, with 84.6%.

Other research performed with the same instrument of methodological analysis as our study, Lipp's questionnaire, had as its objective to evaluate the stress level in two samples: people who lived in the capital and interior of the state of São Paulo; 79% presented meaningful symptoms of stress, independent of the groups. The stress level was concentrated in the second phase, the resistance one, which is considered moderate, but which causes an inner unbalance in the body. It is found to be relevant as it confirms the reliability of the instrument in and outside of the hospital context[4]. Another study, performed by Santos et al.[23], with this same analysis questionnaire, evaluated patients who were submitted to cholecystectomy surgery; 73% of the cases showed to be stressed mainly in the resistance phase in 72% of the stressed patients.

The resistance phase, in all research mentioned using the same measurement instrument, showed to be the most incidental one. This phase is characterized by the maintenance of the alert phase for longer periods. This is when the person resists to the stressors and tries, unconsciously, reestablishing the inner balance that was broken during the alert phase.

The professional and intellectual productivity decreases significantly. It is characterized by a higher production of cortisol. The person is there for more vulnerable to virus and bacteria. If the stressing factors persist in frequency or intensity, there is a break in the person's resistance and he/she enters to the quasi-exhaustion phase.

There is a huge effort of the body to recover its balance, as man's natural condition seeks adaptation to the environment. The General Adaptation Syndrome, described by Selye, informs that initially the resistance is reduced as the body prepares itself to fight or escape. However, the body ends up adapting itself and the resistance increases. Until the body is exhausted and the resistance falls rapidly[24].

The increase in the occurrences of acute and chronic disorders of the population's circulatory system highlights the importance of the relation between diseases and work. Medical literature and media, for example, have highlighted the relation between the occurrence of acute myocardial infarc-

tion, chronic coronary disease and high blood pressure, and stressful situations and unemployment, among others[25].

The interventions on work organizations are more efficient, but more complex, as they usually conflict with the production demands. Health professionals and people who are in charge of Human Resources in companies have been challenged to reduce stress through changes in the forms of organization and work management. Having this in mind they propose: to give more autonomy to workers' in their ways of working, reduce the pressure and demands on productivity, introducing pauses in suitable environments; establish rotation and enrichment of tasks in monotonous, isolated and repetitive jobs; reduce and/or adjust the work schemes and shifts; increase the workers' participation in decision and management processes; improve interpersonal work relationships, replacing competition with collaboration.

Procedures that aim at early identification of problems or damage to health, derived from the exposure to risk factors and the development of actions to promote health, and healthier life habits are important. Nowadays, mainly in the framework of large cooperation, programs named Promotion of Health and Quality of Life have been implemented in order to act on the stress factors related to work[25].

Bourdieu reports that every social agent, who acts in within a specific area, seeks to adjust his/her thoughts, perception and actions in order to meet the objective demands of that social space. For him, the motor of the action lies between *habitus* and *area*. Thus, it is within through adjustment process, transformation and adaptation of a specific area that the social agent builds up his/her practice. There is also a relation between these two structures and a third one identified as domination instruments, which are the resources used to legitimize the power of a certain social class, generating symbolic and political violence[26].

The patient that arrives at the hospital with chest pain and infarcted belongs to the environmental context described above. He tries to adapt to several demands, including symbolic violence suffered and modified risk factors inserted in the universe of coronary diseases.

The presence of physical and/or psychological stress constitutes a modifiable cardiovascular risk factor. We highlight that the research related to stress also approaches other cardiovascular system diseases and we recommend that the promotion of educational health actions within the hospital context may help in the reorganization of infarcted patients' life habits and in secondary prevention.

In the pathology of stress in infarcted and hospitalized patients, the work of the hospital psychologist, who is part of a clinical team, is fundamental in accompanying the patient during the post-infarction period, helping to identify possible stress and its stressor agents, as well as allowing the patient and the doctor in charge to receive guidance regarding the need of psychotherapeutical follow-up upon hospital release,

in order to maintain suitable monitoring regarding the secondary prevention against acute myocardial infarction. Research performed by Pugliese et al.[27], which aims to assess the efficiency of a program designed to promote changes in lifestyle through psychological intervention, associated to the pharmacological therapy, in order to reduce coronary risk in patients with non-controlled high blood pressure, overweight and dyslipidemia, concluded that pharmacological treatment combined with psychological intervention aimed at reducing the stress level and changed the alimentary behavior resulted in additional benefits in reducing coronary risk.

We face stress daily and as we grow and mature we learn how to deal with the unexpected, a reserve of information helps us in the adaptation process. However, there are more serious situations that also occur and we need to consider their impact on our lives, observing the physical and emotional reactions that are initiated, derived from this new experience and try to handle them in a proper way in order to reach balance and well-being. This exercise is dynamic, happens all the time and varies from person to person in a common situation.

CONCLUSION

The data of this study suggests that it was possible to establish a direct relation between stress and its resistance phase with a higher incidence of patients affected by myocardial infarct and active in labor market.

Authors' roles & responsibilities	
LBL	Conception and study design, performing the procedures, and/or experiments
ACMGP	conception and study design, performing the procedures, and/or experiments
KATC	Final approval of manuscript
JCF	Final approval of the manuscript, performing the procedures, and/or experiments
CPB	Statistical analysis
MO	Statistical analysis
VFA	Final approval of manuscript
JRFN	analysis and or interpretation of data, final approval of the manuscript conception and design of the study
LCGS	analysis and/or interpretation of data, final approval of the manuscript conception and design of the study

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