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Factors Associated With Sedentary Behavior Among Adult Women In A Medical Clinic

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Abstract:
Sedentary behavior (SB) refers to any behavior performed with low energy expenditure while seated, reclined, or lying down during waking hours. Considered a public health issue, SB has been associated with various adverse health outcomes. The objective of this study was to analyze factors associated with sedentary behavior in adult women attending a university medical clinic. This is a cross-sectional study with data collected from users at a medical clinic in the city of Aparecida de Goiânia. Information on sociodemographic, occupational, behavioral, and health characteristics was collected. Sedentary behavior was assessed using the short version of the International Physical Activity Questionnaire (IPAQ). Data were analyzed using descriptive statistics.
Keywords: *Sedentary behavior, Women's health, Epidemiology.*

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I. Introduction

Sedentary behavior (SB) refers to any behavior performed during waking hours characterized by an energy expenditure equal to or lower than 1.5 metabolic equivalents (METs) while seated, reclined, or lying down. Activities like using electronic devices (television, computer, tablet, or phone) while seated, reclined, or lying down; reading, writing, or conversing while seated on buses, cars, or trains are considered sedentary behaviors (Tremblay et al., 2017).

The increase in SB over the years has been attributed to changes in transportation, entertainment, and work environments, which predominantly involve sitting, drastically reducing daily physical activity demands (Compernolle et al., 2016; Owen et al., 2010). Adults spend about 55-57% of their time in sedentary behaviors, which corresponds to almost 8 hours a day (Warren et al., 2010).

Data from the Brazilian Ministry of Health show that the frequency of adults who spend 3 or more hours a day of leisure time in SB, such as watching television or using a computer, tablet, or cell phone, is 62.7%. For women, across age groups, this percentage varies from 79.8% for ages 18-24 and 48.1% for ages 65 and older. When related to education level, the frequency observed is 46.6% among those with 0-8 years of schooling and 69.1% for those with 12 years or more. The data suggest a decrease in the prevalence of SB with advancing age and an increase associated with higher education levels (Brazil, 2019).

Evidence suggests that excessive sedentary behavior (SB) is associated with various health problems. A study involving 8,800 Australian adults over the age of 25 found an association between television viewing time (≥ 4 hours/day) and an increased risk of all-cause mortality (RR = 1.46, 95% CI 1.04-2.05) and cardiovascular disease (CVD) (RR = 1.80, 95% CI 1.00-3.25). In this study, individuals who spent more time watching TV had a more adverse health profile (Dunstan et al., 2010). Also in Australia, a study evaluating 222,497 adults over 45 years of age demonstrated that those who spent more time sitting had a higher risk of mortality than others. For those who spent between 8 to < 11 hours and 11 or more hours per day sitting, the hazard ratios (HRs) for all-cause mortality were 1.15 (95% CI 1.06-1.25) and 1.40 (95% CI 1.27-1.55), respectively, compared to the reference category of less than 4 hours per day sitting (Van Der Ploeg et al., 2012).

A study conducted among 245 public school teachers in Presidente Prudente (SP) found that those with high SB were twice as likely to have abdominal obesity compared to teachers with low SB (OR = 2.21, 95% CI 1.23-3.97, p = 0.008). Regarding sedentary breaks, the study pointed out that breaks in leisure SB reduced the likelihood of hypertension by 42%. A possible hypothesis is that individuals who take more breaks in sedentary activities have a higher total energy expenditure than those with fewer breaks (Delfino et al., 2020).

The literature includes studies investigating demographic, socioeconomic, environmental, biological, and behavioral factors that may be associated with SB, such as gender, age, education, income, marital status, occupation, and others. Regarding gender, a population-based study with 9,218 participants aged between 15 and 65 years, using data from eight Latin American countries, showed that men had higher SB than women in computer use, video gaming, reading, and transportation, regardless of age (Ferrari et al., 2020a). A systematic review of 74 studies, 19 of which investigated the association between gender and SB, found that in 10 studies, female gender was inversely associated with SB (O'Donoghue et al., 2016). It is suggested that women tend to show less SB than men due to the double workload of employment and domestic chores (Delfino et al., 2020).

A study involving 524 Brazilian adults aged 18 to 65 used an accelerometer to monitor SB and moderate to vigorous physical activity (MVPA). This study evaluated the association between SB, different intensities of physical activity, steps/day, and body composition variables. In women, only SB was significantly associated with abdominal circumference (AC) (Ferrari et al., 2020b). Thus, understanding the profile of women in terms of time dedicated to sedentary behaviors can be useful for comprehending the factors associated with this circumstance.

Considering that SB has been treated as a public health problem, as it is a recent area of study and there is still a scarcity of data on SB in specific groups, this work focusing on adult women is justified in contributing to the knowledge about this condition and aiding in the implementation of strategies that minimize its adverse health effects. Therefore, the aim of the preset study was to analyze factors associated with sedentary behavior in adult women attending a university medical clinic.

II. Materials And Methods

This is a cross-sectional study with data collected from users of the Unified Health System (SUS) attending a university medical clinic. This study is part of a larger research project called "Sociodemographic, occupational, behavioral, and health aspects of users of a university medical clinic." The mentioned clinic is part of the healthcare network in the municipality of Aparecida de Goiânia, Goiás, providing care in 17 medical specialties.

The non-probabilistic sample consisted of women aged between 18 and 59 years who were followed up at the clinic, with data collection occurring between December 2023 and February 2024. Women over 59 years old, those using assistive devices for walking, and those with cognitive impairments preventing them from answering the questionnaire were excluded, based on the patient's medical record or reports from the patient or their companion.

The invitation to participate in the research was made verbally, and after clarifications, those who agreed to participate signed the Free and Informed Consent Form (ICF). As recommended by the National Health Council (CNS), the research was approved by the Ethics Committee of the University of Rio Verde (UniRV) under approval number 5.410.764 and Ethics Presentation Certificate (CAAE) nº 58117222.0.0000.5077.

A data collection instrument was used to gather information on sociodemographic (age, marital status, education, skin color, income, and if they had children), occupational (whether they work outside the home), behavioral, and health variables (smoking habits, alcohol consumption, physical activity, sedentary behavior, Body Mass Index (BMI), and medication use).

To assess the outcome of sedentary behavior (SB), the short version of the International Physical Activity Questionnaire (IPAQ) was used, specifically questions 4a and 4b regarding time spent sitting per day during the week and on weekends. The SB variable was calculated by multiplying the time spent sitting (hours/day) by five (for weekdays) + sitting hours on one weekend day multiplied by two. To calculate the average time, the result was divided by seven (equivalent to the number of days in a week). The cutoff point for high SB was set at six hours/day or more (Patterson et al., 2018).

Microsoft Excel version 2016 was used to build the database, and the analyses were carried out using the Stata version 13.0 statistical package (Stata Corp LP, College Station, TX, USA). Statistical significance was set at a p-value < 0.05. Descriptive analyses were presented as absolute numbers (n) and relative frequencies (%), along with the mean, standard deviation, and 95% confidence interval (CI). Poisson regression was used to calculate the prevalence ratio (PR) and 95% confidence interval (CI). The Wald test or Fisher's exact test was used in the bivariate analysis. Variables with a significance level of $p < 0.20$ in the bivariate analysis were included in the multiple Poisson regression analysis with robust variance.

III. Results

Table 1 presents the distribution of the sample considering sociodemographic, occupational, and behavioral variables. A total of 223 women attended a university medical clinic, with an average age of 40.85 ± 11.48 years. About 46.64% were married, 53.81% were of brown skin color, 53.60% had an income of 2 to 4 minimum wages, and 43.95% had completed high school. Only 29.60% of the women worked outside the home, and 78.92% had children.

Regarding behavioral variables, the majority (92.38%) were non-smokers, 53.81% consumed alcohol once a week, 64.13% practiced physical activity, and used some medication. Concerning the Body Mass Index (BMI), 69.50% were above the normal weight range, indicating some level of overweight, and of these, about 34.07% had some degree of obesity.

Regarding the level of sedentary behavior, 63.23% (n=141) had low sedentary behavior, and 36.77% (n=82) had high sedentary behavior.

Table 1. Prevalence of sedentary behavior in adult women attending a university medical clinic. 2024

Variables		**Sedentary behavior**	
	Total	**Low**	**High**
	Prevalence n (%)	**Prevalence n (%)**	
Age			
<40	93 (41.70)	49 (52.69)	44 (47.31)
≥40	130 (58.30)	92 (70.77)	38 (29.23)
Marital status			
single	75 (33.63)	44 (58.67)	31 (41.33)
married	104 (46.64)	67 (64.42)	37 (35.58)
widowed	7 (3.14)	5 (71.43)	2 (28.57)
divorced	34 (15.25)	24 (70.59)	10 (29.41)
others	3 (1.35)	1 (33.33)	2 (66.67)
Skin color			
brown	120 (53.81)	73 (60.83)	47 (39.17)
white	46 (20.63)	26 (56.52)	20 (43.48)
black	37 (16.59)	26 (70.27)	11 (29.73)
yellow	19 (8.52)	15 (78.95)	4 (21.05)
indigenous	1 (0.45)	1 (100.00)	0 (0.00)
Income			
1 minimum wage	89 (40.09)	64 (71.91)	25 (28.09)
2 a 4 minimum wages	119 (53.60)	71 (59.66)	48 (40.34)
5 or more minimum wages	14 (6.3)	5 (35.71)	9 (64.29)
Education level			
incomplete primary education	33 (14.80)	25 (75.76)	8 (24.24)
complete primary education	22 (9.87)	18 (81.82)	4 (18.18)
incomplete secondary education	28 (12.56)	12 (42.86)	16 (57.14)
complete secondary education	98 (43.95)	62 (63.27)	36 (36.73)
incomplete higher education	23 (10.31)	11(47.83)	12 (68.42)
complete higher education	19 (8.52)	12 (52.17)	6 (31.58)
Works outside			
no	157 (70.40)	93 (59.24)	64 (72.73)
yes	66 (29.60)	64 (40.76)	18 (27.27)
Has children			
no	47 (21.08)	19 (40.43)	28 (59.57)
yes	176 (78.92)	122 (69.32)	54 (30.68)
Smokes			
no	206 (92.38)	130 (63.11)	76 (36.89)
yes	17 (7.62)	11 (64.71)	6 (35.29)
Alcohol consumption			
does not drink	96 (43.05)	64 (66.67)	32 (33.33)
once a week	120 (53.81)	75 (62.50)	45 (37.50)
twice a week	5 (2.24)	1 (20.00)	4 (80.00)
three times or more a week	2 (0.90)	1 (50.00)	1 (50.00)
BMI			
underweight	5 (2.24)	4 (80.00)	1(20.00)
normal weight	63 (28.25)	37 (58.73)	26 (41.27)
overweight	79 (35.43)	50 (63.29)	29 (36.71)
obesity grade I	56 (25.11)	39 (69.64)	17 (30.36)
obesity grade II	16 (7.17)	10 (62.50)	6 (37.50)
obesity grade III	4 (1.79)	1 (25.00)	3 (75.00)
Physical activity			
no	80 (35.87)	52 (65.00)	28 (35.00)
yes	143 (64.13)	89 (62.24)	54 (37.76)
Use of medications			
no	80 (35.87)	93 (65.03)	50 (34.97)
yes	143 (64.13)	48 (60.00)	32 (40.00)

The bivariate analysis indicated a significant association of high sedentary behavior with: age < 40 years (p = 0.006); 5 or more minimum wages (p = 0.007); education level of incomplete secondary and incomplete higher education (p = 0.024); not having children (p = 0.000); drinking twice a week (p = 0.001) (Table 2).

Table 2 - Bivariate analysis of the association between high sedentary behavior and independent variables in women (N = 223).

Variable	**Sedentary behavior**	
	PR (95% CI)	**p-value**
Age		**0.006***
<40	0.62 (0.44-0.87)	
≥40	1	
Marital status		0.581*
single	1.45 (0.43-4.83)	
married	1.25 (0.37-4.14)	
widowed	1	
divorced	1.03(0.28-3.72)	
others	2.33(0.56-9.67)	
Skin color		0.332*
brown	1.86 (0.76-4.58)	
white	2.06 (0.81-5.25)	
black	1.41 (0.52-3.85)	
yellow	1	
indigenous	1.62 (1.89-0.01)	
Income		**0.007***
1 minimum wage	1	
2 a 4 minimum wages	1.44 (0.96-2.14)	
5 or more minimum wages	2.29 (1.37-3.83)	
Education level		**0.024***
incomplete primary education	1.33 (0.46-3.90)	
complete primary education	1	
incomplete secondary education	3.14 (1.22-8.08)	
complete secondary education	2.02 (0.80-5.10)	
incomplete higher education	2.87 (1.09-7.58)	
complete higher education	1.74 (0.57-5.26)	
Works outside		0.072
no	1.49 (0.96-2.31)	
yes	1	
Has children		**0.000***
no	0.52 (0.37-0.71)	
yes	1	
Smokes		0.897
no	0.96 (0.49-1.87)	
yes	1	
Alcohol consumption		**0.001***
does not drink	1	
once a week	1.13 (0.78-1.62)	
twice a week	2.40 (1.42-4.05)	
three times or more a week	1.5 (0.36-6.19)	
BMI		0.496*
underweight	1	
normal weight	2.06 (0.35-12.25)	
overweight	1.84 (0.31-10.89)	
obesity grade I	1.5(0.25-9.19)	
obesity grade II	1.88 (0.29-12.14)	
obesity grade III	3.75 (0.59-23.76)	
Physical activity		0.684
no	1	
yes	0.93 (0.64-1.34)	
Use of medications		**0.451**
no	1	
yes	0.87 (0.62-1.24)	

The Wald test was used for all p-values, except when the frequencies were less than five in each case, in which case Fisher's exact test was used.
*Significant association (p< 0,05).

The variables included in the multiple regression analysis according to each outcome are presented in Table 3. After the multiple regression analysis, having 5 or more minimum wages (p = 0.021), having incomplete

secondary education (p = 0.032), not working outside the home (p = 0.047), not having children (p = 0.003), and consuming alcohol twice a week (p < 0.000) remained associated with high sedentary behavior.

Table 3 - Multiple regression analysis of the association between high sedentary behavior and independent variables in women. (N=223)

Variable	Sedentary behavior	
	PR (95% CI)	**p-value**
Age		
<40	1.23 (0.85-1.77)	0.271
≥40	1	
Income		
1 minimum wage	1	
2 a 4 minimum wages	1.31 (0.87-1.98)	0.190
5 or more minimum wages	1.89 (1.10-3.23)	**0.021***
Education level		
incomplete primary education	1.51 (0.50-4.52)	0.459
complete primary education	1	
incomplete secondary education	2.98 (1.10 - 8.13)	**0.032***
complete secondary education	1.85 (0.70-4.89)	0.214
incomplete higher education	1.86 (0.68-5.04)	0.224
complete higher education	1.39 (0.47-4.16)	0.553
Works outside		
no	1.56 (1.01-2.41)	**0.047***
yes	1	
Has children		**0.003***
no	0.59 (0.42-0.83)	
yes	1	
Alcohol consumption		**0.001***
does not drink	1	
once a week	1.16 (0.83-1.62)	0.379
twice a week	2.52(1.67-3.81)	**0.000***
three times or more a week	0.76 (0.18-3.20)	0.711
PR: preavalence ratio, CI: confidence interval *Significant association (P < 0,05).		

IV. Discussion

This study demonstrated that among women attending a university medical clinic, the prevalence of high sedentary behavior was 36.7%. Similar data were found in research conducted in Iraq, where 33% of the participants spent at least eight hours a day sitting; and in research with adult women in a city in southern Brazil, where half of the sample spent about 4.5 hours a day in sedentary behavior (Shabu et al., 2024; Cafruni et al., 2020).

Although most reported regular physical activity, almost a third of the group was overweight, and another third had some degree of obesity. Individuals with overweight/obesity engage in less physical activity and spend more time sitting each day, and both conditions (overweight/obesity and sitting time) are associated with increased mortality and various chronic diseases (Patel et al., 2010; Van Der Ploeg et al., 2012). Moreover, in many cases, patients with overweight or obesity are unaware of their daily sitting time and the consequences of such behavior (Martinez-Ramos et al., 2015).

Some factors were associated with high sedentary behavior (SB) among the participants, raising concerns about potential adverse health outcomes. High levels of SB or prolonged sitting time are established risk factors for cardiometabolic diseases and all-cause mortality, and measures to reduce these behaviors have been recommended by various public health agencies (Biswas et al., 2015; Olson et al., 2023; WHO, 2020).

The detrimental effects of SB on health, which lead to chronic diseases and increased morbidity and mortality, are related to a decrease in the enzyme lipoprotein lipase (LPL), which can, in turn, increase the amount of fat in blood vessels, interfering with the uptake and absorption of insulin, glucose, and triglycerides (Cliff et al., 2016). LPL is also associated with muscle contraction, and when in a sedentary state, this enzyme is not adequately stimulated (Bey; Hamilton, 2003; Hamilton et al., 2008).

Changes in daily behavior patterns are recommended, such as introducing breaks in daily activities to interrupt or break long periods of sedentary behavior (SB). This way, the enzyme LPL is stimulated, increasing energy expenditure and reducing the harmful effects of SB on health (Benatti; Ried-Larsen, 2015; Cliff et al., 2016).

More recent epidemiological data indicate physical activity (PA) as an effect modifier for the association between SB and mortality, such that the harmful effects of high SB are more pronounced in physically inactive individuals (Katzmarzyk et al., 2019). A meta-analysis of individual data revealed that the effect of sedentary

time on all-cause mortality was greater among those with lower levels of PA compared to those with higher levels of PA (HR = 1.46 vs. 1.16, respectively) (Biswas et al., 2015).

Sociodemographic, economic, and behavioral factors have been related to increased sitting time, which is one way to assess sedentary behavior (SB). In this study, women with higher income had an 89% higher likelihood of exhibiting high SB compared to those with an income of only one minimum wage. These data corroborate the findings of a study conducted in Australia and another in Brazil, where the authors also demonstrated an association between SB and high income (Plotnikoff et al., 2015; Rocha, 2017). A different result was observed in research with users of the Family Health Strategy in Pernambuco, where those with a family income of less than one minimum wage had a higher likelihood of spending 6 hours or more per day sitting (Oliveira et al., 2020).

Regarding education, SB was higher among those with incomplete secondary education, confirming a study with 540 women in Iraq, where having a high school education or less was significantly associated with high SB. A study with 623 Brazilian women indicated that those with more than 8 years of schooling had a higher prevalence of sitting time (Suzuki; Moraes; Freitas, 2010). In the ELSA-Brazil study, high education levels were positively associated with SB in both men and women (Pitanga et al., 2018).

Women who did not work outside the home were more likely to exhibit high sedentary behavior (SB), with a 56% higher probability compared to those who worked. Some evidence suggests that there is a positive relationship between unemployment and increased time spent watching television, which may explain the results found (Bowman, 2006; Clark et al., 2011; Cafruni et al., 2020).

Not having children emerged as a protective factor against high SB. Although the literature does not discuss this relationship, such a finding can be understood from the perspective of marital status, as women without children may still be single; it could also relate to the younger age range of these women or a higher level of physical activity, suggesting that these women might have a more active lifestyle and less time available for sedentary activities (Shabu et al., 2024).

Interestingly, alcohol consumption was associated with the outcome, as women who consumed the substance twice a week had a 2.5 times higher probability of exhibiting high sedentary behavior (SB) compared to those who did not drink. A study conducted with university students demonstrated that when participants reported an additional hour of SB above normal, they also reported drinking for less time than usual (West et al., 2022). This is because if they engaged in SB during their free time, such as watching TV, reading, browsing the internet, and playing video games, these behaviors could promote alcohol consumption (Denniston et al., 2011). Similarly, the times when alcohol consumption typically occurs may encourage the adoption of SB, such as sitting with friends at a bar, during family gatherings, or even at home in solitude.

Our results highlighted important points that can be addressed to modify negative behaviors among women. Adhering to higher levels of physical activity (PA), regardless of intensity, along with a concomitant reduction in time spent in sedentary behavior (SB), directly contributes to lowering rates of premature mortality, with interdependence in the dose-response relationship (Ekelund et al., 2019). If this occurred, the proportion of preventable diseases would be almost comparable to that of smoking (Murray et al., 2019; Yusuf et al., 2020).

Recent WHO guidelines recommend that adults limit the time spent on sedentary behaviors and engage in 150 to 300 minutes of moderate to vigorous physical activity (MVPA) per week to mitigate the harmful effects of SB (Bull et al., 2020). An important aspect for better adherence among women to behavioral changes would be to enhance their understanding of sitting and non-sitting activities in their daily lives, to ascertain whether SB is greater in the workplace or at home, thereby enabling personalized interventions.

The findings of this study should be interpreted considering the inherent limitations of cross-sectional studies, namely the possibility of reverse causality bias. Additionally, it is important to note that sedentary behavior (SB) and physical activity (PA) were measured subjectively, using self-reported questionnaires, which may have led to errors and biases. On the other hand, a strong point of the study is that it assessed SB solely in women, as this focus is scarce in the literature; furthermore, it highlighted a region of Brazil that is still little explored in the literature.

V. Conclusion

The results indicated that the prevalence of sedentary behavior (SB) among women attending a university medical clinic was 36.7%. The majority were married, had completed secondary education, were of brown skin color, had an income of 2 to 4 minimum wages, worked outside the home, and had children. An income greater than five minimum wages, incomplete secondary education, not working outside the home, not having children, and consuming alcohol twice a week were factors associated with SB.

The findings of this research can guide the planning and implementation of more personalized recommendations regarding physical activity (PA) practices and the reduction of SB for the women served by the clinic in question. Furthermore, the data may contribute to a better understanding of SB and encourage health

professionals to include in their therapeutic plans the reduction of SB and the promotion of a more active lifestyle for all individuals.

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