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PREVALENCE AND ANALYSIS OF THE CORRELATION BETWEEN ALCOHOL USE AND E-CIGARETTES AMONG MEDICAL STUDENTS

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ABASTRACT

Alcohol and e-cigarette consumption among medical students has raised growing concerns due to their detrimental effects on physical and mental health and impacts on academic outcomes. For this purpose, this cross-sectional observational study was carried out to investigate the prevalence and correlation mentioned above among students of a University of Medicine in the Baixada Fluminense. A total of 389 questionnaires were obtained, with a prevalence of alcohol use and alcohol and e-cigarette use of 78.1% and 10.1%, respectively. A significant correlation was identified between the use of both substances and an OR of 12.321 (95% CI) p-Value 0.0003. In addition, 17% of students are at high risk of alcohol dependence, according to the AUDIT score. Still, the findings suggest that students are more likely to use alcohol with course progression due to academic stress. Thus, preventive and educational measures are recommended to improve the quality of life of students and protect them from risky behaviors.

Keywords: Students. Electronic cigarette. Alcohol Consumption in College. Medicine.

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INTRODUCTION

The use of substances, such as alcohol and tobacco, has become a major public health problem, as it is associated with disability risks, preventable deaths, and even crime. It is notorious that electronic cigarettes have emerged as a new phenomenon recently, particularly among young people. As demonstrated by several studies, many young people try the devices without ever having smoked before and later develop nicotine dependence, given their great capacity to deliver the substance compared to conventional cigarettes. This poses a significant threat to current tobacco control policy, as the misconception is that e-cigarettes are safe. (DL; LY; K, 2018) (CANDIDO et al., 2018; JERZYŃSKI et al., 2021)

Alcohol is also common in all age groups. Although its consumption occurs in a social context, excessive intake has biological, social, and psychological consequences in the short and long term. It is estimated that about 38% of the world's adults drink, on average, 17.2 liters of pure alcohol per year. Alcohol associated with e-cigarette abuse is a common problem among college students, especially medical students, being fueled by moral pressure imposed by academics and societal. (CANDIDO et al., 2018; FRENCH; MARTINS; ESPINOSA, 2019; YOO; CHA; LEE, 2020)

Research shows that alcohol use among high school or college students is affected by factors such as "not living with family." One in six students have smoked e-cigarettes and alcohol, starting in high school, which can also lead to harmful patterns of use over time. Therefore, demarcating the profile and prevalence of alcohol and e-cigarette use among students is important for the development of preventive measures. (DE ANDRADE et al., 2021; FRENCH; MARTINS; ESPINOSA, 2019; GOMES et al., 2018; HERRERO-MONTES et al., 2022; MARTINS et al., 2023; PEREIRA et al., 2024; YOO; CHA; LEE, 2020)

Twenty-four percent of students in the Netherlands consume alcohol riskily, compared to 10% of adults in the same place. College medical students have similar behavior patterns and experience higher levels of stress than people in the same age group as their cohort in the general population. In addition, the number of adults using e-cigarettes increased from approximately 58.1 million in 2018 to 68 million in 2020 and 82 million in 2021. This equates to a 42% increase in just 5 years. Drinking alcohol is allowed from the age of 18 in Brazil, where young people at this stage begin to study and have more social interactions, which explains their considerable alcohol consumption profile. The

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use of alcohol and e-cigarettes among medical students was intense. Significant correlations were found between alcohol use and family homelessness and age. The high workload and content of the medical course have a negative impact on quality of life and influence alcohol consumption and smoking. E-cigarettes are seen as chic and highly technological, something that deserves attention when considering their widespread use among medical students and ignorance about the long-term side effects of e-cigarettes. (JERZYŃSKI et al., 2021; JERZYŃSKI; STIMSON, 2023) (FREIRE; DE CASTRO; PETROIANU, 2020; HERRERO-MONTES et al., 2022; MATOS et al., 2024; WASFI et al., 2022)

There is also an apparent connection between e-cigarette use and alcohol consumption. Findings have proven the relationship between e-cigarette use and alcohol use among young people. This connection has already been suggested to medical students in relation to smoking and alcohol use. However, it is possible to add that the simultaneous practice of these two substances as a coping mechanism for academic stress, since this issue was not discussed in the studies consulted. Many people are drawn to vape by the stylized image and social ease of the process and are not fully informed about the problems with this practice. The relationship of e-cigarettes to alcoholic ingredients suggests that this may also be influenced considerably by high academic stress, another disjunctive variable for medical education. This corroborates the arguments that there is sufficient evidence to consider the development of intervention tactics to raise awareness on the subject urgent, also and especially among medical students. (FREITAS; MARTINS; ESPINOSA, 2019; PEREIRA et al., 2024) (GAJDA et al., 2021; LACERDA BARBOSA et al., 2013; MATOS et al., 2024; PEREIRA et al., 2024; TZORTZI et al., 2020)

Therefore, this study aimed to determine the prevalence of alcohol and e-cigarette consumption among medical students. Also, to analyze the differences in consumption throughout the course, to identify factors related to the use of these substances and to verify the hypothesis of correlation between the use of electronic cigarettes in alcohol users.

METHODOLOGY

This is an observational, cross-sectional study analyzing the prevalence of alcohol and e-cigarette consumption among medical students at a university in the Baixada

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Fluminense. The sample consisted of students regularly enrolled in medical school from the 1st to the 12th period and aged 18 years or older. Those who refused to sign the Informed Consent Form were excluded. Data collection was carried out through a structured and validated questionnaire sent to participants through the Google platform. This section consists of 3 sections, the first related to the socioeconomic part, the second section is composed of the AUDIT questionnaire - *Alcohol Use Disorders Identification Test* (Questionnaire developed by the WHO to identify problems associated with alcohol consumption) and the third section is related to the consumption of electronic cigarettes, using part of the GATS - *Global Adult Tobacco Survey* questionnaire also from the WHO in its Global Research Program on Tobacco in Adults. (BALLESTER et al., 2021; "Noncommunicable, Disease, Surveillance, Monitoring and Reporting", [s.d.])

The inclusion criteria for participation in the project by answering the questionnaire were: being 18 years old or older, being enrolled in the medical course at Universidade Iguaçu - Campus 1, attending any period of the course (from the 1st to the 12th) during the time the questionnaire was collecting answers. All cases that did not fit the previous criteria were excluded from the study.

After tabulating the data, an exploratory analysis was performed, using measures of central tendency and dispersion for continuous variables, and analysis of absolute and relative frequencies for categorical variables. To correlate alcohol consumption and e-cigarette use and the variables sex, marital status and household status, the odds ratio (OR) values were estimated with 95% confidence intervals and respective p-values.

Considering the theme, this study is subject to false response bias, emphasizing, in order to minimize it, the guarantee of anonymity to all participants.

This study was approved by the Research Ethics Committee (CEP), CAAE: 75073023.7.0000.8044, in compliance with Resolution No. 466, of December 12, 2012, of the National Health Council (CNS).

RESULTS

A total of 389 responses were obtained, with a greater participation of women 244 (63%) and students under 25 years of age 172 (44.2%), it is also possible to observe a percentage of more than 30% of students over 30 years of age. (Table 1).

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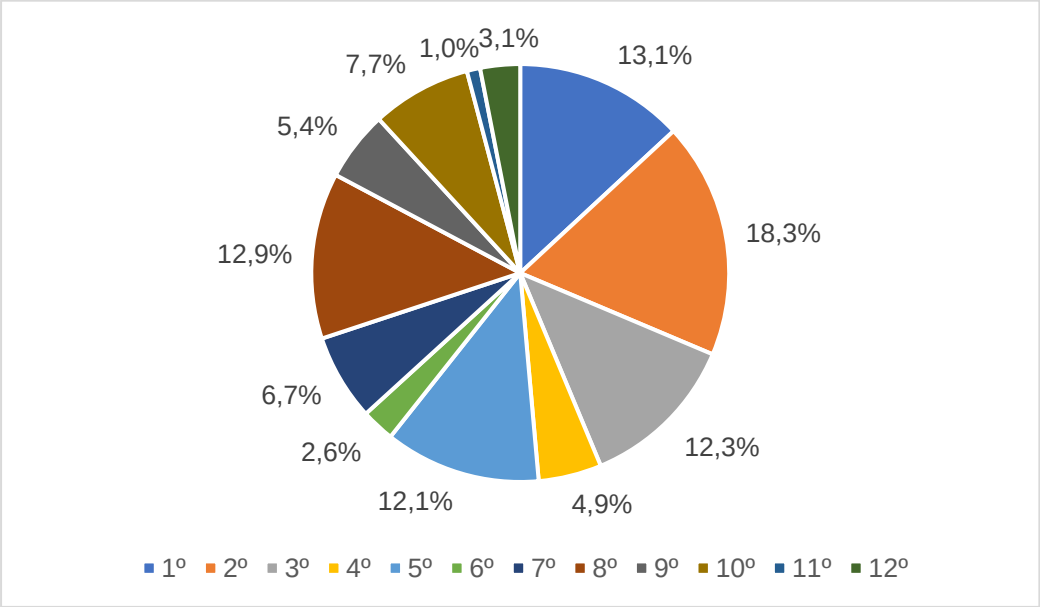
Table 1 – Distribution of the sample group by age group and sex

Age group	Sex				Total	
	Male		Female			
	n	%	n	%		
< 25	64	16%	108	28%	172	44,2%
25 |- 30 months	22	6%	62	16%	84	21,6%
30 |- 35 years	19	5%	25	6%	44	11,3%
35 |- 40 months	18	5%	23	6%	41	10,5%
40 |- 45 years	14	4%	16	4%	30	7,7%
≥ 45	8	2%	10	3%	18	4,6%
Total	145	37%	244	63%	389	

Source: Authorship

The distribution of participation between the periods was reasonably homogeneous with some discordant periods, such as 2nd (highest percentage per period), 6th and 11th had the two lowest percentages per period (Graph 1).

Graph 1 – Distribution of the sample group by period



Source: authorship

The prevalence of alcohol consumption alone was 68.1% of the sample of 389, and of e-cigarettes alone was 0.3%, with only 1 participant claiming to use such a device and not alcohol (Table 2).

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Table 2 – Distribution of alcohol and e-cigarette consumption separately by housing situation and marital status.

Housing Situation	Alcohol Only						Just Electronic Cigarette						Total
	Solt		Cas		Out		Solt		Cas		Out		
	n	%	n	%	n	%	n	%	n	%	n	%	
Alone or students	53	13,6%	3	0,8%	8	2,1%	1	0,3%	0	0,0%	0	0,0%	65
With Parents	97	24,9%	1	0,3%	1	0,3%	0	0,0%	0	0,0%	0	0,0%	99
Spouse and/or children	16	4,1%	75	19,3%	5	1,3%	0	0,0%	0	0,0%	0	0,0%	96
Other	6	1,5%	0	0,0%	0	0,0%	0	0,0%	0	0,0%	0	0,0%	6
Total	172	44,2%	79	20,3%	14	3,6%	1	0,3%	0	0,0%	0	0,0%	266

Source: authorship

A prevalence of 10.1% of individuals who use drugs concomitantly and 21.6% of students who do not use one or the other was also observed (Table 3).

Table 3 – Distribution of concomitant alcohol and e-cigarette consumption and non-consumption by housing situation and marital status.

Housing Situation	Alcohol and Electronic Cigarettes						Do not use						Total
	Solt		Cas		Out		Solt		Cas		Out		
	n	%	n	%	n	%	n	%	n	%	n	%	
Alone or students	9	2,3%	0	0,0%	0	0,0%	26	6,7%	0	0,0%	3	0,8%	38
With Parents	25	6,4%	0	0,0%	0	0,0%	34	8,7%	1	0,3%	1	0,3%	61
Spouse and/or children	1	0,3%	3	0,8%	0	0,0%	1	0,3%	12	3,1%	0	0,0%	17
Other	1	0,3%	0	0,0%	0	0,0%	4	1,0%	1	0,3%	1	0,3%	7
Total	36	9,3%	3	0,8%	0	0,0%	65	16,7%	14	3,6%	5	1,3%	123

Source: authorship

Single individuals had a higher prevalence of alcohol (53.5%) and e-cigarette (9.6%) consumption (Table 2). In addition, more than 10% of the sample reported smoking e-cigarettes when consuming alcohol (Table 3), corroborating the hypothesis of an association between the use of the two substances.

Fisher's exact test was performed to evaluate the association between the use of electronic cigarettes in students who already drink alcohol, and OR (95% CI) = 12.321(9.912 – 14.730), p=0.0003 (Chart 1) was identified.

Chart 1 – Fisher's Exact Test

Groups	N (groups)	Use electronic cigarettes - n(%)	Fisher OR test (95% CI)		p-value
Uses Alcohol	304	39 (10,02%)	12,321 (9.912 - 14.730)		0,000392
Does not use alcohol	85	1 (0,25%)			
Total	389	40(10,27%)		-	-

Source: authorship

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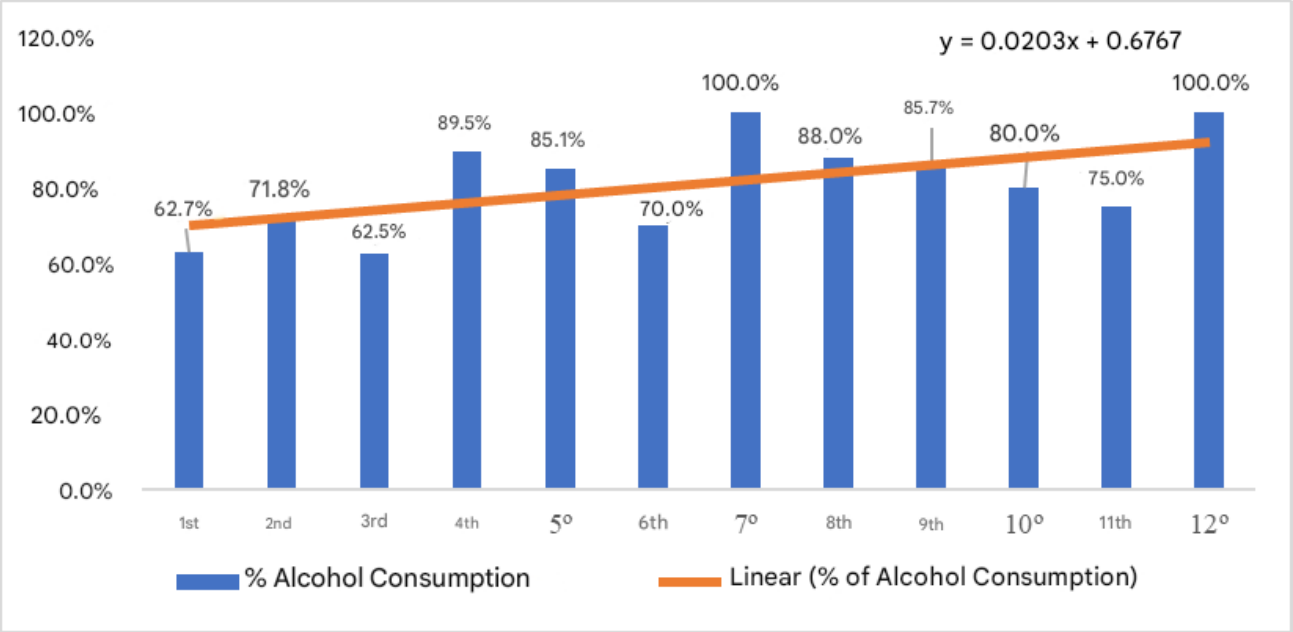
The distribution of alcohol consumption over the course periods showed a positive trend line (Graph 2).

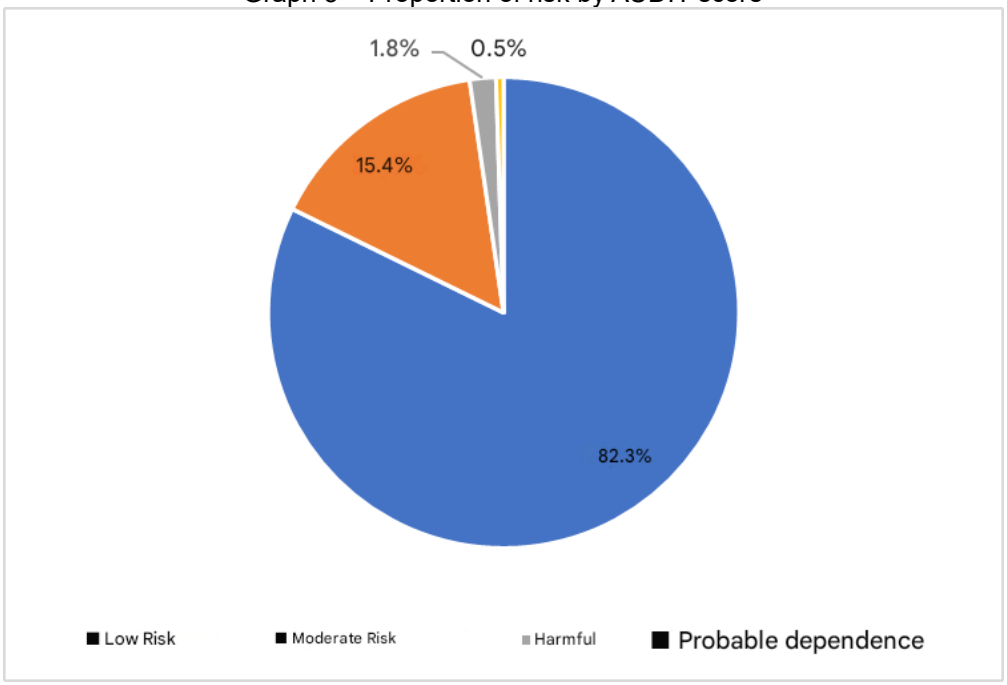
Graph 2 – Distribution of Alcohol Consumption by Period and Trend Line



Source: authorship

The AUDIT score assessment revealed that approximately 17% of students have a moderate to severe risk for alcohol dependence (Graph 3).

Graph 3 – Proportion of risk by AUDIT score



Source: authorship

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Finally, it was also observed that a higher percentage of male individuals fit into the AUDIT consumption profiles of Moderate to Harmful, 10.2%, however, the consumption profile of Probable dependence was composed of female individuals, 0.5% (Table 4).

Table 4 – Distribution of consumption profile and gender of the AUDIT tool

Consumption Profile	Sex				Total
	Male		Female		
	n	%	n	%	
Low Risk	105	27,0%	215	55,3%	320
Moderate Risk	34	8,7%	26	6,7%	60
Harmful	6	1,5%	1	0,3%	7
Probable dependence	0	0,0%	2	0,5%	2
					389

Source: authorship

DISCUSSION

The present study presented relevant data for the discussion of the increased prevalence of alcohol and e-cigarette consumption and also the hypothesis of association between these drugs. It was observed that 78.1% of the interviewees consumed alcohol and approximately 10% alcohol together with electronic cigarettes or only electronic cigarettes (Tables 2 and 3), considering that only 0.25% of the sample claimed to use only vape (Table 2). These results converge with the literature, indicating that the use of electronic cigarettes is less prevalent than the use of alcohol among students. However, there are still no studies in the literature about the possible association with the use of both (CANDIDO et al., 2018; FRENCH; MARTINS; ESPINOSA, 2019; HERRERO-MONTES et al., 2022; MARTINS et al., 2023; PEREIRA et al., 2024; SCAPIM et al., 2021) drugs in students. (PEREIRA et al., 2024)

According to the result, 17.1% of the students had a moderate to severe risk of alcohol dependence, based on the AUDIT tool. This result is still below some studies conducted in England, Norway and Finland, in which the percentage ranged from 25% to 42%, with greater emphasis on males, which could also be observed in the present study (Table 4).

Biologically, men tend to metabolize alcohol differently than women, resulting in a higher tolerance over time, which may encourage higher drinking patterns. In addition, social norms that associate masculinity with alcohol consumption exacerbate this predisposition, especially in high-pressure university and professional contexts, such as medical school. Data show that men are more vulnerable to alcohol-related risk behaviors,

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including alcohol abuse and dependence, reinforcing the need for specific intervention strategies for this population.Thus, there is a need to implement preventive policies and campaigns among this population that is usually under great stress. (HENDRIKS, 2020; WHITFIELD; STARMER; MARTIN, 1990) (GUIMARÃES et al., 2010; HENDRIKS, 2020; SINCLAIR et al., 2019)

In addition, the trend in graph 2, which expresses a positive inclination in alcohol consumption with the progression of the course periods, suggests that, with more time in the course, students are possibly subjected to greater pressures and responsibilities, either of the course itself, or of the expectations with the arrival of the end of the course.

The probability test showed a statistically significant correlation between electronic cigarettes and alcohol consumption . An OR of 12.321 (9.912 - 14.730) and a p-value of 0.000392, strengthening, once again, the hypothesis that alcohol users are more likely to use cigarettes than electronic cigarettes than non-alcohol users . The literature still lacks further studies on this association.

Other studies mentioned in the literature, such as *Jerzyński et al*. and *Scapim et al*., support these findings and conclude that e-cigarette consumption is increasing rapidly among young people. It was found that the increase in Brazilian standards reflects the global reality with increasing uses of electronic cigarettes, especially in those who already consume alcohol. According to the data, almost half of the singles, 53.5%, report alcohol use, while 9.6% report experience with electronic cigarettes (Tables 2 and 3). Such a finding can be justified by social and emotional factors that involve the university environment, where social life without multigenerational responsibility forces one to assume such intense standards. (JERZYŃSKI et al., 2021; JERZYŃSKI; STIMSON, 2023; SCAPIM et al., 2021) (CANDIDO et al., 2018; DE ANDRADE et al., 2021; SCAPIM et al., 2021; TZORTZI et al., 2020; WASFI et al., 2022)

According to the AUDIT analysis, cigarette consumers among future doctors need to be monitored more intensively, as some are at high risk of developing addiction to the substance. Thus, preventive actions should be directed to teaching and education programs about alcohol and the use of electronic cigarettes.

CONCLUSION

The study contributes substantially to point out the need to direct individualized preventive measures based on behavioral findings. However, longitudinal studies are

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needed to confirm possible associations between the observed consumption patterns and the different social aspects considered here, allowing the development of intervention proposals that can effectively contribute to reducing the frequency of these habits among young and future physicians.

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