

ALCOHOL CONSUMPTION AND MAXILLOFACIAL FRACTURES IN TIMES OF COVID-19: A CROSS-SECTIONAL STUDY IN A CUBAN UNIVERSITY HOSPITAL.

Consumo de alcohol y fracturas maxilofaciales
en tiempos de COVID-19: un estudio transversal
en un hospital universitario cubano

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ABSTRACT:

Introduction: The consumption of alcoholic beverages reduces the body's ability to deal with dangerous situations and exposes people to trauma.

Objective: To determine the association between the consumption of alcoholic beverages and the characteristics of maxillofacial fractures treated at a Cuban university hospital in the context of COVID-19.

Material and Methods: An observational, analytical, and cross-sectional study was carried out in the Maxillofacial Surgery unit at the "Carlos Manuel de Céspedes" General University Hospital during the year 2020. Prevalence ratios, 95% confidence intervals and *p*-values were obtained using generalized linear models.

Results: In 58.23% of the cases, fractures were related to the consumption of alcoholic beverages. The fundamental etiology was interpersonal violence (47.75%), regardless of the consumption of alcoholic beverages. There was a prevalence of patients with nasal fractures ($n=98$; 55.06%), among which, 35.71% had consumed alcoholic beverages at the time of the trauma. Being male ($p=0.005$), the lack of university studies ($p=0.007$), the need for surgical treatment ($p<0.001$), the fractures of the zygomaticomaxillary complex ($p=0.023$), and the traumas that occurred during the weekends ($p<0.001$) or during the month of June ($p=0.029$) were factors associated with a higher frequency of fractures related to the consumption of alcoholic beverages. There was a lower frequency of fractures associated with alcohol consumption during the months of January ($p=0.006$) and March ($p=0.001$).

Conclusion: Six out of ten cases were under the influence of alcoholic beverages. There was a greater number of young and male patients, mainly due to interpersonal violence.

KEYWORDS:

Alcoholic beverages; Mandibular fractures; Maxillary fractures; Zygomatic fractures; COVID-19; Epidemiology.

RESUMEN:

Introducción: La ingestión de bebidas alcohólicas disminuye la capacidad del organismo para enfrentar situaciones de peligro y lo predispone a sufrir traumatismos diversos.

Objetivo: Determinar la asociación entre el consumo de bebidas alcohólicas y las características de las fracturas maxilofaciales atendidas en un hospital universitario cubano en el contexto de la COVID-19.

Material y Métodos: Estudio observacional, analítico y transversal realizado en el servicio de Cirugía Maxilofacial del Hospital General Universitario "Carlos Manuel de Céspedes" durante el 2020. Se obtuvieron razones de prevalencia, intervalos de confianza a 95% y valores p mediante modelos lineales generalizados.

Resultados: En el 58.23% de los casos las fracturas se relacionaron con la ingestión de bebidas alcohólicas. La etiología fundamental fue la violencia interpersonal (47.75%), independientemente del consumo o no de bebidas

alcohólicas. Predominaron los pacientes con fracturas nasales ($n=98$; 55.06%), en los que el 35.71% había consumido bebidas alcohólicas en el momento del trauma. El sexo masculino ($p=0.005$), la carencia de estudios universitarios ($p=0.007$), la necesidad de tratamiento quirúrgico ($p<0.001$), las fracturas del complejo cigomático-maxilar ($p=0.023$), los traumas sucedidos durante los fines de semanas ($p<0.001$) o durante el mes de junio ($p=0.029$) fueron factores asociados a una mayor frecuencia de fracturas relacionadas con el consumo de bebidas alcohólicas. Hubo menor frecuencia de fracturas asociadas a este consumo durante los meses de enero ($p=0.006$) y marzo ($p=0.001$).

Conclusión: Seis de cada diez casos estuvieron bajo los efectos de la ingestión de bebidas alcohólicas. Existió una mayor afectación de pacientes jóvenes, masculinos, a causa principalmente de la violencia interpersonal.

PALABRAS CLAVE:

Bebidas alcohólicas; Fracturas mandibulares; Fracturas maxilares; Fracturas cigomáticas; COVID-19; Epidemiología.

INTRODUCTION.

Patients with facial trauma require frequent care in emergency units, particularly maxillofacial surgery.^{1,2} Facial trauma can be associated with multiple injuries that involve multistage surgeries and a long recovery period.¹ In this way, it compromises the availability of hospital beds, increasing the costs associated with the treatment and rehabilitation of the injured patients.²

In most countries, due to the reduction in the price of alcoholic beverages and of the legal age to consume them, there is an increasing availability, affordability, and acceptability of their consumption.¹ As alcohol interferes with cognitive and motor responses and impairs the ability to solve problems in conflict situations, there is a direct correlation between its consumption and the risk of being involved in a dangerous situation, which could result in facial injuries of various etiologies.³

Maxillofacial injuries or trauma related to the consumption of alcoholic beverages usually occur on weekends, associated with going to parties, visiting bars, and other similar activities that are often related to substance abuse for leisure and recreation.⁴

The treatment of facial fractures related to the consumption of alcoholic beverages is a heavy burden for medical care systems.¹ In addition, the management of traumatized patients with chronic abuse of alcoholic beverages poses a challenge for professionals, since they can suffer withdrawal symptoms. Additionally, they also have an increased likelihood of perioperative complications, delayed healing, and possible recurrence of injury.⁵

Although some studies have examined the association of maxillofacial trauma with the consumption of alcoholic beverages in countries such as

Brazil,^{2,3,4,6} the Netherlands,⁷ Australia,^{1,5,8-10} Finland,¹¹ Japan,¹² Korea,¹³ United Kingdom,¹⁴ and in the capital of Cuba;^{15,16} the understanding of its epidemiology through research in different populations and moments is crucial for the adequate allocation of hospital resources, the training of surgeons, and the training of the emergency unit staff,¹⁰ among others. Additionally, it is necessary to continue collecting evidence that contributes to a better understanding and management of the problem, especially in an epidemiological context such as the COVID-19 pandemic. In this way, the present study aims to determine the association between the consumption of alcoholic beverages and the characteristics of maxillofacial fractures treated at a Cuban university hospital in the context of COVID-19.

MATERIALS AND METHODS.

This observational, analytical, and cross-sectional study was carried out in the Maxillofacial Surgery unit at the "Carlos Manuel de Céspedes" General University Hospital in Bayamo, Granma province, Cuba, from January 1 to December 31, 2020. The universe consisted of patients with clinically and radiographically diagnosed maxillofacial fractures (except dentoalveolar fractures) who were treated at the aforementioned establishment. The sample was obtained through a non-probabilistic and intentional sampling. Patients who agreed to participate in the study and who provided their informed consent were included. Those who declined to receive treatment (n=3) were excluded.

The following variables were studied: consumption of alcoholic beverages (yes/no), age, gender, place of residence (rural/urban), education level (university/non-university studies), etiology (interpersonal violence, animals attacks, traffic, sports, work and home accidents, as well as falls), the types of fractures (nasal, mandibular, zygomaticomaxillary complex, Le Fort I, Le Fort II, Le Fort III, and panfacial), the number of traces of fractures (single/multiple), treatment (surgical/non-surgical), as well as the day of the week and the month of the trauma. The identification of the consumption of alcoholic beverages was carried

out through the interview and the presence of ethylic breath during the physical examination.

The guidelines set forth in the Declaration of Helsinki for conducting research in human beings were followed. Patients were asked to participate voluntarily and properly informed about the objectives of the research and the protection of their privacy. They were also asked to sign an informed consent. The ethics committee and the scientific council of the hospital where the study was carried out approved a megaproject on maxillofacial trauma, of which the present study is a part.

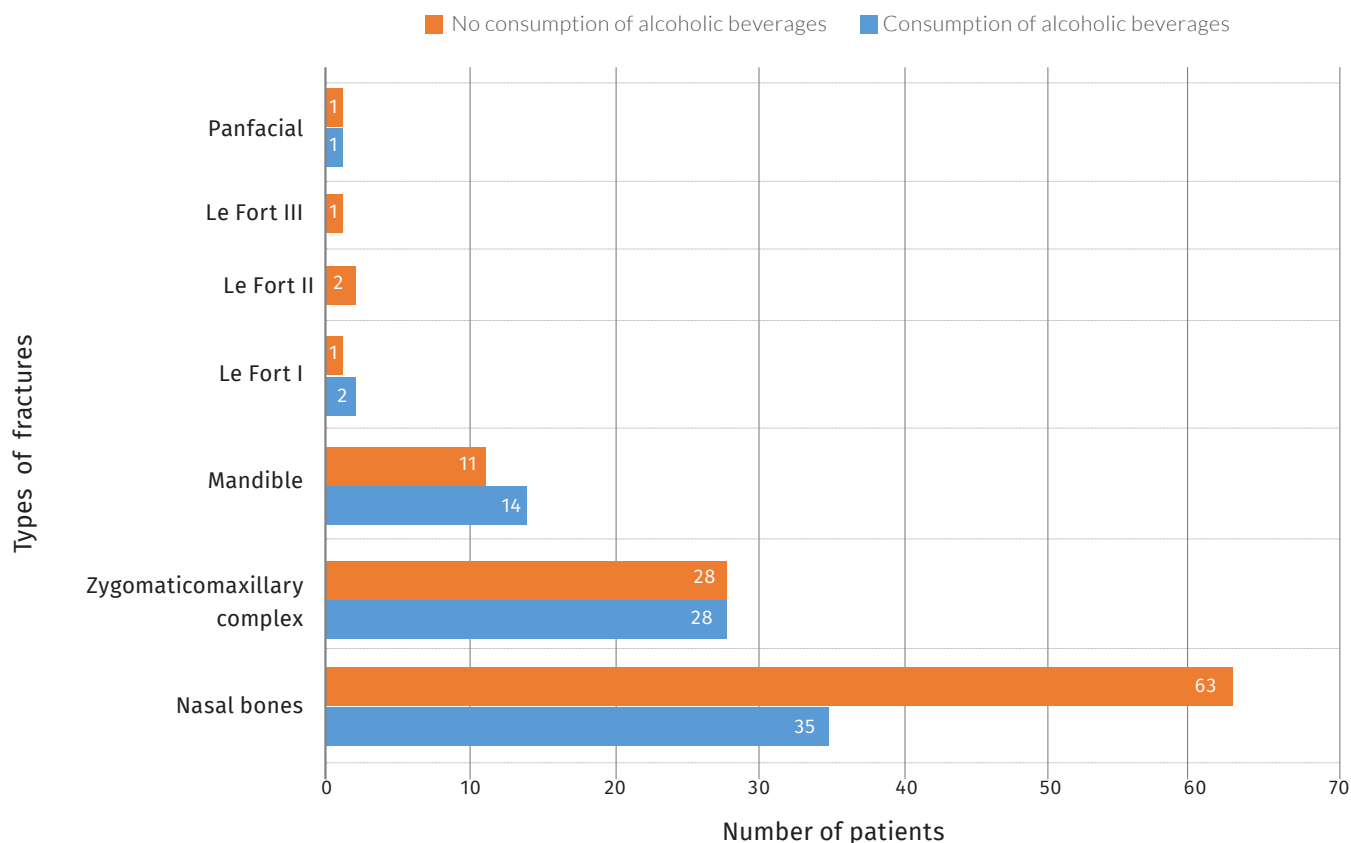
A primary source of data was used. To collect the data in a homogeneous manner, a form was drawn up and placed in the on-call consultation desk, and all the staff and specialists of the Maxillofacial Surgery unit on-call were trained in how to fill it out. A database was created using Microsoft Excel®, and the descriptive analysis of the variables was carried out by means of absolute and relative frequencies; *p*-values were obtained with the Chi square test.

Due to the design used (cross-sectional analytical), bivariate and multivariate statistics were produced, with generalized linear models (Poisson family, log link function, and robust models). With this, the prevalence ratios (crude and adjusted), the confidence intervals (95% CI) and the *p*-values were obtained. For a variable to enter the bivariate model into the multivariate model, it had to have a value *p*<0.30 (statistical criterion); however, at all times the cut-off point for statistical significance was considered to be 0.05, and at all times a confidence level of 95% was considered. The statistical program Stata v.11.1 (StataCorp LP, College Station, TX, USA) was used.

RESULTS.

One hundred and seventy-eight patients with a mean age of 40.60 ± 17.84 years were included in the study. The minimum and maximum ages were 16 and 74; 79.78% (n=142) were male. The male:female ratio was 3.94:1. In 55.62% (n=99) of the cases, fractures were related to the consumption of alcoholic beverages. In this group, the most prevalent were males (94.94%), those between the ages of 20

Figure 1. Distribution of patients according to the types of maxillofacial fractures and the consumption of alcoholic beverages.



and 39 (46.84%), those without university studies (84.81%), residents of urban areas (56.96%), those whose fractures were related to interpersonal violence (59.49%), with single fractures (68.35%), and those treated surgically (54.43%). There were significant differences according to gender ($p < 0.001$), age ($p = 0.023$), and the etiology of the fractures ($p = 0.048$) (Table 1).

Figure 1 shows the prevalence of patients with nasal fractures ($n = 98$; 55.06%), in which 35.71% had consumed alcoholic beverages at the time of the trauma. In patients with fractures of the zygomaticomaxillary complex ($n = 56$; 31.46%), the number of cases whose trauma was related to the consumption of alcoholic beverages was the same as those who had not consumed them.

In general, the first quarter of the year was the period with the highest number of patients with fractures, regardless of whether they had consumed alcoholic beverages. Until then, the monthly average of cases was approximately 23, while in the rest of the year it was 12, reaching a maximum peak in August ($n = 16$). The largest number of patients with fractures related to the consumption of alcoholic beverages occurred in the months of February, October, and March (in that order). No significant relationships were observed after analyzing the temporal pattern of alcoholic beverage consumption (Table 2).

The trauma happened on weekdays for 58.23% ($n = 46$) of the total cases with fractures related to the consumption of alcoholic beverages ($n = 79$). In

this group, the most prevalent were males (93.48%), those between the ages of 20 and 39 (45.65%), and those without university studies (84.81%) (Table 3).

When performing the multivariate analysis, males (aPR: 4.37; 95% CI: 1.54-12.37; p=0.005), without university-level education (aPR: 1.33; 95% CI: 1.08-1.64; p=0.007), the need for surgical treatment (aPR: 1.20; 95% CI: 1.10-1.32; p<0.001), fractures of the zygomaticomaxillary complex (aPR: 1.74; 95% CI: 1.08-2.80; p=0.023), as well as trauma that occurred on weekends (aPR: 1.32; 95% CI: 1.16-1.51; p<0.001)

or during the month of June (aPR: 1.44; 95% CI: 1.04-2.01; p=0.029) were factors associated with a higher frequency of fractures related to the consumption of alcoholic beverages. After adjusting for the types of mandibular or nasal fracture, as well as for the fact that the trauma occurred in the months of April or October, there were fewer fractures associated with the consumption of alcoholic beverages during the months of January (aPR: 0.83; 95% CI: 0.73-0.95; p=0.006) and March (aPR: 0.65; 95% CI: 0.50-0.83; p=0.001) (Table 4).

Table 1. Description of the patients according to the consumption of alcoholic beverages.

Variable	Categories	Consumption of alcoholic beverages n (%)		p-value
		Yes (n=79)	No (n=99)	
Gender	Male	75 (94.94)	67 (67.68)	<0.001
	Female	4 (5.06)	32 (32.32)	
Age (years)	< 20	4 (5.06)	15 (15.15)	0.023
	20 – 39	37 (46.84)	35 (35.35)	
	40 – 59	32 (40.51)	32 (32.32)	
	≥ 60	6 (7.59)	17 (17.17)	
Educational level	University studies	12 (15.19)	21 (21.21)	0.304
	Non-university studies	67 (84.81)	78 (78.79)	
Place of residence	Rural	34 (43.04)	39 (39.39)	0.623
	Urban	45 (56.96)	60 (60.61)	
Etiology	Interpersonal violence	47 (59.49)	38 (38.38)	0.048
	Animal attacks	2 (2.53)	19 (19.19)	
	Traffic accidents	13 (16.46)	19 (19.19)	
	Sports accidents	1 (1.27)	4 (4.04)	
	Work accidents	0 (0.00)	5 (5.05)	
	Home accidents	2 (2.53)	6 (6.06)	
	Falls	14 (17.72)	26 (26.26)	
	Number of fractures	Single	54 (68.35)	
Multiple	25 (31.65)	29 (29.29)		
Treatment	Non-surgical	36 (45.57)	49 (49.49)	0.602
	Surgical	43 (54.43)	50 (50.51)	

p-values were obtained with the Chi square test.

Table 2. Temporal pattern of alcoholic beverage consumption.

Variable	Categories	Consumption of alcoholic beverages n (%)		p-value
		Yes (n=79)	No (n=99)	
Month	January	6 (7.59)	11 (11.11)	0.441
	February	10 (12.66)	16 (16.16)	
	March	8 (10.13)	17 (17.17)	
	April	6 (7.59)	5 (5.05)	
	May	7 (8.86)	7 (7.07)	
	June	7 (8.86)	3 (3.03)	
	July	5 (6.33)	5 (5.05)	
	August	7 (8.86)	9 (9.09)	
	September	4 (5.06)	9 (9.09)	
	October	9 (11.39)	4 (4.04)	
	November	5 (6.33)	4 (4.04)	
	December	5 (6.33)	9 (9.09)	
Day of the week	Monday	12 (15.19)	16 (16.16)	0.125
	Tuesday	9 (11.39)	10 (10.10)	
	Wednesday	12 (15.19)	15 (15.15)	
	Thursday	8 (10.13)	7 (7.07)	
	Friday	4 (5.06)	22 (22.22)	
	Saturday	19 (24.05)	18 (18.18)	
	Sunday	14 (17.72)	11 (11.11)	

p-values were obtained with the Chi square test.

Table 3. Variations in fractures related to the consumption of alcoholic beverages according to days of the week.

Variable	Categories	Weekday (n=46)	Weekend (n=33)	p-value
Gender	Male	43 (93.48)	32 (96.97)	0.485
	Female	3 (6.52)	1 (3.03)	
Age (years)	< 20	2 (4.35)	2 (6.06)	0.907
	20 – 39	21 (45.65)	16 (48.48)	
	40 – 59	20 (43.48)	12 (36.36)	
	≥ 60	3 (6.52)	3 (9.09)	
Educational level	University studies	7 (15.22)	28 (84.85)	0.994
	Non-university studies	39 (84.78)	5 (15.15)	
Place of residence	Rural	22 (47.83)	12 (36.36)	0.310
	Urban	24 (52.17)	21 (63.64)	
Etiology	Interpersonal violence	25 (54.35)	22 (66.67)	0.705
	Animal attacks	2 (4.35)	0 (0.00)	
	Traffic accidents	8 (17.39)	5 (15.15)	
	Sports accidents	1 (2.17)	0 (0.00)	
	Work accidents	0 (0.00)	0 (0.00)	
	Home accidents	1 (2.17)	1 (3.03)	
	Falls	9 (19.57)	2 (6.06)	
Number of fractures	Single	30 (65.22)	24 (72.73)	0.479
	Multiple	16 (34.78)	9 (27.27)	
Treatment	Non-surgical	23 (50.00)	13 (39.39)	0.351
	Surgical	23 (50.00)	20 (60.61)	

p-values were obtained with the Chi square test.

DISCUSSION.

The consumption of alcoholic beverages plays a fundamental role in the etiology of maxillofacial fractures through various mechanisms that are associated with depression of the central nervous system producing multiple changes at the neurological level, ranging from minor trauma to coma. People who have consumed alcoholic beverages are in worse conditions to deal with a dangerous situation, drive vehicles, perform normal work and home tasks, in addition to being more aggressive and engaging in interpersonal violence.⁶

It is important to mention the impact of COVID-19 on the epidemiology of maxillofacial fractures. There are studies that confirm the results obtained in this research.¹⁷⁻¹⁹ In Cuba, the first patients infected with SARS-CoV-2 were Italian tourists diagnosed on March 11, 2020. The date is recognized as the beginning of the epidemic in the country.²⁰ This explains why the first quarter of the year was the period with the highest number of patients with fractures, regardless of whether they had consumed alcoholic beverages.

Thus, the measures adopted to stop the advance of COVID-19 such as mandatory social isolation, suspension of the sale of alcoholic beverages, closure of sporting events, reduction of traffic in cities, etc., resulted in a decrease in cases with maxillofacial fractures by being directly related to the main etiologies of traumatic events on a global scale.

Nasal fractures were the most frequent, one third of which were related to the consumption of alcoholic beverages. These results are similar to those reported in Australia by Lee *et al.*,¹ but they differ from the study conducted in the same country by Elledge *et al.*,¹⁴ The anatomical exposure of the maxillofacial region makes it more susceptible to trauma and, consequently, the fracture of the nasal bones is the most common and the third most frequent at the body level, since the nose is the facial structure with the greatest projection and, therefore, the main area injured in a traumatic event, resulting in important aesthetic and functional alterations.²¹

A prevalence of male patients is reported, which

is consistent with international studies,^{22,23} as well as with national Cuban reports.^{15,16,24,25} In addition, this gender was associated with a higher frequency of fractures related to the consumption of alcoholic beverages. These results confirm that males tend to be more exposed to traumas than females, since males account for the largest number of drivers of motorized vehicles, practice more physical contact sports, in addition to consuming more alcoholic beverages and other drugs, which can contribute to a more violent behavior.²⁶

There is clear evidence of increased morbidity and mortality from maxillofacial fractures in patients with abusive consumption of alcoholic beverages.³ The results of this study, in which 55.62% of the fractures were related to the consumption of these substances, are higher than those reported in Australia (8%),^{1,10} Japan (29%),¹² and the United Kingdom (35%).¹⁴ In turn, they are similar to what was reported in Finland (55%),¹¹ as well as in studies carried out by Morales-Navarro *et al.*,^{15,16} in the Cuban capital (50%); but lower than those reported in another Australian paper (87%).²⁷ In other words, the epidemiology of maxillofacial fractures related to the consumption of alcoholic beverages varies between the populations studied and this variation can be established between countries and in different regions of the same country. Variables such as demographic, geographic, cultural, social, and economic factors, as well as the time of year can influence the type and distribution of maxillofacial injuries.²⁸

The consumption of alcoholic beverages has become part of the lifestyle of younger generations and the proportion of young people falling into this habit is constantly growing. The increase in availability, affordable prices, and social acceptance of these legal drugs have contributed to make them a problem with serious social, economic, and health implications.¹ In line with the above, a prevalence of young patients is reported. They suffered fractures in the maxillofacial region and were under the influence of alcoholic beverages.

These findings agree with Pietzka *et al.*,²² and

Alqahtani *et al.*,²³ Young people are more active in comparison to older individuals, in addition to the fact that young people engage more often in contact sports that may involve violence, frequently under the influence of alcoholic beverages.

In the present study, the main etiology was interpersonal violence and more than half of the cases were related to the consumption of alcoholic beverages, a result that is consistent with several previous studies,^{1,8,11,25,27} but that contrasts with the findings reported in other studies that established traffic accidents and falls as the most common causes.^{10,14-16,24} However, it is important to reassert that intoxication ranks first among the conditions that trigger violent situations. People under the effects of alcoholic beverages are three times more likely to behave violently.²⁴

Patients without university studies were more prevalent and this was precisely another of the factors associated with a higher frequency of fractures related to the consumption of alcoholic beverages. Although there are no reports that have evaluated this variable, it is possible to note that people with a lower educational level also have a lower perception of the risk to health involved in the consumption of alcoholic beverages. In addition, they do more activities in risky environments, consume alcoholic beverages more frequently, drive under the influence of alcohol, and engage more often in interpersonal violent situations. All this makes them prone to suffer various types of trauma such as maxillofacial fractures.²⁹

There is no doubt that the COVID-19 pandemic had an impact on the number of cases treated for maxillofacial trauma and the treatment modalities used. Accordingly, more conservative treatments have been used, based on biosafety protocols that have been implemented to deal with the health situation. In addition, some patients could have refused surgery for fear of contracting SARS-CoV-2 during their hospitalization, a criterion that is shared by de Boutray *et al.*,¹⁷ and is an additional element to consider when interpreting the results.

Despite this, the consumption of alcoholic beverages was associated with a higher frequency of fractures that required surgical intervention. In a study carried out in Australia by O'Meara *et al.*,²⁷ the consumption of alcoholic beverages in patients with maxillofacial fractures increased the relative risk of requiring surgical treatment by about 1.6 times. In addition, in most of the cases where there was consumption of alcoholic beverages and the severity of the trauma was evaluated, it was significantly more severe than in non-consumer patients.

The fact that the fractures occurred on weekends was significantly associated with a higher consumption of alcoholic beverages. These results are similar to those found in Australia by Lee *et al.*,¹⁰

Regardless of the fact that the study was framed in a period of the COVID-19 pandemic, characterized by the suspension or reduction of the sale of alcoholic beverages in order to decrease the spread of the disease, it is recognized that alcohol consumption during weekends is higher compared to other days and this could be explained by the increase in the number of leisure and recreational activities, which frequently trigger the occurrence of accidents or trauma.

It is important to point out that data collection was carried out during the COVID-19 pandemic, therefore, frequencies and even the associated factors could be closely related to the characteristics of this period, which is known to have caused evident changes in multiple disease presentations. Therefore, these results should be taken and interpreted with caution. Future research should collect data in a post-pandemic period, with larger samples and variables. However, this also can be considered a strength because, according to the review of the literature, this is the first research to study the association between the consumption of alcoholic beverages and the characteristics of maxillofacial fractures in the context of the COVID-19 pandemic.

CONCLUSION.

Six out of ten patients with maxillofacial fractures were under the influence of alcoholic beverages. Being male, not having university studies, the need for surgical treatment, fractures of the zygomaticomaxillary complex, traumas that occurred during the weekends or during the month of June were associated with a higher frequency of fractures related to the consumption of alcoholic beverages. There was a lower frequency of fractures associated with this consumption during the months of January and March.

Conflict of interests:

The authors declare that they have no competing interests.

Ethics approval:

Study approved by the ethics committee and scientific council of the “Carlos Manuel de Céspedes” General University Hospital.

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Authors' contributions:

All authors contributed to the execution of the study and writing of the manuscript.

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