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CARDIOVASCULAR RISK FACTORS AMONG PROFESSIONAL FISHERMEN IN CÁCERES – MATO GROSSO

FATORES DE RISCO CARDIOVASCULARES EM PESCADORES EM PESCADORES PROFISSIONAIS EM CÁCERES – MATO GROSSO

FACTORES DE RIESGO CARDIOVASCULAR EN PESCADORES PROFESIONALES DE CÁCERES – MATO GROSSO

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ABSTRACT

This study aimed to identify cardiovascular risk factors among professional fishers affiliated with the Cáceres Fishermen's Colony (Colônia Z-2) and the Cáceres Professional Fishermen's Association (APPEC). This was a cross-sectional, descriptive, quantitative study. A total of 97 participants (52.6% men and 47.4% women) were assessed through laboratory tests, with mean values and standard deviations for total cholesterol (143.1 ± 52.8), triglycerides (104.7 ± 77.2), LDL-C (83.9 ± 43.4), HDL-C (56.5 ± 15.1), and fasting blood glucose (109.06 ± 34.1). The results indicated that, on average, lipid profile parameters remained within normal ranges. However, individual analysis revealed that a proportion of workers presented altered lipid levels. In addition, fasting blood glucose levels were elevated. These findings suggest that these workers are exposed to cardiovascular risk factors, such as hyperglycemia and dyslipidemia, which increase their predisposition to developing acute myocardial infarction, stroke, pancreatitis, and diabetes mellitus. Therefore, the implementation of specific health programs targeting these workers is warranted. In addition, raising awareness among this population is crucial to encourage the early identification and treatment of cardiovascular risk factors, considering the vulnerability of this group to the aforementioned health.

KEYWORDS: Clinical Laboratory Techniques. Metabolic Diseases. Public Health.

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RESUMO
O presente estudo tem como objetivo identificar os fatores de risco cardiovasculares entre pescadores profissionais da Colônia de Pescadores de Cáceres (Colônia Z-2) e da Associação de Pescadores Profissionais de Cáceres (APPEC). Trata-se de um estudo transversal, descritivo e quantitativo. Foram avaliados 97 participantes (52,6% homens, 47,4% mulheres) por meio de exames laboratoriais, com médias e desvios padrão de colesterol total (143,1±52,8), triglicerídeos (104,7±77,2), LDL (83,9±43,4), HDL (56,5±15,1) e glicemia em jejum (109,06±34,1). Os resultados indicaram que, em média, os exames lipídicos mantiveram-se dentro dos parâmetros normais. Contudo, a análise individualizada revelou que uma parcela dos trabalhadores apresentou alterações nos níveis lipídicos. Além disso, os valores de glicemia em jejum evidenciaram níveis elevados. Esses achados sugerem que esses trabalhadores estão expostos a fatores de risco cardiovasculares, como hiperglicemia e dislipidemia, o que aumenta a predisposição para o desenvolvimento de infarto agudo do miocárdio, acidente vascular encefálico, pancreatite e diabetes mellitus. Diante do exposto, destaca-se a relevância de implementar programas de saúde específicos voltados para esses trabalhadores. Além disso, é crucial conscientizar essa população, incentivando a identificação e tratamento precoce dos fatores de risco cardiovasculares, considerando a vulnerabilidade desse grupo às condições de saúde mencionadas.

KEYWORDS: Clinical Laboratory Techniques. Metabolic Diseases. Public Health.

RESUMEN
El presente estudio tuvo como objetivo identificar los factores de riesgo cardiovascular entre pescadores profesionales de la Colonia de Pescadores de Cáceres (Colônia Z-2) y de la Asociación de Pescadores Profesionales de Cáceres (APPEC). Se trata de un estudio transversal, descriptivo y cuantitativo. Se evaluaron 97 participantes (52,6% hombres y 47,4% mujeres) mediante pruebas de laboratorio, con valores medios y desviaciones estándar de colesterol total (143,1 ± 52,8), triglicéridos (104,7 ± 77,2), LDL-C (83,9 ± 43,4), HDL-C (56,5 ± 15,1) y glucemia en ayunas (109,06 ± 34,1). Los resultados indicaron que, en promedio, los parámetros del perfil lipídico se mantuvieron dentro de los valores normales. Sin embargo, el análisis individual reveló que una proporción de los trabajadores presentó alteraciones en los niveles lipídicos. Además, los valores de glucemia en ayunas evidenciaron niveles elevados. Estos hallazgos sugieren que estos trabajadores están expuestos a factores de riesgo cardiovascular, como la hiperglucemia y la dislipidemia, lo que aumenta su predisposición al desarrollo de infarto agudo de miocardio, accidente cerebrovascular, pancreatitis y diabetes mellitus. Ante lo expuesto, se destaca la importancia de implementar programas de salud específicos dirigidos a estos trabajadores. Asimismo, es fundamental concienciar a esta población, fomentando la identificación y el tratamiento precoz de los factores de riesgo cardiovascular, considerando la vulnerabilidad de este grupo frente a las condiciones de salud mencionadas.

PALABRAS CLAVE: Análisis Clínicos. Enfermedades Metabólicas. Salud Pública.

INTRODUCTION

Artisanal fishing is understood as a small-scale activity carried out using simple tools and vessels, without navigational support instruments, relying mostly on experience and traditional

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knowledge (Silva, 2014). Its primary purpose is to obtain fish for commercialization and local human consumption. Its importance extends beyond human subsistence, as it employs a large number of workers and therefore represents an economically significant activity (Rios; Rego; Pena, 2011).

In this context, fishing plays a fundamental role for the population of Cáceres, Mato Grosso, being the main source of economic livelihood for many low-income families who depend on the waters of the Upper Paraguay River and its tributaries in the Mato Grosso Pantanal (Bezerra; Oliveira, 2011). In addition, it is responsible for shaping the identity of many riverside communities and serves as a means of maintaining cultural and social ties (Silva; Leitão, 2012).

However, studies indicate that individuals in less favorable socioeconomic conditions constitute a significant risk group for cardiovascular diseases, with professional fishers representing a relevant example of this population profile (Ishitani *et al*., 2006; Stefanello *et al*., 2024).

Cardiovascular diseases comprise a group of conditions that impair the functioning of the heart and blood vessels (PAHO, 2024). The myocardium functions as a natural pump, responsible for propelling oxygenated blood throughout the body. For this function to be adequately performed, it is essential that the entire cardiovascular system remains intact and in good condition (Malta *et al*., 2020).

In Brazil, approximately one-third of deaths are attributed to cardiovascular diseases (CVDs), which also generate the highest healthcare costs, particularly due to metabolic disorders such as hyperglycemia and elevated cholesterol and its fractions (Brazil, 2022a). In addition to their significant impact on mortality, these diseases result in prolonged hospitalizations and work absenteeism, placing a burden on the public healthcare system and generating considerable economic and social losses (Stevens *et al*., 2018).

Hyperglycemia, characterized by elevated blood glucose levels, is one of the major risk factors for cardiovascular diseases (Lima; Glaner, 2006). As a condition that is frequently silent in its early stages, it may not present evident symptoms; however, its harmful effects are continuous, as excess glucose damages blood vessels, contributing to atherosclerosis and other cardiac complications (Beraldo *et al*., 2021).

Cholesterol is an essential lipid and a precursor of steroid hormones, bile acids, and vitamin D. It is also crucial for cell membrane fluidity and the regulation of metabolic processes (Faludi *et al*., 2017). Its transport in the bloodstream depends on lipoproteins, since fats are insoluble in plasma. These particles include triglycerides (TG), low-density lipoprotein cholesterol

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(LDL-C), and high-density lipoprotein cholesterol (HDL-C), whose effects vary according to their concentrations in the body (Wanchun Xu *et al*., 2024).

Several studies have provided evidence that elevated serum cholesterol levels are associated with a higher risk of myocardial infarction, as there is an intrinsic relationship between high cholesterol levels and increased cardiovascular disease risk (Malta *et al*., 2019). This condition is particularly concerning because it is frequently asymptomatic, making it potentially highly dangerous (De Souza; Tafuri, 2020).

In this context, laboratory tests play a crucial role in health assessments by providing detailed and accurate information that assists healthcare professionals in confirming and supporting diagnoses (Mattioni; Grzybowski; Beck, 2020). Their importance is even greater in silent diseases, such as hyperglycemia and dyslipidemias, in which laboratory results may be essential for the early detection and effective treatment of these conditions (Aragão; Araújo, 2019).

Based on this context, the hypothesis is that risk factors such as hyperglycemia and dyslipidemia contribute to the development of cardiovascular diseases among the fishing population. Thus, this study is guided by the following research question: do cardiovascular diseases represent a health problem among professional fishers in Cáceres, Mato Grosso? Therefore, this study aims to screen for cardiovascular risk factors, specifically hyperglycemia and dyslipidemia, among artisanal professional fishers affiliated with the Cáceres Fishermen's Colony (Colônia Z-2) and the Cáceres Professional Fishermen's Association (APPEC).

METHODOLOGY

This field study employed a cross-sectional, descriptive, and quantitative approach. The study was conducted in the Pantanal region, in Cáceres, Mato Grosso State, Brazil, in 2023, during the fishing season, which took place from February to September of the same year.

The target population comprised artisanal professional fishers affiliated with the Z-2 Fishermen's Colony and the Cáceres Professional Fishermen's Association (APPEC), who were contacted through the fishing leaders of each organization. Participants were instructed to attend their respective organization on previously scheduled dates and in a fasting state for the collection of biological material (blood).

The inclusion criteria comprised all professional fishers aged 18 years or older who were duly registered with their respective organizations. In addition, participants were required to voluntarily agree to participate in the study and sign the Informed Consent Form (ICF).

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For data collection, blood samples were obtained using the vacuum collection method on dates and at locations previously agreed upon with each organization. After collection, the samples were stored in a refrigerated thermal container, with the tubes positioned vertically and properly secured to ensure the accuracy of the analyses.

The collected samples were used to quantify total cholesterol, triglycerides, HDL cholesterol, LDL cholesterol, and fasting blood glucose. Analysis of the biological material was performed at the laboratory of the State University of Mato Grosso, following the guidelines provided by the reagent manufacturer, Biotécnica. LDL cholesterol was calculated using the Friedewald formula, established in 1972, as follows: LDL = TC – HDL – TG/5, where TC represents total cholesterol and TG represents triglyceride levels.

Laboratory test results were interpreted based on the reference ranges established by the reagent manufacturer, which were also consistent with the current parameters established by the Brazilian Society of Cardiology. The data were organized in a Microsoft Excel spreadsheet, version 2009, for analysis. Variables were presented as means, standard deviations, and percentages and were displayed in tables and frequency graphs, as well as box plots.

Statistical analyses were performed using Student's t-test, assuming unequal variances. The objective was to determine whether significant differences existed between sexes regarding lipid profile parameters (cholesterol, triglycerides, LDL, and HDL) and glucose levels, as well as to assess whether the mean values obtained were above or below the reference ranges for each test.

Regarding ethical considerations, this study was submitted to and approved by the Research Ethics Committee in accordance with Resolution No. 466/12 (CEP), under approval number 5.928.210. All participants signed the Informed Consent Form before participating in the study.

RESULTS

Of the 407 artisanal fishers registered with the two organizations, 97 participated in the study, corresponding to 23.83% of the total. Among the participants, 52.6% were men and 47.4% were women.

In this context, altered total cholesterol levels were observed in 19.6% of the participants, with a mean of 143.1 ± 52.8 mg/dL. Regarding triglycerides, 10.3% of the participants presented altered levels, with a mean of 104.7 ± 77.2 mg/dL. For LDL cholesterol, 24.7% of the tests showed altered values, with a mean of 83.9 ± 43.4 mg/dL. Regarding HDL cholesterol, 9.3% of the results indicated altered levels, with a mean of 56.5 ± 15.1 mg/dL.

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Table 1. Distribution of the lipid profile of artisanal professional fishers in the municipality of Cáceres, Mato Grosso, from February to September 2023.

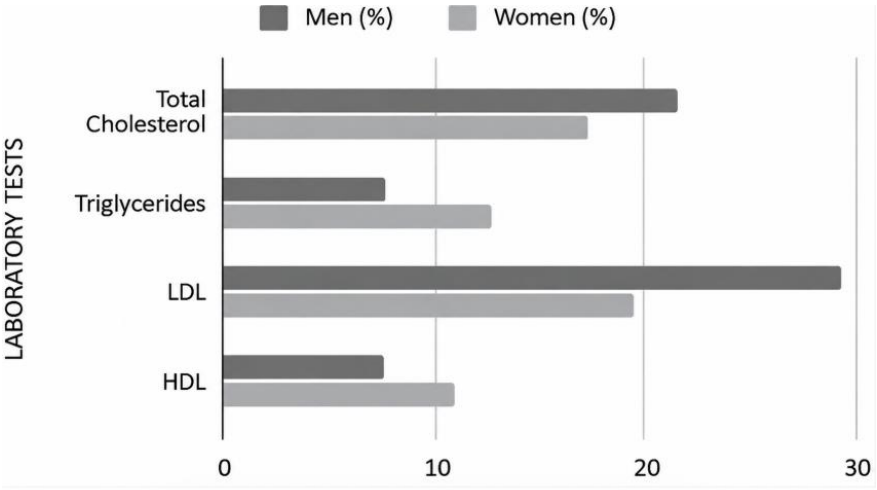
Lipid profile	N	%	Mean ± SD
Total cholesterol (mg/dL)	**97**	**100.0**	**143.1 ± 52.8**
Normal (<190 mg/dL)	78	80.4	—
Altered (≥190 mg/dL)	19	19.6	—
HDL-C (mg/dL)	**97**	**100.0**	**56.5 ± 15.1**
Normal (>40 mg/dL)	88	90.7	—
Altered (≤40 mg/dL)	9	9.3	—
LDL-C (mg/dL)	**97**	**100.0**	**83.9 ± 43.4**
Normal (<100 mg/dL)	73	75.3	—
Altered (≥100 mg/dL)	24	24.7	—
Triglycerides (mg/dL)	**97**	**100.0**	**104.7 ± 77.2**
Normal (<150 mg/dL)	87	89.7	—
Altered (≥150 mg/dL)	10	10.3	—

Note: SD = standard deviation; HDL-C = high-density lipoprotein cholesterol; LDL-C = low-density lipoprotein cholesterol.

In the analysis according to sex, 21.6% of men and 17.4% of women presented altered total cholesterol levels. Regarding triglycerides, elevated levels were observed in 7.8% of men and 13.0% of women. For LDL-C, 29.4% of men and 19.6% of women presented concentrations above the recommended limit. Regarding HDL-C, 7.8% of men and 10.9% of women presented altered levels.

Comparison of mean values between sexes was performed using Welch's t-test. No statistically significant differences were observed for total cholesterol ($t(95) = 0.98$; critical $t = 1.66$), LDL-C ($t(95) = 1.58$; critical $t = 1.66$), or HDL-C ($t(94) = 0.14$; critical $t = 1.66$). However, a statistically significant difference was observed for triglycerides between men and women ($t(68) = -1.72$; critical $t = 1.67$), considering a significance level of 5%.

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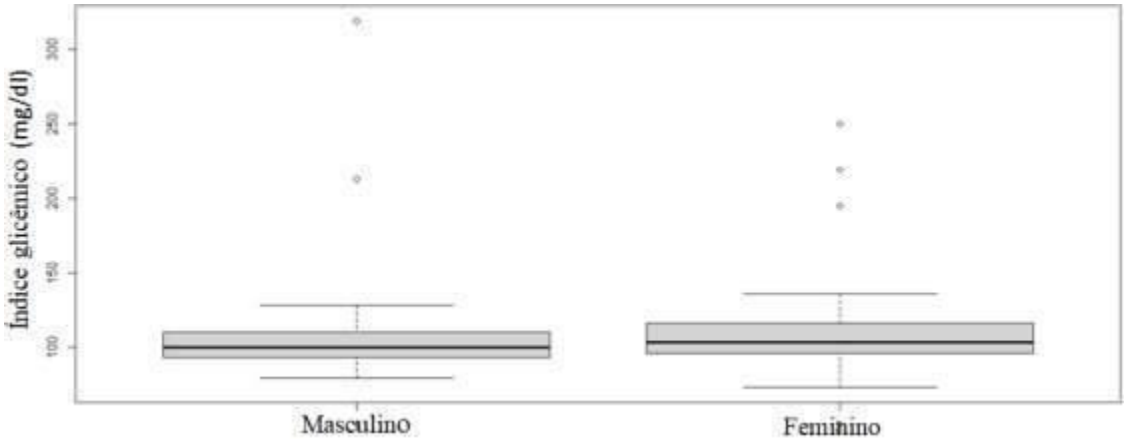


Note: low-density lipoprotein cholesterol (LDL-C), and high-density lipoprotein cholesterol (HDL-C)
Source: Authors' own elaboration, 2023

Regarding the glycemic profile, 56.7% of the results were found to be altered, with a mean of 109.06 ± 34.1 mg/dL. Among the altered results, 60.9% (110.9 ± 32.8 mg/dL) were recorded among women, whereas 52.9% (107.2 ± 35.7 mg/dL) were observed among men. The Student's *t*-test ($t(95) = -0.53 < t_{0.05} = 1.66$) showed no statistically significant difference in altered glucose levels between the sexes.

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Figure 2. Comparison of blood glucose levels by sex among artisanal professional fishers in Cáceres, Mato Grosso, from February to September 2023.



Source: Authors' own elaboration, 2023

DISCUSSION

The results of the study indicate that the difference in participation between men and women was small. This finding suggests that, although fishing remains predominantly a male activity (IUCN, 2022), the number of women who participated in this study was nearly equivalent to that of men, demonstrating significant female representation in the study population.

This finding may be related to the fact that women tend to be more concerned about their health, whereas men often show resistance to seeking preventive healthcare and tend to access health services only in emergency situations (Silva; Lima, 2021). This behavior is influenced by cultural factors, social values, and, often, a lack of information. For many men, illness is perceived as a sign of weakness or vulnerability rather than as a natural condition of the body (Martins *et al*., 2020). These factors contribute to lower levels of health care-seeking among men, greater exposure to risks, and inadequate recognition of their own health needs (Vieira *et al*., 2020).

The results of the lipid profile tests revealed that, on average, participants presented levels within the normal ranges. However, individual analysis showed that a proportion of participants had altered levels, representing a significant risk for cardiovascular diseases. Although the mean total cholesterol level was below the threshold for dyslipidemia, individuals with elevated values remain vulnerable to serious complications, such as acute myocardial

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infarction and other cardiovascular conditions. This relationship is supported by studies associating elevated cholesterol levels with increased cardiovascular risk (Malta *et al*., 2019).

Similarly, fishers with elevated LDL-C levels are at increased risk, which is concerning because elevated LDL-C is an important risk factor for atherosclerosis (Brazil, 2023). When present at elevated plasma concentrations, LDL-C contributes to the accumulation of fatty plaques in arterial walls, a process known as atherosclerosis, which impairs blood flow and increases the occurrence of ischemic cardiovascular and cerebrovascular events, such as stroke and acute myocardial infarction (Oliveira *et al*., 2021).

From this perspective, according to the aforementioned author, the accumulation of fat in the arteries increases the risk of clot formation. This occurs because narrowing and stiffening of the arterial lumen increase the likelihood of local thrombus formation, which may detach and travel through the circulation to the lungs, resulting in pulmonary embolism.

The proportion of artisanal professional fishers with altered triglyceride levels is also exposed to an increased risk of health problems. This finding may be explained by the role of hypertriglyceridemia, which constitutes the third leading cause of pancreatitis worldwide. This is a serious inflammatory condition affecting the pancreas and may lead to several complications, including abdominal pain, jaundice, diarrhea, and weight loss (Yang; Baltar, 2020).

Furthermore, HDL-C is a high-density lipoprotein that plays a crucial role in reverse cholesterol transport by removing excess cholesterol from cells (Santos *et al*., 2013). Known as “good cholesterol,” low HDL-C concentrations are associated with an increased risk of cardiovascular diseases, as this lipoprotein contributes to the removal of cholesterol from arterial walls (Brazil, 2022b). Thus, fishers with HDL-C levels below the reference values may be at increased risk of acute myocardial infarction and stroke.

Elevated fasting blood glucose levels, as observed in the study sample for both sexes, suggest an increased risk of insulin resistance and type 2 diabetes mellitus (Evaristo *et al*., 2021). Prolonged hyperglycemia damages blood vessels, increasing the risk of cardiovascular diseases. These risks may be even greater when hyperglycemia is combined with other risk factors, thereby potentiating its impact on quality of life (Berbudi, 2020).

Therefore, the metabolic risks faced by these professionals substantially increase their predisposition to developing conditions such as type 2 diabetes mellitus and other cardiovascular diseases (Junior; Baracat; Baracat, 2021). The interaction among multiple risk factors further increases the likelihood of adverse health events, negatively affecting the quality of life and well-being of these individuals (Oliveira *et al*., 2020).

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CONCLUSION

The results of this study support the initial hypothesis that cardiovascular diseases represent a significant health concern among the fishing population. The objective of the study was achieved by identifying risk factors for the development of these diseases, specifically hyperglycemia and dyslipidemia, in a proportion of this population.

To modify the scenario identified, it is essential to implement health programs specifically targeted at these workers, including educational sessions emphasizing healthy eating habits and regular physical activity, as well as addressing the harmful effects of smoking. These initiatives may increase health awareness and contribute to reducing the risk of cardiovascular diseases. Partnerships among universities, research institutions, government agencies, and non-governmental organizations could be established to promote initiatives that expand access to reliable health information, encourage preventive practices, and support more comprehensive and inclusive health policies.

Furthermore, the availability of mobile health units near these workers' workplaces could facilitate access to healthcare, considering that many of them spend long periods in fishing colonies. This population also frequently demonstrates resistance to seeking preventive healthcare. Such an approach could enable the early identification and treatment of potential risk factors, thereby reducing future treatment and hospitalization costs, since prevention represents a lower-cost investment than the treatment of advanced diseases. These preventive initiatives could significantly contribute to reducing public healthcare expenditures associated with chronic diseases and preventing illness among this population.

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