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Alcohol consumption in later life: prevalence and associated risk factors

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Abstract

Background Alcohol is a legal substance, and its worldwide consumption reaches all population segments, including different social strata and age groups. In older adults, alcohol consumption represents a growing challenge for health management, as they are more susceptible to the effects of alcohol due to physiological processes. The aim of this study was to estimate the patterns of alcohol consumption and evaluate the risk factors associated with alcohol use in older adults.

Methods This cross-sectional study is a part of a cohort entitled "Living conditions, health, frailty and body composition of older adults: a cohort of the Older Adult/Goiânia Project" conducted in Goiânia in the Central-West Region of Brazil from July 2018 to March 2019. To assess the information about e alcohol consumption and patterns we used the Alcohol Use Disorders Identification Test (AUDIT). Participants were part of a second wave of a cohort study 221 older adults were interviewed and included in this study. The dependent variable was alcohol use in lifetime and the consumption patterns were low risk/no alcohol use (0–7), risky alcohol consumption (≥ 8) and binge drinking pattern was defined as drinking five or more alcoholic drinks on one occasion for a man, and four or more alcoholic drinks on one occasion for a woman. Bivariate and multiple logistic regression models and crude and adjusted odds ratios (OR) were calculated with their respective 95% confidence intervals.

Results Of the 221 participants, 14.9% reported alcohol use in the last year. When it comes to the consumption patterns, low alcohol consumption stands out (97.3%), and binge-drinking was observed in 1.8% of the sample. Masculine gender (Adjusted OR: 2.57; 95% CI: 1.36–4.88), secondary/higher educational level (Adjusted OR: 0.18; 95% CI: 0.05–0.68), and religion protestant/evangelical (Adjusted OR: 0.45; 95% CI: 0.23–0.89) were significantly associated with alcohol use.

Conclusions Alcohol consumption among older adults is a cause of concern, considering that even with a small percentage of risky and binge drinking, the problems in this population are significant due to biological, social, and emotional factors relating to population aging. Also, our results can contribute to the understanding of health behaviors in older adults, according to the heterogeneity of aging. Furthermore, it can also help to improve health actions for this age group development.

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Keywords Alcohol consumption, Alcohol use, Older adults

Introduction

Alcohol is a legal drug, with easy access, and good social acceptance [1]. Globally, more than 35 million people have problems related to the abuse of psychoactive drugs and more than 38% of the population over 14 years old consume alcoholic beverages at least once [2]. Furthermore, alcohol use has expanded to all population segments, reaching different social strata and age groups [2–4].

Alcohol consumption in later life constitutes a silent epidemic [5], which poses a growing challenge for healthcare management [3, 6]. The profile of alcohol consumption in older adults can be characterised in two ways, early onset and lasting throughout all stages of life until old age, or late onset in response, often to negative circumstances that occurred during life, such as retirement, divorce, or even the experience of mourning [7, 8].

Older adults are more susceptible to the effects of alcohol due to the physiological processes linked to senescence that potentiate its negative effects, such as reduction of total body water, use of medications that interact with alcohol, risk of falls, and the development of conditions that may be related or even exacerbated by alcohol use [4, 7, 9]. It is expected that the harm associated with alcohol among older adults will increase considerably, due to the growth of this population and alcohol abuse, thus affecting health, well-being, and healthy ageing [3, 6, 10], requiring attention and specific care measures.

Several studies on alcohol use have been conducted around the world, however, they are still focused on young people and adults, and little is known about the effects of alcohol on older adults [3, 4, 7, 11]. However, a 30-year cohort study with older adults showed that high, more than 196 g of alcohol, more than 14 drinks/week, consumption decreased, while lighter consumption, 1–98 g/week, reported as maximum 7 drinks/week, remained stable [11]. Binge drinking was already highly reported among older adults who were also more likely to use tobacco and illegal drugs compared to non-binge drinkers [12, 13]. And although there are studies on risk factors for alcohol consumption in ageing in Goiás [3, 14, 15], data on alcohol use in older adults are scarce.

To promote healthy ageing and support public health efforts, it's important to have a good understanding of the circumstances in which older adults consume alcohol and the factors linked to this behaviour in old age. Therefore, this study aims to determine the drinking patterns of older adults and analyse the risk factors associated with alcohol use in this demographic.

Methods

Study design

This is a cross-sectional study that is part of a cohort entitled "Living conditions, health, frailty and body composition of older adults: a cohort of the Older Adult /Goiânia Project", carried out in the capital of the State of Goiás, Goiânia, in the Central-West Region of Brazil. This project began in 2008 when the baseline (t1) was carried out. In 2018/2019, the second wave of the cohort (t2) was carried out, which comprises the target population of this study, composed of 221 participants. The methodological details have been described in previous publications [16–18].

Population and location

The present study was developed in the city of Goiânia, which is in the central region of Brazil. The city has an area of 729,296 km^2, with a total population of 1,555,626 inhabitants, with approximately 199,483 people aged 60 or older (IMB, 2021) [19]. Population from the second wave of the cohort (t2), carried out from July 2018 to March 2019, consisting of 221 older adults aged 70 or over, who survived the ten years follow-up and were located by the researchers to conduct a home interview.

At the time of the interview, all participants were screened by trained interviewers to ensure they had sufficient cognitive capacity to understand and respond to the questionnaire. Cognitive capacity was assessed based on temporal and spatial orientation (e.g., awareness of date, place, and personal information), comprehension of questions, and ability to provide coherent responses during the interview. When participants presented difficulties in comprehension or communication, a legally authorized representative assisted with objective health-related questions, in accordance with ethical procedures approved by the ethics committee [20].

Data collection

The data were collected by trained researchers at the individuals' residences. The participants were interviewed after they had read and signed the informed consent form. Data on sociodemographic characteristics, living and health conditions, functional capacity, and the need for and provision of care were collected. The main data collection took place after a pilot study.

Independent and dependent variables

The dependent variable used was alcohol use, and to define the variable the first question of the Alcohol Use Disorders Identification Test (AUDIT) [21] "*How often do you drink alcohol?*", which classifies consumption

as 0– never; 1– once a month or less; 2– two to four times a month; 3– two to three times a week; 4– four or more times a week. A dichotomous variable was created: (0) non-use, (1) alcohol use. The AUDIT has 10 questions and its score ranges from 0 to 40. The consumption patterns are divided into two categories: low risk/no alcohol use = 0–7 points in AUDIT and risky alcohol consumption = ≥ 8 points in AUDIT. The binge drinking pattern was defined as drinking five or more alcoholic drinks on one occasion for a man, and four or more alcoholic drinks on one occasion for a woman [22]. A dichotomous variable (0) no and (1) yes was created for alcohol use.

Sociodemographic characteristics were used as independent variables: sex (female or male), skin color (white or black/brown), age, marital status (lives with a partner, lives without a partner), income (in reais), education (categorised according to the Brazilian educational system and its classifications and levels of education: elementary education - equivalent to 9 years of study; living alone (yes or no), number of residents in the household, retired (yes or no) and religion (catholic or other). Regarding health conditions, the variables used were migraine (yes or no), smoking (yes or no), feeling of decreased strength in the last 12 months (yes or no), falls (yes or no). Depression was evaluated by the Geriatric Depression Scale (GDS-15) [23], a 15-item scale classified in 0–4: Normal, 5–8: Mild depression, 9–11: Moderate depression, 12–15: Severe depression. The variables satisfaction with health (satisfied or dissatisfied), perception of quality of life (good or bad), and satisfaction with sexual life (satisfied, neither satisfied nor dissatisfied or dissatisfied) were measured using questions from the World Health Organization Quality of Life (WHOQOL) [24].

Data analysis

The data were analysed using the R program, version 4.1.3. The normality of continuous variables was tested using the Shapiro-Wilk test. The qualitative and quantitative variables were presented in descriptive form. The prevalence of alcohol consumption and consumption patterns were estimated according to the AUDIT score (low-risk consumption/no use: 0–7; risk consumption ≥ 8) and their respective 95% confidence intervals. Bivariate and multiple logistic regression models and crude and adjusted odds ratios (OR) were calculated with their respective 95% confidence intervals. The OR was chosen as a measure of association because the study outcome has a small prevalence, so it does not overestimate the measurements [25]. The variables that presented a $p < 0.20$ in the bivariate analysis were included in the model, following the Backward method of entering variables into the model i.e., a model including all available independent variables and then iteratively removing the variables that contribute least to the model fit [26]. The model was chosen based on the Akaike Criterion (AIC) and the quality of model fit was assessed using the Hosmer-Lemeshow test. The Variance Inflation Factor (VIF) test was used to certify that the variables included in the final model did not present multicollinearity. In all analyses, significance levels of 95% ($p < 0.05$) were adopted.

Results

Table 1 presents the sample characteristics. 221 older adults were included in the study, among whom the majority were female (67.4%), white (61.5%), up to 79 years of age (57.9%), single, divorced, or widowed (54.7%), with an individual income of up to 1 minimum wage (56.6%) and family income above 1 minimum wage (84.2%). Most participants lived with up to 2 people in the household (50.2%), were retired (76.9%) and were Catholic (54.7%). Concerning their clinical and behavioural characteristics, the most frequent mobilities were systemic arterial hypertension (70.9%), followed by diabetes (33.2%), high cholesterol (19.1%), osteoporosis (17.4%), and cataracts (15.4%). Smoking was a common risk behaviour in 49.9% of the sample. Regarding self-perceived health, most participants (55%) reported being satisfied with their own health and the majority also reported being satisfied with their own sexual health (61.4%). Furthermore, all study participants presented depressive symptoms at some level, with 34.4% having severe depression. Frailty was present in 74.1% of the sample and 57.9% reported falls.

Figure 1 shows participants' alcohol consumption and drinking patterns. A prevalence of alcohol use of 14.9% was identified. A low alcohol consumption was the most prevalent pattern (97.3%). Binge drinking was observed in 1.8% of the sample.

In the bivariate analysis, significant associations between alcohol consumption and the variables gender, education, religion, and smoking were observed. The final model was adjusted for the variables gender, income, education, religion, smoking, and satisfaction with sexual life. However, only the variables gender, education, and religion were statistically significant, suggesting that older men (OR = 2.57; 95% CI = 1.36; 4.88; $p = 0.003$) are more likely to consume alcohol. Inversely, education was presented as a protective factor suggesting that individuals with secondary and higher education are 83% less likely to drink alcohol than individuals with no education (OR = 0.17; 95% CI = 0.05; 0.68; $p = 0.011$). Being from Protestant or evangelical religions reduced the odds of alcohol consumption by 48% (OR = 0.52; 95% CI = 0.29; 0.93; $p = 0.022$) (Table 2).

Table 1 Sociodemographic characteristics and perceptions and/or health conditions in the older adults. Goiás. Brazil, 2018

Variables	Total ($n=221$)	%	CI 95%
Gender			
Male	72	31.1	26.0; 38.3
Female	149	67.4	61.2; 73.6
Skin color			
White	136	61.5	55.1; 67.9
Black/brown	85	38.5	32.0; 44.9
Age (median, IQR)	221	78	74; 83
Marital status			
Lives with partner	100	45.2	38.7; 51.8
Lives without partner	121	54.7	48.2; 61.3
Income			
Up to 1 minimum wage	128	57.9	51.41; 64.42
> 1 minimum wage	93	42.1	35.58; 48.59
Education level			
Elementary School	122	55.4	48.8; 62.0
Secondary/higher education	24	11.0	6.7; 15.0
None	74	33.6	27.3; 39.9
Live alone			
Yes	182	82.3	77.3; 87.4
No	39	17.7	12.6; 22.7
Number of residents in the household (median, IQR)	221	2	2; 3.0
Retired			
Yes	170	76.9	71.4; 82.5
No	51	23.1	17.5; 28.6
Religion			
Catholic	121	54.7	48.2; 61.3
Protestants/evangelicals	100	45.3	38.7; 51.8
Satisfaction with the own health			
Satisfied	115	55.5	48.8; 62.3
Unsatisfied	92	44.5	37.6; 51.2
Perception of quality of life			
Good	125	60.4	53.7; 67.0
Bad	82	39.6	32.9; 46.3
Satisfaction with sex life			
Satisfied	124	61.4	54.5; 67.8
Neither satisfied nor dissatisfied	32	15.8	11.4; 21.5
Unsatisfied	46	22.8	17.5; 29.0
Migraine			
Yes	10	4.5	1.7; 7.3
No	210	95.5	92.7; 98.2
Smoking			
Yes	108	48.9	42.3; 55.4
No	113	51.1	44.5; 57.7
Depression			
Severe	72	34.4	28.0; 40.9
Mild	137	65.6	59.1; 72.0
Feeling of decreased strength in the last 12 months			
Yes	160	74.1	68.2; 79.9
No	56	25.9	20.0; 31.8
Falls			
Yes	93	57.9	51.4; 64.4
No	128	42.1	35.5; 48.6

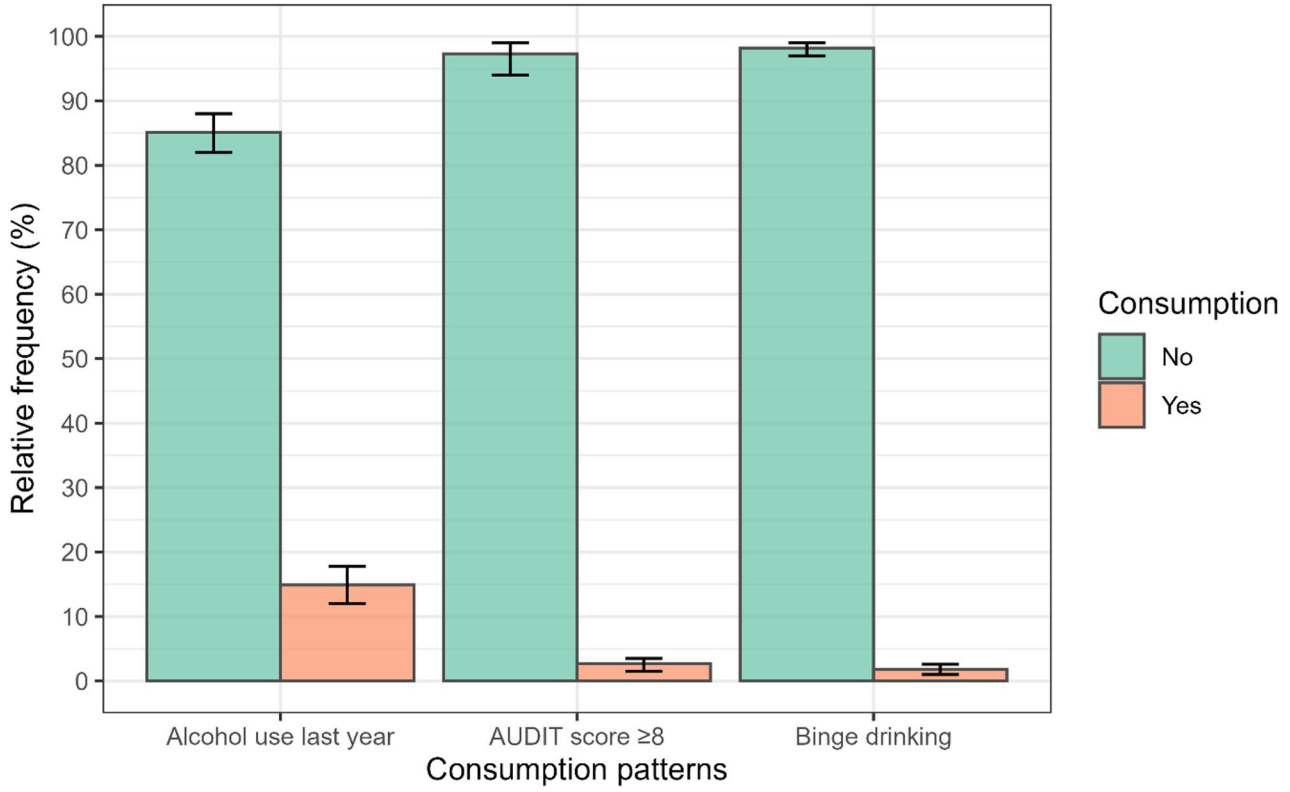

Fig. 1 Alcohol use consumption according to AUDIT in older adults ($n = 221$) in Goiás, Central Brazil, 2018–2019

Discussion

In the present study, an association was identified between alcohol consumption and male sex among older Brazilian adults. Interestingly, among individuals with better financial conditions and those who said they belonged to certain religious affiliations, there was a lower risk of alcohol consumption. These results provide valuable insights into a segment of the older adults, prompting contemplation on the factors influencing healthy ageing, self-care in old age, and their implications for society and health services.

The lack of consensus between the different screening approaches and diagnostic tools available highlights the complexity of assessing alcohol consumption among older adults [27]. In this study, we have adopted a multifaceted approach that considered three indicators to assess alcohol consumption patterns in older adults i.e., binge drinking, risky consumption (AUDIT > 8), and alcohol consumption in the last year, due to the importance of approaching this behaviour from different perspectives.

In this study 14.9% (95% CI: 10.8% – 20.2%) of the participants reported alcohol consumption in the last year. This rate was substantially lower than that recorded in the multicontinental project Aging Trajectories of Health: Longitudinal Opportunities and Synergies (ATHLOS), which investigated the relationship between alcohol consumption and healthy ageing in individuals aged 65 and older in 38 countries, identifying a rate of current alcohol consumption of 47.5% (95%CI: 47.2–47.7) [28]. In the Brazilian context, a household survey followed a similar trend, showing a prevalence of 26.5% (95%CI: 23.6–30.7) [6]. However, in the National Survey of older adults, a prevalence of only 9.4% (95%CI: 8.4–10.6) was identified [14], which is significantly lower than the data presented in this study.

Similarly, when analysing risky alcohol consumption behaviour in later life by the AUDIT screening test (> 8 points), we found a prevalence of 2.7% (95% CI: 1.3–5.8). This result is similar to the estimates found in Sweden, where the prevalence of risky consumption among older adults (≥ 65 years) was 2.1% (95% CI: 1.9–2.4) [29], and the results obtained in a population-based study in Brazil, which revealed a prevalence of 4.6% (95% CI: 3.9–5.3) [14]. These convergences highlight the consistency of the data and reinforce the importance of comprehensively addressing alcohol consumption among older adults. It is important to note that risky alcohol consumption was already associated with higher mortality due to cancer and cardiovascular disease [30].

Furthermore, the prevalence of binge drinking in our sample was 1.8% (95% CI: 0.8% – 4.6%). These results demonstrate a relatively lower prevalence than that observed in a study involving older North American

Table 2 Bivariate and multivariate analysis of factors associated with alcohol consumption by older adults. Goiás. Brazil, 2018–2019

Variables	Total (*n* = 221)	Alcohol consumption		OR crude (CI 95%)	*p*-value	OR adjusted (CI 95%)	*p*-value
		n	% (CI 95%)				
Gender							
Male	72	12	29.1 (18.6; 39.6)	0.21 (0.10; 0.46)	< 0.001	2.57 (1.36; 4.88)	0.003
Female	149	21	8.0 (3.6; 12.4)	Ref		Ref	
Skin color							
White	136	22	16.1 (9.9; 22.3)	1.29 (0.59; 2.83)	0.512		
Black/brown	85	11	12.9 (5.8; 20.0)	Ref			
Age (median, IQR)	221	33	77 (73; 81)	1.03 (0.96; 1.10)	0,331		
Marital status							
Lives with partner	100	17	17.0 (9.6; 24.3)	1.34 (0.64; 2.81)	0.434		
Lives without partner	121	16	13.2 (7.1; 19.2)	Ref			
Income							
Up to 1 minimum wage	128	14	10.9 (5.5; 16.3)	2.09 (0.98; 4.42)	0.053	1.25 (0.51; 3.06)	0.624
> 1 minimum wage	93	19	20.4 (12.2; 28.6)	Ref		Ref	
Education level							
Elementary School	122	17	13.9 (7.8; 20.1)	0.64 (0.25; 1.63)	0.356	0.85 (0.30; 2.42)	0.770
Secondary/higher education	24	9	37.5 (18.1; 56.8)	0.17 (0.05; 0.54)	< 0.001	0.18 (0.05; 0.68)	0.011
None	74	7	9.4 (2.8; 16.1)	Ref		Ref	
Number of residents in the household (median, IQR)	221	33	2 (2; 3)	1.10 (0.81; 1.48)	0.529		
Retired							
Yes	170	23	13.5 (8.3; 18.6)	0.64 (0.28; 1.45)	0.286		
No	51	10	19.6 (8.7; 30.5)	Ref			
Religion							
Catholic	121	24	19.8 (12.7; 26.9)	Ref		Ref	
Protestants/evangelicals	100	9	9.0 (3.4; 14.6)	0.52 (0.29; 0.93)	0.028	0.45 (0.23; 0.89)	0.022
Satisfaction with the own health							
Satisfied	115	20	17.4 (10.4; 24.3)	0.71 (0.32; 1.54)	0.391		
Unsatisfied	92	12	13.0 (6.2; 19.9)	Ref			
Perception of quality of life							
Good	125	22	17.6 (10.9; 24.3)	0.65 (0.29; 1.45)	0.295		
Bad	82	10	12.2 (5.1; 19.2)	Ref			
Satisfaction with sex life							
Satisfied	124	16	12.9 (7.0; 18.8)	0.64 (0.34; 1.19)	0.159	0.92 (0.45; 1.89)	0.830
Neither satisfied nor dissatisfied	32	6	18.7 (5.2; 32.2)	1.04 (0.46; 2.33)	0.913	0.86 (0.35; 2.11)	0.748
Unsatisfied	46	10	21.7 (9.8; 33.6)	Ref		Ref	
Smoking							
Yes	108	22	20.4 (12.7; 27.9)	2.37 (1.08; 5.16)	0.026	1.43 (0.77; 2.65)	0.248
No	113	11	9.7 (4.2; 15.2)	Ref		Ref	
Feeling of decreased strength in the last 12 months							
Yes	160	27	16.8 (11.0; 22.6)	1.69 (0.65; 4.34)	0.271		
No	56	6	10.7 (2.6; 18.8)	Ref			
Falls							
Yes	93	14	15.0 (7.7; 22.3)	1.01 (0.48; 2.14)	0.965		
No	128	19	14.8 (8.6; 21.0)	Ref			

OR Odds-Ratio, *95%: CI* 95% Confidence Interval

Parameters of the model: AIC: 164.75; Pearson goodness-of-fit: $\chi 2$: 9.579; *p*-value = 0.295

adults (9.0% CI 95%: 4.2–21.4) [31]. In the Brazilian context, our data also differed from the estimates from the Brazilian Longitudinal Study of Ageing (ELSI-Brazil), which found a prevalence of binge drinking of 6.7% (95%CI: 5.8–7.7) in individuals aged 60 or older [32], and the findings from Castro-Costa and collaborators (2008), who identified a consumption rate of alcoholic beverages of 10.4% (95%CI: 7.7–13.8) in the same age group [33].

The relationship between alcohol consumption and the older may be influenced by psychosocial factors that

become more complex with advancing age. Some older adults may turn to alcohol to stay connected to younger age groups or to seek positive sensations, especially when facing psychological distress [34].

However, behaviour related to alcohol consumption can be modified with advancing age, restricting consumption. This change may be influenced by the negative repercussions that alcohol consumption can cause health problems prevalent in older adults, as well as by the greater harmful effects of alcohol [35]. This transformation in behaviour related to alcohol consumption reflects the complexity of interactions between the ageing process and psychosocial factors in one's decision to consume alcohol.

Overall, it is important to recognise that alcohol misuse is a problem that can affect individuals of all ages, including the older population. Identifying risky consumption patterns among the older adults is a challenge, as it is common for them not to reveal their real consumption to health professionals, who may not be trained adequately to identify this behaviour [36, 37]. Furthermore, older adults may experience more subtle cognitive and physical changes as a result of alcohol use, which may be confused with other health problems or age-related changes, masking alcohol consumption [36, 38].

In this investigation, it was observed that alcohol consumption was associated with the male sex, as evidenced in other studies [29, 32, 39, 40]. This trend can be explained by cultural and social perception, as well as historical conditions that shaped the roles of gender, which attributes alcohol consumption to men, and the greater social disapproval of this behaviour in women, which persists into more advanced ages [41]. This result deserves attention, considering that men seek out health care services less, which can be an even greater barrier to identifying and managing risky consumption of alcoholic beverages, especially at older ages [39].

However, it was found that religion has a significant influence on low alcohol consumption. Many traditions and religious teachings discourage excessive alcohol consumption or even completely prohibit the use of alcohol, exerting a protective mechanism in addition to promoting healthier lifestyles [42]. Religion is an important resource for older care, as it can offer meaning to their existence, and comfort in situations related to the end of life, promoting a sense of well-being, happiness, participation in the community, a feeling of solidarity, and health [43]. In this way, religious support and social networks can also play a role in encouraging healthy behaviours and reducing risky alcohol consumption.

Considering the global movement towards healthy ageing, which reiterates the need for longer lives accompanied by functional maintenance [44], alcohol consumption in later life can compromise the well-being of individuals. The ageing process already causes changes in cognition, balance, and motor coordination, when added to alcohol consumption, the damage is even greater, with an increased risk of injuries and complications due to falls, in addition, given the greater consumption of medication in the older adults, the use of alcohol can interact with medications and trigger side effects. Also, compromised quality sleep can be recurrent in older adults who drink alcohol [45].

In the present study, no significant association was observed between income and alcohol consumption. Although having an income higher than one minimum wage showed a near-threshold p-value (p = 0.053), the odds ratio (OR: 2.09 [95% CI: 0.98 to 4.42]) indicates an increased likelihood of alcohol consumption among those with higher income, rather than a protective effect. This differs from a previous study that found excessive alcohol consumption among individuals aged 50 or over with higher income [46]. It is also important to highlight that the relationship between income and alcohol consumption can be dynamic and influenced by various factors, including sociocultural context, personal experiences, access to education, and health information [47]. Similarly, the economic stability provided by a higher income can play a crucial role in reducing financial stress, a factor that often contributes to alcohol abuse. Additionally, the financial security associated with retirement can eliminate concerns related to instability in the job market [48].

Although most older adults have annual medical consultations, the collection of information on behaviours related to alcohol consumption is usually limited [45]. Therefore, health teams that assist older adults must expand the history of the pattern of unhealthy alcohol consumption, discuss the impact of alcohol consumption on health, including the effect on sleep quality, risk of injuries, and chronic diseases, and review medications in use that are influenced by alcohol consumption, to guide older adults to reduce harmful alcohol consumption or even receive integrated care for specific treatment of alcohol dependence, if necessary [45, 49].

Limitations

The present study has some limitations. First, due to its cross-sectional design, it is not possible to infer causality or effects on the variables investigated. However, it is possible to explore the associations found. Furthermore, data collection on alcohol consumption was done through self-report, which can lead to information bias and "social desirability". This is because many participants may feel ashamed, afraid, or underestimate their alcohol consumption due to the social stigma associated with its use, which can result in inaccurate responses about their actual pattern of daily alcohol consumption.

Conclusion

The key findings indicate that older men are more likely to consume alcohol, while income and religious affiliations serve as protective factors in the older population's alcohol consumption behaviour. These data contribute to understanding health behaviours in old age, considering the heterogeneity of this population group. Therefore, they can contribute to public health policies towards this age group.

Abbreviations

AIC	Akaike Criterion
ATHLOS	Aging Trajectories of Health: Longitudinal Opportunities and Synergies
AUDIT	Alcohol Use Disorders Identification Test
CI	Confidence interval
OR	Odds-Ratios
VIF	Variance Inflation Factor
WHOQOL	World Health Organization Quality of Life

Authors' contributions

LSM: Formal analysis, conceptualization, methodology, writing–original draft (lead). WEAM: writing–review & editing (supporting). GOS: writing–review & editing (supporting). MB: writing–review & editing (supporting). BVDS: writing–review & editing (supporting). SAT: Data curation, Investigation, Formal analysis, funding acquisition, conceptualization, methodology, writing–original draft (lead), supervision. CCP: writing–review & editing (supporting). CO: writing–review & editing (supporting). EAS: writing–review & editing (supporting). VP: Data curation, Investigation, Formal analysis, funding acquisition, conceptualization, methodology, writing–original draft (lead). All authors approved the final version of the paper submitted.

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Data availability

The datasets used and analysed during the current study are available from the corresponding author upon request.

Declarations

Ethics approval and consent to participate

This study was approved by the research ethics committee of the Universidade Federal de Goiás (Protocol number. 2.358.818). All participants were informed about the study objectives and provided written informed consent.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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