ORIGINAL ARTICLE

Alcohol Use and Anxiety in Primary Health Care Patients During the COVID-19 Pandemic: a Phone-Based Study

Divane de Vargas[1] · **Erika Gisset Leon Ramirez[1]** · **Caroline Figueira Pereira[1]** · **Rosa Jacinto Volpato[1]** · **Sheila Ramos de Oliveira[1]**

Abstract

In March 2020, physical distancing and quarantine measures were implemented in Brazil, which may have affected the physical and mental health of the population. This cross-sectional study used a convenience sample and telephone-based interviews to identify anxiety symptoms and alcohol use patterns among 1,264 Brazilian primary health care (PHC) patients during the COVID-19 pandemic. The State-Trait Anxiety Inventory-State 6 and Alcohol Use Disorders Identification Test (AUDIT-C) questionnaires were used to assess anxiety symptoms and alcohol use patterns, respectively. According to the AUDIT-C results, the prevalence of harmful drinking was 38.5%. Those who reported that their alcohol consumption decreased during the pandemic had high scores on the AUDIT-C, indicating a moderate/severe risk of drinking. Moderate or severe anxiety was observed in 60.1% of participants. These results highlight the needs to assess the pandemic's consequences on the mental health of the population and to encourage the implementation of preventive approaches in PHC settings to address anxiety and harmful alcohol consumption.

Keywords COVID-19 · Anxiety · Alcohol · Primary health care · Mental health · Telephone-based survey

During the COVID-19 pandemic, several measures were adopted worldwide to reduce the spread of the virus, including social and physical distancing, mobility restrictions, and the restricted operation of health care facilities (Garcia & Sanchez, 2020). The broader consequences of these measures on mental health have increased rapidly worldwide (Mahase, 2020; Smith et al., 2020).

Anxiety, depression, increased alcohol and substance use, irritability, anger, insomnia, and an increased risk of suicide have been reported in various countries during this period (Mahase, 2020; Maulik et al., 2020; Petersen et al., 2020). Additionally, multiple psychosocial aspects that impact the lives of individuals, groups, and communities have also been reported (Otanga et al., 2021).

✉ Divane de Vargas
vargas@usp.br

1 São Paulo University, School of Nursing, Av. Dr Enéas de Carvalho Aguiar, 419, São Paulo, SP 05403-000, Brazil

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Brazil is among the countries most affected by COVID-19. Its first death due to COVID-19 was reported on March 17, 2020, 6 days after the World Health Organization (WHO) recognized the outbreak of COVID-19 as a pandemic. In March 2020, Brazil acknowledged the community transmission of the virus and enforced physical distancing and quarantine measures across its territories (Croda & Garcia, 2020).

Mental Health Consequences of the COVID-19 Pandemic

Most studies exploring the social restriction measures and their outcomes in the population have shown various negative effects, including disrupted routines, the loss of income, financial stress, health-related concerns, mourning, and fear, and highlighted these situations as risk factors for increased mental health problems in the affected countries (Alishah et al., 2021; Mahase, 2020; Petersen et al., 2020). Evidence also shows that depression, anxiety, and harmful alcohol use patterns have been commonly experienced during the COVID-19 outbreak (Ahmed et al., 2020; Bäuerle et al., 2020; Garcia-Cerde et al., 2021; Malta et al., 2020; Smith et al., 2020; Verma & Mishra, 2020).

Furthermore, anxiety can be worsened by excessive alcohol use, and individuals who suffer from various forms of anxiety often exhibit an increased tendency to consume alcohol to relieve their symptoms. This behavior then exacerbates their psychopathological symptoms and traps them in a vicious cycle (De Boni et al., 2020; Smith & Randall, 2012). This phenomenon seems to be consistent in screening results worldwide, which have shown that anxiety (Chodkiewicz et al., 2020; Pollard et al., 2020), stress, and depression (Avery et al., 2020; Grossman et al., 2020; McPhee et al., 2020) were the main predictors of increased alcohol consumption during the COVID-19 pandemic.

At the beginning of the pandemic, a decrease in the rate of alcohol use was observed. However, this finding was mostly due to the measures implemented in many countries as a part of which the operations of establishments selling alcohol were restricted (Garcia-Cerde et al., 2021; Kilian et al., 2021; Rehm et al., 2020). Subsequently, an increase in alcohol consumption was observed (Garcia & Sanchez, 2020), which probably emerged as individuals consumed alcohol as a coping mechanism in response to stressful life events arising due to the social restrictions (Rehm et al., 2020).

Due to the lockdown, some people who did not previously consume alcohol began to drink, and some people who used alcohol in a low-risk manner increased the amount and frequency of consumption (Grossman et al., 2020; Malta et al., 2020; Schmits & Glowacz, 2021). These findings are consistent with evidence showing an increased number of mentally unwell people, a worsening of existing psychiatric illnesses, and increased reports of new illnesses in previously healthy people (Haider et al., 2020) during the outbreak.

The pandemic's impact on the population is likely to continue long after the outbreak subsides (Maulik et al., 2020; Rogers et al., 2020), and its long-term consequences on mental health will be especially severe in regions of the globe with limited resources, such as Brazil (Mari & Oquendo, 2020), where mental health care deficits were evident even before the outbreak (Kola et al., 2021).

Therefore, conducting studies to identify the risk factors for developing mental disorders in various communities and settings in these regions would support the development of strategies to mitigate the impact of COVID-19 on mental health, including strategies for implementing systematic early screenings and interventions for mental health issues in PHC settings. Conducting such studies could aid efforts to monitor and report the rates of

anxiety and alcohol use during and after the pandemic with the aim of understanding the related behavioral changes and the current and long-term consequences of exposure to the measures adopted during this period.

Theoretical Perspective

Anxiety

Freud (1936) first described anxiety as a feeling of imminent and pressing danger. Researchers (Spielberger, 1972; Spielberger et al., 1983; Endler & Kocovski, 2001) have differentiated aspects of anxiety into state anxiety and trait anxiety. State anxiety can be defined as a transitory emotional state characterized by subjective feelings or tension related to adverse events (Spielberger et al., 1983). Trait anxiety can be defined as a more stable feature of a person in response to stress (Cattell & Scheier, 1961). In the present study, we investigated state anxiety in people who were facing a very stressful situation: the COVID-19 pandemic.

Alcohol Use

Alcohol use is manifested in several ways. Sometimes it is excessive and can cause damage to multiple aspects of human life (Babor et al., 2001). This type of alcohol use is influenced by various social determinants and environmental issues that can lead to stressful situations, as was the case during the COVID-19 pandemic (Singu et al., 2020).

Different patterns of alcohol use are defined by the WHO, including risky use and harmful use of alcohol. Risky use is defined as use that increases the chance of suffering negative consequences related to the use, while harmful use refers to use involving negative physical and/or mental consequences arising from the use (Babor et al., 2001). These definitions make the assessment of alcohol use more objective and comprehensive.

It is worthwhile to provide information to facilitate the development of and adjustments to public health policies to enable the development of prevention and treatment programs for individuals engaging in harmful alcohol use patterns and/or experiencing anxiety symptoms. This would reinforce the importance of PHC practitioners in helping patients to cope with emergency situations, such as those we are currently experiencing (Sarti et al., 2020). Therefore, this study aimed to identify anxiety symptoms and alcohol use patterns among PHC patients during the COVID-19 pandemic in Brazil.

Methods

Study Design and Sample

A cross-sectional design was implemented. Considering the difficulties associated with face-to-face interactions during the COVID-19 pandemic, a telephone-based interview was administered to a convenience sample of 1,264 individuals. Adults aged 18 years or older who had an appointment scheduled at a PHC facility and spoke Portuguese well enough to understand the interviewer's questions were included in the sample. This study was

conducted remotely from January to June 2020 with patients at five PHC facilities in São Paulo, Brazil.

Variables and Instruments

Telephone-Based Survey

The AUDIT-C was used to identify patterns of alcohol use. It is a simplified version of the Alcohol Use Disorders Identification Test and contains three questions with five response options (ranging from 0 to 4) with a maximum total score of 12. The classification varies by sex: for females, 0 to 2 = low risk, 3 to 5 = moderate risk, 6 to 7 = high risk, and 8 to 12 = severe risk; for males, 0 to 3 = low risk, 4 to 5 = moderate risk, 6 to 7 = high risk, and 8 to 12 = severe risk. The survey has been validated for use in Brazil for the identification of harmful alcohol use (Meneses-Gaya et al., 2010).

In addition to administering the questionnaire, participant perceptions regarding alcohol use, beverage preference, the number of standard drinks consumed, and shifts in alcohol use (both before and after the COVID-19 restrictions were implemented) were noted.

The State-Trait Anxiety Inventory-State 6 (STAI-S6) was used to assess the participants' anxiety symptoms. The STAI-S6 is a brief self-report scale used to gauge anxiety. It has been validated for use in the Brazilian population and has adequate reliability (0.90) (Fioravanti-Bastos et al., 2011). There are a total of six questions with four possible answers; the answers have values ranging from 1 to 4 and the total score can range from 6 to 24. The following cutoff points were established for the classification of anxiety traits: 6 to 10 = mild anxiety, 11 to 15 = moderate anxiety, and 16 to 24 = severe anxiety.

Furthermore, questions about anxiety triggers and the strategies used to address the symptoms of anxiety were asked. Once the screenings for anxiety and alcohol consumption were complete, the sociodemographic, clinical, and lifestyle information of the respondents was obtained through a form designed by the research team, which contained nine questions about race, marital status, educational attainment, occupational status, family income, physical activity level, previous illnesses, reason for making a PHC appointment, and issues related to the COVID-19 outbreak, such as COVID-19 infection status, prior hospitalization for COVID-19 treatment, and the deaths of family members/friends due to COVID-19 infection.

Procedures

Trained nurses made telephone calls to individuals who had appointments scheduled at PHC facilities within the previous 3 days and offered them the chance to participate in the study. After providing consent, those who accepted the offer responded to the questionnaires. The data were collected and managed using forms from the REDCap electronic data capture tool. The average length of the telephone interviews was 15 min.

Ethical Approval and Consent to Participate

This study was approved by the institutional review board of the university where the study was conducted. Proper informed consent was obtained from all the subjects using a verbal informed consent form, after which the participants' answers were recorded. Participation

was voluntary, and the participants were informed that they could withdraw from the study at any time.

Statistical Analysis

Data analysis was performed using R software. Frequencies, percentages, means, and standard deviations of the various variables were calculated. Comparisons between demographic variables and participants' anxiety levels and alcohol use patterns were performed using univariate tests including Fisher's exact test and the chi-square test for categorical variables and the Kruskal–Wallis test, Wilcoxon test with Holm correction, and Pearson's correlation test for numerical variables. The level of significance was fixed at 0.05.

We conducted linear regression analyses for the variables of age, sex, the presence of depression, alcohol use, the STAI-S6 anxiety score, race, marital status, educational attainment, occupational status, family income, physical activity level, the presence of hypertension, diabetes, cholesterol, and gastric issues, and the variables related to COVID-19; we used the least absolute shrinkage and selection operator method to identify the unique, significant predictors of anxiety and the problematic alcohol use.

Results

Out of 1,441 individuals, 88.1% agreed to participate in the study. The average age of the participants was 48 years ($SD = 16.4$). The largest proportion of respondents were women (62.3%) and single (38.6%). Those who had completed high school (36.7%), were employed (36.3%), had low family income (42.61%), and engaged in physical activity (43.1%) also represented significant proportions of the sample. Among the respondents, 11% had been diagnosed with COVID-19; of these, 16.5% had required hospitalization. Concerning other illnesses, 36.2% of the respondents reported high blood pressure, 20.3% reported gastric issues, and 19.9% reported diabetes. The most frequently reported mental disorders were generalized anxiety disorder (GAD; 23.3%), depression (14.5%), and bipolar affective disorder (BAD; 2.4%) (Table 1).

Anxiety Symptoms and Alcohol Use Patterns

The average score on the STAI-S6 was 12.4 ($SD = 3.8$). The largest proportion of participants experienced moderate anxiety (39.4%), followed by low anxiety (39.3%) and severe anxiety (20.7%). Of those identified as having moderate or severe anxiety, 72.6% perceived themselves as anxious. Most could identify the triggers for their anxiety, and COVID-19 was most commonly mentioned (39.5%), followed by financial problems (24.8%). When coping strategies for addressing anxiety symptoms were explored, listening to music, watching TV, and engaging in physical activity were most often reported (Table 2).

Alcohol consumption was reported by 43.6% of the participants. Table 3 describes the alcohol use patterns of the participants according to their AUDIT-C scores as well as their perceptions of the shifts in their alcohol consumption during the pandemic.

Table 1 Sociodemographic characteristics and COVID-19 information from primary health care service users during COVID-19 pandemic in São Paulo city, Brazil, 2021

Variável		n	%
Sex	Female	791	62.30
	Male	479	37.70
Race	Asian	18	1.44
	White	572	45.40
	Brown	483	38.31
	Black	171	13.67
	No information	26	1.18
Marital status	Cohabitation	226	17.91
	Married	335	26.55
	Separated	152	12.04
	Single	488	38.67
	Widower	61	4.83
	No information	8	0.62
Ocupação	Retired	227	17.99
	Unemployed	386	30.67
	Employee	459	36.37
	Student	14	1.11
	Freelancer	175	13.87
	No information	9	0.70
Family income*	A	832	65.50
	B	269	21.18
	C	35	2.75
	No information	134	10.55
Diagnosis of COVID-19	Não	1119	88.96
	Sim	139	11.04
Precisou internação	Não	116	83.45
	Sim	23	16.5
Internou em UTI	Não	19	82.61
	Sim	4	17.39
Perdeu familiar/amigo	Não	836	65.80
	Sim	406	31.90
	No information	28	2.23

*A: R$ 1.000–R$ 2.000; B: R$ 2.000–R$ 5.000; C: Up to R$ 5.000 ($ 1.00=R$ 4.20)

Anxiety Symptoms and Associated Variables

Various variables and the anxiety symptoms associated with them were explored in the study, including sex ($p=0.001$); the presence of some mental disorders such as GAD ($p=0.001$), BAD ($p=0.002$), and depression ($p=0.001$); the presence of gastric disease ($p=0.001$); having a relative or close friend diagnosed with COVID-19 ($p=0.004$); and having been diagnosed with COVID-19 ($p=0.001$). The participants' self-perception of anxiety ($p=0.008$), the number of hours of media (TV news/radio) consumption ($p=0.001$), and having financial or health problems as anxiety triggers ($p=0.001$)

Table 2 State-Trait Anxiety Inventory (STAI-6) classification, triggers, and coping strategies information from primary health care service users during COVID-19 pandemic in São Paulo city, Brazil, 2021

Variable		n	%
Anxiety level	Low	500	39.34
	Moderate	506	39.89
	High	264	20.77
Triggers			
Media excess	No	114	88.37
	Yes	15	11.63
Financial problems	No	97	75.19
	Yes	32	24.81
Health problems	No	109	84.50
	Yes	20	15.50
Unemployment	No	113	87.60
	Yes	16	12.40
COVID-19	No	78	60.47
	Yes	51	39.53
Coping strategies			
Physical exercise	No	107	82.95
	Yes	22	17.05
Excessive food	No	109	84.50
	Yes	20	15.50
Watching TV	No	99	76.74
	Yes	30	23.26
Listening music	No	95	73.64
	Yes	34	26.36

were associated with higher anxiety scores. Meanwhile, engaging in physical exercise ($p=0.008$) or breathing activities ($p=0.007$) as a coping strategy was associated with lower anxiety scores.

Alcohol Use Patterns and Associated Variables

Age was a statistically significant variable ($p=0.001$); older people reported decreased or unchanged alcohol consumption, while the use of alcohol increased in younger people. There was a significant negative correlation between the AUDIT-C score and age, such that the younger a person was, the higher his or her alcohol use score was ($R=-0.081$). Regarding sex, the statistical analyses indicated that the men's scores on the AUDIT-C were twice ($M=2.1$, $SD=2.9$) as high as those of the women ($M=1$, $SD=2.1$) ($p=0.001$). Occupational status was also related to elevated AUDIT-C scores ($p=0.001$), with participants in the student ($M=2$, $SD=2.9$) and employed ($M=1.6$, $SD=2.7$) categories having higher scores.

In addition, there was a statistically significant difference ($p=0.001$) between participants' AUDIT-C scores and their self-perception of having undergone a shift in alcohol consumption during the pandemic. Respondents who indicated that their alcohol consumption had increased during the pandemic had higher AUDIT-C scores ($M=5.9$, $SD=3.4$) than those who reported a decrease in alcohol consumption ($M=2.6$, $SD=2.7$) or an

Table 3 Characterization of alcohol use information from primary health care service users during COVID-19 pandemic in São Paulo city, Brazil, 2021

Variable	n	%
Alcohol use		
No	897	70.74
Yes	371	29.26
No information	2	0.15
Alcohol use in celebrations		
No	707	78.82
Yes	190	21.18
Risk alcohol use classification		
Low	345	61.50
Moderate	93	16.57
High	59	10.51
Severe	64	11.40
No information	7	1.24
Kind of drink		
Beer	252	70.99
Spirit	17	4.79
Distilled	37	10.42
Wine	49	13.80
No information	206	72.35
Change in consumption in the pandemic		
Increase	85	15.23
Decrease	210	37.63
Equal	263	47.13
No information	3	0.53

unchanged pattern of use ($M = 3.1$, $SD = 2.5$). However, those who had a self-perception of decreased alcohol consumption during the outbreak had scores that reflected a moderate/severe risk of problematic alcohol use in the AUDIT-C ($p < 0.000$).

Among the participants with mental disorders, the difference in the AUDIT-C scores was only significant among the participants with GAD ($p = 0.042$), which is reasonable since participants with anxiety tended to drink more ($M = 1.8$, $SD = 3$) to cope with their symptoms. The relationship between the AUDIT-C scores and the variables related to COVID-19 indicated that the participants who had been infected with COVID-19 and hospitalized for COVID-19 treatment had lower scores ($M = 1.08$ $SD = 2.17$) than those who had not been infected ($M = 2.54$, $SD = 1.44$) ($p = 0.047$).

Predictors of Anxiety Symptoms and Alcohol Use Patterns

Anxiety Model

The regression model was statistically significant, explaining 20% of the variance in anxiety symptoms. As shown in Table 4, some variables were predictors of high anxiety scores. These variables included sex; the presence of anxiety symptoms, depression, and gastric disease; occupational status; and some anxiety triggers, such as having been diagnosed with COVID-19 or having financial problems.

Table 4 Multiple linear regression predicting anxiety symptoms from primary health care service users during COVID-19 pandemic in São Paulo city, Brazil, 2021

	Estimate	SE	p value
(Intercept)	10.33	0.45	0.00
Anxiety (yes)	2.3	0.20	0.00
Depression (yes)	2.38	0.30	0.00
Occupation (unemployed)	0.90	0.25	0.03
Occupation (student)	1.80	0.97	0.22
Occupation (retired)	1.01	0.29	0.00
Gastric disease (yes)	1.19	0.26	0.00
Sex (female)	1.29	0.25	0.00
Lost someone with COVID	0.58	0.22	0.01
Triggers financial problem (yes)	1.32	0.21	0.04
Triggers unemployed (yes)	1.95	0.65	0.03
Triggers COVID (yes)	2.46	0.52	0.00
Alcohol use (yes)	0.52	0.23	0.02

Alcohol Use Pattern Model

The regression model was statistically significant, explaining 12.5% of the variance. Family income and anxiety scores were considered predictors with a positive effect; that is, the higher a person's score in the category was, the higher his or her alcohol use score was. In contrast, the older the person was, the lower their alcohol use score was. In addition, being married, having been infected with COVID-19, and having been hospitalized for COVID-19 were associated with lower alcohol use scores (Table 5).

Table 5 Multiple linear regression predicting alcohol use from primary health care service users during COVID-19 pandemic in São Paulo city, Brazil, 2021

	Estimate	SD	p value
(Intercept)	2.54	0.28	0.00
Sex (male)	1.18	0.14	0.00
Family income (A)*	0.48	0.17	0.00
Family income (B)**	0.71	0.20	0.00
Family income (C)***	9.09	2.37	0.00
Age	0.01	0.00	0.01
Previous anxiety (yes)	0.56	0.16	0.00
Current moderate/severe anxiety	0.04	0.02	0.01
Marital status (married)	−0.49	0.18	0.00
Marital status (single)	0.08	0.19	0.66
Marital status (separated)	−0.06	0.24	0.78
Marital status (widower)	−0.52	0.34	0.13
COVID-19 diagnoses (yes)	−0.46	0.22	0.04
Needed hospitalization (yes)	−0.79	0.64	0.22
Lost someone with COVID	0.05	0.18	0.05

*A: R$ 1.000–R$ 2.000; **B: R$ 2.000–R$ 5.000; ***C: Up to R$ 5.000 ($ 1.00 = R$ 4.20)

Discussion

This is one of the few studies conducted on a Brazilian sample regarding the prevalence of anxiety and problematic alcohol use during the COVID-19 pandemic. The results showed that the population had an overall high level of anxiety, as almost half of the participants had STAI-S6 scores indicating the presence of moderate or severe anxiety. This finding is unsurprising considering that studies from other countries have reported similar anxiety rates during the pandemic in populations without previous anxiety diagnoses.

Bäuerle et al. (2020) reported the presence of elevated GAD symptoms in approximately 45% ($n = 6748$) of the study population in Germany. In China, severe anxiety levels were observed in 11% ($n = 1837$) of individuals who were experiencing quarantine for the second time (Chen et al., 2021). A systematic review ($N = 26$) performed by Rodríguez-Fernández et al. (2021) found that factors such as the anticipated presence of mental disorders, youth, female sex, and not having income acted as precipitating factors that exacerbated or triggered anxiety, depression, and stress symptoms during the pandemic.

Additionally, Alishah et al. (2021) showed that high anxiety and depression levels in patients diagnosed with COVID-19 were associated with difficulties during the recovery period and increased mortality. The global situation regarding anxiety and the prevalence of poor mental health may be explained by the presence of psychological stress, various worries specifically related to the COVID-19 pandemic, and the social and economic consequences of the outbreak.

The regression analysis results demonstrated that sex; the presence of GAD, depression, and gastric disease; occupational status; and some anxiety triggers, such as having been infected with COVID-19 and having financial problems, were predictors of high anxiety scores, explaining 20% of the variance in anxiety symptoms. Additionally, participants' self-perception of anxiety symptoms and some common triggers, such as a fear of being infected with COVID-19, losing family members and friends, and worrying about financial problems, also showed a relationship with high anxiety levels.

Participants with severe anxiety levels in China reported that factors such as decreased income, activity restriction, and spending more time looking for news about COVID-19 caused confusion, mood declines, feelings of loneliness, and worse sleep quality (Chen et al., 2021), and those results corroborate our findings.

Evidence shows that the spread of communicable diseases and associated quarantine measures can have devastating psychological and socioeconomic consequences (Alishah et al., 2021). Therefore, it is relevant to consider prevention-oriented programs from a PHC perspective to identify the factors that may make individuals more vulnerable to infection and thus facilitate the development of effective coping strategies and programs to guarantee a minimum income for families experiencing catastrophic situations such as the COVID-19 pandemic.

Our results showed that few coping strategies were identified by the participants; however, those who reported using physical exercise or breathing activities as coping strategies had lower anxiety scores. People who maintained healthy behaviors, such as healthy eating, exercise, impulse control, and the ability to manage adverse events, showed positive results for the maintenance of mental health and well-being during a study carried out in Portugal (Sousa et al., 2021). This suggests that providing education on coping strategies can be useful in helping people manage and prevent anxiety in stressful and traumatic situations, such as those experienced during the COVID-19 pandemic. Such strategies can be systematically promoted in PHC facilities to address this phenomenon.

Elevated anxiety levels were associated with sex, indicating that anxiety scores tended to be higher among women. Anxiety scores were also higher in participants with mental disorders, such as GAD, BAD, and depression, consistent with the results of studies from other countries (Alishah et al., 2021).

Chinese men who were experiencing the phase of confinement/social isolation due to the increase in COVID-19 cases had higher levels of anxiety than Chinese women. In contrast, among people who were not in isolation, women were more anxious than men (Chen et al., 2021). During the pandemic, the role of women changed; with the switch to working from home and school closures, many women had their responsibilities increase in terms of caring for children and close family members who became ill. This phenomenon has contributed to extreme exhaustion, anxiety symptoms, and depression in women and has led to an increase in the consumption of psychoactive substances, including alcohol (Aldossari & Chaudhry, 2021).

In addition to the situational and contextual factors mentioned above, some physical factors have been found to be related to anxiety symptoms, including gastrointestinal problems. Addolorato et al. (2008) reported that most patients seeking a medical consultation for gastrointestinal problems also exhibited an associated affective disorder, such as anxiety, and that the prevalence of gastrointestinal diseases was directly correlated with state and trait anxiety. Additionally, poor health was associated with higher levels of anxiety (Chen et al., 2021).

Although increased alcohol use during the COVID-19 pandemic has been reported in many studies (Anderson et al., 2021; Bramness et al., 2021; Chodkiewicz et al., 2020; Pollard et al., 2020), the study participants were reluctant to declare their own alcohol use, and many of them reported their consumption only after the interviewer mentioned use on special occasions, such as family parties, festivals/carnivals, and birthdays.

This may be related to the stigma attached to substance use and the fact that the survey was conducted via telephone. Even after the interviewer stated that they were allied with the PHC service, the participants were ashamed to admit during a phone conversation that they drank. In some cases, they did not think that this information was important because they were unaware that their consumption habits could be considered harmful.

Cummins et al. (2021) described a person's "drinking self-identity" as a predictor of harmful alcohol use, specifically in individuals using alcohol in harmful ways who do not consider their use harmful.

The other results of this study corroborate this last suggestion, as many of the participants believed that their alcohol use during the COVID-19 pandemic had decreased, while their scores on the AUDIT-C indicated that they were at moderate or severe risk of harmful alcohol use. This finding could explain why many people do not seek help from PHC services and why it is difficult to identify harmful alcohol use patterns early in PHC settings.

A significant percentage of the participants were classified as having a moderate or severe risk of harmful alcohol use, suggesting that the alcohol use patterns of the Brazilian population may have become harmful during the pandemic, which is consistent with the research carried out by the Oswaldo Cruz Foundation in 2019 that showed an 18% increase in the population with a moderate or severe risk of harmful alcohol use (Fundação Oswaldo Cruz, 2020). Studies conducted in other countries have also highlighted this issue (Calina et al., 2021; Garcia-Cerde et al., 2021; Pollard et al., 2020).

With sample characteristics similar to those in our study, Jacob et al. (2021) found an increase in alcohol consumption and anxiety and depression symptoms in young individuals in the UK. Despite the comparable results, that study did not find an association between increased alcohol consumption and anxiety symptoms, while our study showed

this association. These results show that the COVID-19 pandemic has increased alcohol consumption and impaired mental health in a similar way globally.

In addition to the social and personal issues that may increase alcohol consumption, many issues related to social isolation, such as fear, increased anxiety, and loneliness, have been associated with increased alcohol use (Ahmed et al., 2020; Verma & Mishra, 2020). The regression analysis results from this study demonstrated that sex, family income, age, the presence of moderate/severe anxiety symptoms, marital status, having been diagnosed with COVID-19, having been hospitalized in the ICU, and having lost close family members or friends to COVID-19 explained 20% of the variance in alcohol use.

Sex-related differences in alcohol use have been historically documented (Verplaetse et al., 2021). However, women's health was especially impaired during the COVID-19 pandemic. Additionally, there is evidence of a high percentage of women engaging in harmful alcohol use (Barbosa et al., 2021; Kar et al., 2021) along with a high incidence of anxiety and depression in women during the COVID-19 pandemic (Connor et al., 2020; Thibaut & van Wijngaarden-Cremers, 2020).

As mentioned previously, the role of women changed during the pandemic, and they often used alcohol as a coping strategy to deal with feeling overwhelmed and exhausted because of excessive home- and work-related expectations. These factors contributed to their increased alcohol use. Another factor related to high levels of alcohol use was high family income, as participants with disposable income showed a tendency to engage in harmful alcohol use.

This is a logical relationship, considering that those who have abundant financial resources tend to have access to alcohol, especially during periods of social isolation, and many individuals increase their alcohol consumption while confined indoors. This finding suggests that revisions should be made to policies regulating alcohol purchases and sales in emergency health situations as an integrated action to prevent harmful alcohol use.

The harmful use of alcohol leads to behavior that favors the exposure to contagions and has been considered a risk factor for infection and complications related to COVID-19. Additionally, the presence of mental disorders and/or feelings of loneliness exacerbate or reinforce substance use for relief (Marel et al., 2021). Meanwhile, the relationships between low AUDIT-C scores and having received a COVID-19 diagnosis, having been hospitalized in the ICU, and having lost a close family member or friend to COVID-19 may be explained by the relationship between illness and drinking. Accordingly, many individuals who experienced chronic or severe illness indicated a shift in their perceptions of the disease process and their lifestyle habits (Favoreto & Cabral, 2009), which includes harmful alcohol use patterns. This finding suggests that an experience with illness during the COVID-19 pandemic prompted a protective mechanism, encouraging a reduction in alcohol consumption.

Limitations

Despite the epidemiological contribution of this study, some limitations should be noted. This research was performed in the context of five PHC settings in the metropolitan area of São Paulo, so generalizing the results to the entire Brazilian population is not possible. The use of short surveys by the interviewers due to the fast pace of telephone interviews might have led to the underestimation or minimization of the influence of some factors; therefore, using more complete, longer, and more detailed tools in future studies could yield more detailed responses. Thus, the methodological design did not allow for a deep theoretical analysis of the

important relationships identified among the variables, and the authors suggest continuing the research with mixed-methods studies.

Implications

The identification of patterns of anxiety and alcohol use during the pandemic provides an understanding of the mental health of PHC patients. These insights can guide the interventions provided by health professionals, such as the inclusion of screening for anxiety and alcohol use during routine PHC visits. The screening for anxiety and alcohol use can be performed face-to-face at the health facility or through the use of technologies, such as the telephone, online photovoice (OPV), and mobile apps. The use of OPV in research has increased because it provides information regarding the factors associated with alcohol use and anxiety symptoms through a qualitative approach. Overall, this study showed the need for the inclusion of technologies to improve population mental health through health education and to improve the quality of data collected through a mixed-methods approach in health care settings.

Conclusions

The COVID-19 pandemic has had important consequences for the mental health of Brazilians. The results of this study showed that the prevalence of anxiety symptoms and harmful alcohol use among patients seeking treatment in PHC settings during the COVID-19 outbreak was high and that the relationship between these issues and socioeconomic and demographic factors was significant.

The data conveyed information that could be important in identifying constructive ways of responding to the consequences of the pandemic on the mental health of the population and providing support for the development of strategies for the assessment and prevention of crisis situations.

The results of this study recommend the implementation of more research to continue monitoring alcohol use and anxiety symptoms in PHC patients during and after the COVID-19 pandemic. They also suggest the execution of intervention studies on COVID-19 and the increases in anxiety and alcohol consumption during the pandemic period. The results of such studies will be important for improving health care practitioners' understanding of the effects of COVID-19 on the mental health of the population.

Declarations

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