Cardiovascular risk, lifestyle and anthropometric status of rural workers in Pardo River Valley, Rio Grande do Sul, Brazil

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ABSTRACT | Background: The state of health of rural workers is influenced by the living conditions to which they are subjected, including social, economic, technological and organizational aspects. Given the scarcity of studies on this population of workers, establishing their profile is necessary. Objectives: To analyze cardiovascular risk according to demographic factors and anthropometric status of rural workers under the Pardo River Valley Regional Development Council (COREDE-VRP). Methods: Cross-sectional analytical study with rural workers in five municipalities in the COREDE-VRP southern region. We administered a structured questionnaire for lifestyle socioeconomic information, physical activity and self-reported health. Anthropometric measurements, resting heart rate and electrocardiogram (ECG) were performed to analyze heart rate variability (HRV). Results: Women exhibited higher cardiovascular risk, which in turn did not differ as a function of age, marital status, socioeconomic status or lifestyle. We found a relationship between cardiovascular risk and anthropometric measurements, but not with cardiovascular variables. Conclusion: Women exhibited higher cardiovascular risk, which was not associated with marital status, socioeconomic status, alcohol use, smoking, sleep disorders or physical activity. Therefore, we emphasize the relationship between cardiovascular risk and anthropometric variables, as well as the lack of association with heart rate and autonomic imbalance.

Keywords | rural workers; lifestyle; anthropometry.

RESUMO | Introdução: A saúde dos trabalhadores rurais sofre influência decorrente das condições de vida a que estão submetidos, como fatores sociais, econômicos, tecnológicos e organizacionais. Nesse contexto, surge a necessidade de identificar o perfil de saúde de trabalhadores rurais, pela escassez de pesquisas relacionadas a essa área. Objetivo: Avaliar o risco cardiovascular de acordo com fatores demográficos e composição corporal em trabalhadores rurais do Conselho Regional de Desenvolvimento do Vale do Rio Pardo (COREDE/VRP). Método: Estudo transversal analítico realizado com trabalhadores rurais de cinco municípios da microrregião sul do COREDE/VRP. Utilizou-se um questionário de estilo de vida estruturado com informações socioeconômicas sobre atividade física e saúde autorreferida. Foram feitas avaliação antropométrica, verificação da frequência cardíaca de repouso e gravação do eletrocardiograma (ECG), para análise da variabilidade da frequência cardíaca (VFC). Resultados: As mulheres apresentaram significativamente mais risco cardiovascular. Não foram encontradas diferenças para idade, estado civil, classe socioeconômica e estilo de vida. Ao se comparar variáveis antropométricas e cardiovasculares, observou-se que existe relação significativa do risco com a antropometria, não havendo relação entre o risco e as variáveis cardiovasculares. Conclusões: Observou-se que as mulheres da área rural apresentam significativamente maior risco cardiovascular, não sendo observada relação com o estilo de vida. Além disso, é possível destacar a relação estatisticamente significativa entre as variáveis antropométricas e o risco cardiovascular, não havendo relação entre o risco cardiovascular e a frequência cardíaca e o risco cardiovascular e o desequilíbrio autonômico. Palavras-chave | trabalhadores rurais; estilo de vida; antropometria.
INTRODUCTION

The ongoing epidemics of noncommunicable diseases (NCD) is one of the main global causes of morbidity and mortality, the rate of deaths having considerable grown in the period from 2007 to 2017. NCD thus pose a significant public health problem, and represent 70% of causes of death in Brazil. Cardiovascular disease (CVD) stands out among NCV; risk factors include smoking, alcohol use, excess weight, inadequate diet and physical inactivity. Physical inactivity has serious consequences, including illness. Exercising contributes to control the body weight and reduces risk factors and the occurrence of diseases. In Brazil, excess weight results from changes in dietary patterns and physical inactivity, and is one of the causes of NCD.

Autonomic dysfunction is another risk factor for CVD, which can be assessed based on the heart rate variability (HRV). This condition interferes with the regulation of the cardiovascular system and is thus involved in and influences the course of CVD.

Martins-Silva et al. found higher prevalence of general and central obesity among women in rural areas in the South region of Brazil compared to those living in cities. Rural populations are susceptible to diseases related to physical inactivity and exposure to toxins, while access to health services is difficult. Thus the present study is justified as it sought to identify risk factors to health among rural workers in the interior of the state of Rio Grande, Brazil, who have poor access to health care and have been seldom targeted in scientific studies. Indeed, investigating cardiovascular risk factors among this population is necessary, particularly the relationship between lifestyle and anthropometric status, for which data are easily accessible and enable early detection of high cardiovascular risk.

The aim of the present study was to analyze cardiovascular risk according to demographic factors and anthropometric status of rural workers in the region covered by the Regional Development Council of Pardo River Valley (COREDE/VRP), Brazil.

METHODS

The present cross-sectional analytical study was performed with rural workers from five municipalities in the COREDE/VRP southern micro-region (Candelária, Encruzilhada do Sul, Passo do Sobrado, Rio Pardo and Vale Verde). It is part of project “Excess Weight Risk Factor Screening among Agricultural Workers by means of Novel Health Analytical and Information Technologies — Phase 3,” approved by the research ethics committee of University of Santa Cruz do Sul (Certificate of Presentation for Ethical Appraisal—CAAE: 7889317.1.0000.5343).

Participants were recruited by convenience sampling. We contacted all five municipal Technical Assistance and Rural Outreach Companies (Empresas de Assistência Técnica e Extensão Rural—EMATER) to intermediate our access to rural workers. Inclusion criteria were: having a rural job as main source of income, residing in the aforementioned towns, age above 18, and fasting and refraining from exercising on the day before data collection. We excluded subjects with any health problem that could hinder HRV testing.

The sample comprised 106 participants who provided informed consent. Data were collected during the first semester of 2018 at University of Santa Cruz, except for the participants from Encruzilhada do Sul and Rio Pardo, in which case for logistical reasons data collection was performed in facilities provided by EMATER and the Rural Worker Trade Union.

We administered a structured lifestyle questionnaire that included the following variables: age (in years), sex (male/female), socioeconomic status (A-B/C/D-E), marital status (married/other), number of household residents, smoking (no/smoker or ex-smoker), alcohol use frequency (weekly/monthly/less than once per month), physical activity (yes/no) and sleep disorders (yes/no).

Duly trained investigators collected anthropometric data, to wit, body weight and height, with analog scale and stadiometer. Next we calculated the body mass index (BMI) by dividing weight by height squared; the cut-off point was set to 25 kg/m² (adequate/inadequate). Waist (WC) and hip circumference (HC) were measured with inelastic tape measure on the midpoint between the last rib and the iliac crest and on the greater trochanter respectively. WC was used to estimate cardiovascular risk, which was categorized following Lean et al. as normal/no risk or high/high risk. We next calculated the WC/HC ratio, categorized as adequate (low risk) or inadequate (medium, high or very high risk). Neck circumference (NC) was measured on the cricothyroid...
cartilage with inelastic tape measure; values >37 cm (men) and >34 cm (women) were considered inadequate.14

HRV was tested following the recommendations by the Task Force of the European Society of Cardiology using Polar V800 heart rate monitor. Electrocardiogram (ECG) was recorded (RR interval) for 10 minutes in a quiet room at room temperature 21–23°C with the participants lying on supine position, awake, silent, without performing abrupt motions and breathing spontaneously.

The data were exported to software Kubios HRV Analysis 2.0 (Kubios, Kuopio, Finland). We performed frequency domain analysis relative to the most stable 5-minute record by means of spectral analysis of the low/high frequency power ratio (LF/HF) which represents the sympathetic to parasympathetic balance. Values 1.5–2.0 were considered adequate and those <1.5 or >2.0 inadequate. Heart rate (HR) <100 bpm was considered adequate and >100 bpm inadequate.15

The results were analyzed with software Statistical Package for the Social Sciences (SPSS), version 23.0 (IBM, Armonk, NY, USA). Categorical variables are presented in tables of absolute and relative frequencies, and numerical variables as mean and standard deviation. Normality was assessed with the Shapiro-Wilk test. Means were compared with Student’s t-test for independent samples (parametric) or the Mann-Whitney U test (nonparametric). Categorical variables were subjected to the χ² test. The significance level was set to p<0.05.

RESULTS

More than half of the participants (54/106, 51%) were female, aged above 50 and belonged to socioeconomic category C (60%). Based on socioeconomic and lifestyle variables, the women exhibited statistically significant higher cardiovascular risk than the men (80% vs. 39%). We did not find difference in age (p=0.081), marital status (p=0.112), socioeconomic category (0.327), alcohol use (p=0.248), smoking (p=0.061), sleep disorders (p=0.802) or physical activity (p=0.237) between the participants with or without cardiovascular risk (Table 1).

In turn, cardiovascular risk exhibited significant association with inadequate BMI (p<0.001), WC/HC (p<0.001) and NC (p<0.001) but not with HR (p=0.272) or autonomic imbalance (p=0.862) (Table 2).

DISCUSSION

The female participants exhibited significantly higher cardiovascular risk compared to the men (p<0.01). None of the other socioeconomic or lifestyle variables was associated with cardiovascular risk (p>0.05). We further found a relationship between cardiovascular risk and anthropometric variables (p<0.001) but not with HR or autonomic imbalance (p>0.05).

A substantial migration of youths, especially women, to cities took place in recent decades in Brazil, resulting in a predominance of males and older adults in rural areas. However, Sarmento et al. observe that attention should be paid to regional differences, since some production activities favor a predominance of men, while family farming contributes to keep women in rural areas. According to some studies, women predominate over men in the COREDE/VRP area, which was also the case in the present study.

The socioeconomic profile we identified agrees with that reported by Silva et al., to wit, predominance of women above age 40, on average, and seven years of formal schooling (incomplete elementary school). However, data from the National Household Sample Survey from 2008, analyzed by Moreira et al., indicate that 58% of agricultural workers in Brazil are male and most are under age 40. In the study by Mori et al., the average age of family farmers in Alto Jacuí, Rio Grande do Sul, was 50 years old.

Biernat et al. analyzed leisure physical activity in a rural population and workers in Poland, and found that 49 and 66% respectively did not meet the recommendations by the World Health Organization for weekly physical activity. These findings agree with ours, since most of the participants (82%) did not perform physical activity on a regular basis.

Felisbino-Mendes et al. reported excess weight in 34.9% of 863 analyzed rural workers, 25.6% among the men and 43.2% among the women, who were found to perform less
physical activity. In the present study, the high rate of rural workers with excess weight who did not perform physical activity suggests that the physical demands of the job do not suffice to control the body weight, with consequent higher risk of NCD.

In their study with 683 adults and 321 older adults, Cichoki et al. found that physical activity modulated cardiovascular risk. However, cardiovascular risk was lower only among individuals who performed moderate to vigorous physical activity regularly, while light intensity activity did not reduce risk. The high prevalence of cardiovascular risk in our study might be related to physical inactivity.

Poor access to health services is another characteristic of rural areas, especially as concerns prevention and health promotion actions, which thus might be considered as a factor of aggravation. Following their study with citriculture workers in which they identified several occupational risk factors and diseases, Santos and Menta observe that lack of access to this type of actions implemented by the occupational health integrated care

### Table 1. Socioeconomic and lifestyle characteristics of rural workers with or without high cardiovascular risk, Santa Cruz do Sul, Brazil, 2019 (n=106).

| Variables            | Cardiovascular risk | p     |
|----------------------|---------------------|-------|
|                      | No (n=43) | Yes (n=63) |     |
| n (%)                | n (%)       |       |     |
| Age*                 |            |        | 0.081|
| Sex                  |            |        | <0.001|
| Female               | 11 (20)    | 43 (80) |     |
| Male                 | 32 (61)    | 20 (39) |     |
| Marital status       |            |        | 0.112|
| Married              | 29 (36)    | 51 (64) |     |
| Other                | 14 (59)    | 12 (46) |     |
| Socioeconomic status |            |        | 0.327|
| A-B                  | 7 (28)     | 18 (72) |     |
| C                    | 29 (45)    | 35 (55) |     |
| D-E                  | 7 (41)     | 10 (59) |     |
| Alcohol use          |            |        | 0.248|
| Weekly               | 13 (50)    | 13 (50) |     |
| Monthly              | 7 (54)     | 6 (46)  |     |
| Less than once per month | 43 (41)     | 62 (59) |     |
| Smoking              |            |        | 0.061|
| Never                | 28 (35)    | 52 (65) |     |
| Smoker/ex-smoker     | 14 (56)    | 11 (44) |     |
| Sleep disorders      |            |        | 0.802|
| Yes                  | 12 (39)    | 19 (61) |     |
| No                   | 31 (41)    | 44 (59) |     |
| Physical activity    |            |        | 0.237|
| Yes                  | 10 (53)    | 9 (47)  |     |
| No                   | 33 (38)    | 54 (62) |     |

n: absolute frequency; %: relative frequency; *mean: standard deviation.

### Table 2. Anthropometric and cardiovascular characteristics of rural workers with or without high cardiovascular risk, Santa Cruz do Sul, Brazil, 2019 (n=106).

| Variables                        | Cardiovascular risk | p     |
|----------------------------------|---------------------|-------|
|                                  | No (n=43) | Yes (n=63) |     |
| n (%)                            | n (%)       |       |     |
| Body mass index                  |            |        | <0.001|
| Adequate                         | 26 (93)    | 2 (7)  |     |
| Inadequate                       | 17 (22)    | 78 (61)|     |
| Waist circumference/hip circumference |            |        | <0.001|
| Adequate                         | 20 (87)    | 3 (13) |     |
| Inadequate                       | 23 (28)    | 60 (72)|     |
| Neck circumference               |            |        | <0.001|
| Adequate                         | 23 (72)    | 9 (28) |     |
| Inadequate                       | 20 (27)    | 54 (73)|     |
| Heart rate*                      |            |        | 0.272|
| Adequate                         | 36 (47)    | 41 (53)|     |
| Inadequate                       | 7 (33)     | 14 (67)|     |
| LF/HF*                           |            |        | 0.862|
| Adequate                         | 8 (42)     | 11 (58)|     |
| Inadequate                       | 35 (44)    | 44 (56)|     |

n: absolute frequency; %: relative frequency; LF/HF: ratio between low frequency (LF) and high frequency (HF) spectral components; *eight missing.
network is one further reason for distress among this population of workers.

Most of the analyzed population exhibited at least one cardiovascular risk factor, but autonomic imbalance — caused by diseases or medications with effects on the autonomic nervous system — did not have any relationship with the outcome. In turn, BMI, WC/HC and NC were associated with cardiovascular risk. As in ours, also in the study by Luz et al. with 790 farmers in Santa Maria de Jetibá, Espírito Santo, Brazil, BMI was associated with cardiovascular risk. Those authors further found association between age and high WC and number of cardiovascular risk factors, two or more. In the study by Berhard et al. with 138 rural workers, intermediate and high cardiovascular risk predominated among those with overweight or obesity, but only among the females. Nevertheless, these authors call the attention to the relevance of BMI in the implementation of interventions to promote healthy lifestyles.

Our results indicate that health actions in rural areas are still precarious, and might also serve to channel attention and resources to prevention and health promotion interventions, particularly focused on the aspects we analyzed, i.e. reduction of anthropometric measurements and adoption of a healthy lifestyle.

The present study has some limitations, for instance those derived from convenience sampling, which was partially due to difficulties to access the target population. Then, while dietary habits are relevant for weight control and risk factor analysis, we did not investigate them. As positive aspects, we emphasize the fact we analyzed a seldom considered population of workers, as well as the relationship between cardiovascular risk and anthropometric measurements, which are reliable and easy to collect in the primary care setting and allow detecting abnormalities early. Our findings might also serve to ground prevention and health promotion actions targeting rural populations.

CONCLUSION

Women in rural areas exhibited higher cardiovascular risk by comparison to the men. We did not find any relationship between cardiovascular risk and marital status, socioeconomic status, alcohol use, smoking, sleep disorders or physical activity. In turn, cardiovascular risk was significantly associated with anthropometric variables (BMI, WC/HC, NC) but not with autonomic imbalance. Public policies should be formulated to prevent diseases and promote health among rural workers, particularly including interventions to change their anthropometric profile.

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