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Análise do perfil toxicológico e epidemiológico das vítimas de homicídio em Vitória, ES, Brasil

RESUMO: Introdução | *O abuso de substâncias ilícitas sempre foi associado com o risco de morte entre os usuários. Os problemas sociais, como o aumento do desemprego, pobreza, evasão escolar e desigualdade social, levaram as pessoas cada vez mais jovens para o tráfico de drogas e dependência química.*
Objetivo: *Avaliar a prevalência de intoxicação por cocaína e maconha em vítimas de homicídio e correlacionar com as mudanças demográficas e as causas da morte.*
Métodos: *O estudo transversal foi desenvolvido no departamento de Medicina Forense de Vitória. As vítimas de homicídio foram caracterizadas por sua etnia, gênero e idade, correlacionando o tipo de arma usada no crime com o uso de drogas ilícitas. Um total de 150 amostras de urina de vítimas de homicídio foi analisada. As amostras de urina foram coletadas durante a autópsia.*
Resultados: *Das amostras de urina estudadas, 36,7% foram positivas para a presença do metabólito da cocaína e 47,3% para maconha. A maioria dos pacientes era do sexo masculino (93,3%). A predominância dos homicídios ocorreu em mulatos, e arma de fogo foi o método mais utilizado pelos criminosos.*
Conclusão: *O estudo demonstrou uma correlação entre vítimas de homicídio e o uso de maconha e cocaína. Esses dados podem constituir a base para comparação de futuros testes toxicológicos na comunidade, servindo como referência para as políticas de segurança pública e monitoramento de grupos que estão mais expostos.*

Palavras-chave | *Cocaína; Cannabis; Violência.*

| Analysis of the toxicological and epidemiological profile of homicide victims in Vitória, ES, Brazil

ABSTRACT | Introduction: Abuse of illicit substances has been associated with increased risk of death among drug users. Social problems such as rising unemployment, poverty, high school dropout, and social inequality have increasingly led more young people to drug trafficking and chemical dependency. **Objective:** The aim of this study was to evaluate the prevalence of cocaine and marijuana use in homicide victims and correlate it with demographic changes and causes of death. **Methods:** This cross-sectional study was carried out by the Department of Forensic Medicine of Vitoria. The murder victims were classified according to ethnicity, gender, and age, correlating the type of weapon used in the crime with the use of illicit drugs. 150 urine samples from victims of homicide were collected at autopsy and were then analyzed. **Results:** Of the urine samples studied, 36.7% tested positive for cocaine metabolite, and 47.3% for marijuana. Most patients were male (93.3%). Most homicides were committed against mulattos, and firearm was the method most commonly used by the perpetrators. **Conclusion:** This study demonstrates a strong relationship between homicide victims and the use of marijuana and cocaine. These findings provide a basis for further toxicological studies in the community and may help inform public security policies and the monitoring of the most vulnerable groups.

Keywords | Cocaine; Cannabis; Violence.

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INTRODUCTION |

In recent years society has seen the increase in urban violence, particularly in large metropolitan centers¹. Social problems such as unemployment, poverty, school dropout, and social inequality have led more and more young people to drug trafficking and chemical dependency². Data from the World Health Organization (WHO) showed that violence in the world has caused the death of 520,000 people, excluding the cases of deaths caused by wars and suicides, accounting for 8.8 deaths for every 100,000 inhabitants, with 77% involving male victims. The vast majority of homicides occurred in low- and middle-income countries, while the developed world accounted for less than 10% of the deaths.

WHO has found a strong association between drug use and increased violence, describing it as one of the biggest challenges to public health nowadays. The impact of this correlation may be devastating, leading to serious damage to public health, causing serious family disruption and weakening social networks⁴.

There are three ways in which drug users become homicide victims. The first is caused by the irrational and violent behavior triggered by drug users. The second, called economic-compulsive, is the result of the violence generated by drug dependency (thefts, robberies etc.). And the third, called systemic, is inherent in the trafficking of illicit drugs, in that it uses force to defend its interests⁵.

The analysis of homicides in different cities may provide valuable information to properly identify risk groups and factors. These studies can also be used to understand the nature of homicide and decide on which steps should be taken to lower such alarming rates. Information about the nature of the homicide can be used by police departments and public organizations to develop methods to decrease drug-related deaths in affected areas⁶.

The objective of the present study is thus to evaluate the prevalence of cocaine and marijuana use in homicide victims in the metropolitan area of the Greater Vitória, located in southeastern Brazil, and correlate those data with information on demographic changes and causes of death.

METHODS |

This cross-sectional study was conducted in the Department of Forensic Medicine of Vitória, located in the city of Vitória, which concentrates all cases of violent death occurring in the municipalities comprising the Greater Vitória area. The population of the study consisted of 150 human cadavers, which had homicide as the clear decisive factor for death. Cadavers with time of death greater than twenty-four hours were excluded, avoiding changes caused by decomposition. Corpses from unexplained deaths and accidental deaths were also excluded.

Urine samples from 150 victims of homicide in the period from September 2011 to November 2011 were collected and analyzed. Epidemiological data were obtained from the records of the Department of Forensic Medicine, with cadaveric data gathered from the post-mortem report, with the prior consent of the family and approval by the Committee for Ethics in Research of the University of Vila Velha - CEP/UVV registration number 09/2011. During autopsy, urine was collected by direct bladder puncture after completion of pubic incision. In cases where the responsible expert in medical law did not make the incision, urine was collected by suprapubic bladder puncture.

Once collected, the urine was stored in sterile plastic bottles at -20° C for up to 48 hours. The urine was thawed at room temperature, and immediate detection of the urinary metabolite of cocaine (benzoylecgonine) and marijuana (delta-9-tetrahydrocannabinol) was carried out in qualitative rapid test by brand WAMA Diagnostics™, São Paulo, Brazil. The murder victims were characterized by their ethnicity, gender, and age, correlating the type of weapon used in the crime with the use of these substances. The results were analyzed using Epi Info™ 7.0.8.0., and a chi-square test was applied to determine the association between variables.

RESULTS |

Urine samples of 140 men (93.3%) and 10 women (6.7%) were studied. The results were positive for cocaine or marijuana in 95 patients (63.3%). Seventy-one cadavers (47.3%) were found positive for marijuana, while 55 cadavers (36.7 %) were positive for urinary cocaine metabolite, benzoylecgonine. Thirty-one of the corpses (20.6%) were positive for both substances.

Among male victims, 64 were positive for the presence of marijuana (45.7%) and 53 (37.8%) for cocaine. Of the 10 women, six were positive for marijuana, and two for cocaine. There was no relationship between gender and the presence of either marijuana or cocaine in the urine (Table 1).

Table 1 - Marijuana and cocaine abuse in murder victims, and the correlation to gender and age. Department of Forensic Medicine, Vitória-ES, 2011

Gender	Marijuana		Cocaine	
	N	%	N	%
Male	64	45.7	53	37.8
Female	6	60	2	20
Age				
Under 18	18	12	6	4
Between 18-30	43	28.7	32	21.3
Over 30	13	15.3	16	10.7
Total	74	49.3	54	36

The average age was twenty-eight years (SD \pm 12.7). The youngest victim was 12 years old, and the oldest was 64 years old. The presence of marijuana in urine was associated with the victim's age ($P < 0.001$). The most prevalent age group was between 18 and 30 years of age. The positive result for cocaine showed no direct relationship with age (Table 1).

The most frequent race among the victims of homicide was the mixed race groups (92%), followed by whites (7.3%) and blacks (0.7%). There were no Asian or indigenous individuals. Also, no relationship between race and the presence of marijuana and cocaine in urine was observed (Table 2).

Table 2 - Marijuana and cocaine abuse in murder victims and correlation between race and mechanisms of homicide. Department of Forensic Medicine, Vitória-ES, 2011

Race	Marijuana		Cocaine	
	N	%	N	%
White	4	2.7	4	2.7
Black	1	0.7	-	-
Mixed Race	66	44	51	34
Total	71	47.4	55	36.7
Mechanism of Homicide				
Fire arms	65	43.3	50	33.3
Other weapons	6	4	5	3.3
Total	71	47.3	55	36.6

The most frequent mechanism of injury causing death was firearms (86.7%), followed by stab wounds (6.7%), blows from blunt instruments (5.3%), hanging (0.7%) and strangulation (0.7%). There was also no observed relationship between the mechanism of death and the presence of metabolites of marijuana and cocaine in the urine of the victims (Table 2).

DISCUSSION |

Violence may occur at different stages of drug use. A dependent or a nondependent user may display violent behavior resulting from either an acute intoxication or withdrawal symptoms⁷. Marijuana produces a state of altered consciousness characterized by euphoria, relaxation, altered perception, and impaired motor skills and reaction time⁸. Despite of these effects, the use of cannabis in moderate doses inhibits the violent and aggressive behavior in animals and humans⁹. In the present study, about 36.7% of homicide victims tested positive for cocaine, although it is not possible to correlate the drug abuse with the motive for murder. Cocaine is one of the most commonly used illicit stimulants and it leads to psychosis, characterized by paranoia, hallucinations, and altered sense of reality. It may also cause irritability and aggressiveness, unlike marijuana or heroin, which tends to depress the activity^{10,11}. Taking large doses of cocaine can produce explosions of violence in some individuals, particularly those with preexisting psychosis¹². Crack cocaine has been associated more often with violence than cocaine taken intranasally, and also produces higher levels of irritability and aggression, which seems to be associated with the rapid onset and conclusion of its effects¹³. The violence caused by crack cocaine is systemic, and it is related with conflicts between crack dealers and disputes between drug dealers and users, the need to maintain discipline among the dealers and display of newly acquired wealth¹⁴. In the present study, approximately one third of murder victims had cocaine metabolites, indicating that perhaps the drug can be related to the motive for the crime.

The relationship between homicide victims and the use of illegal substances such as marijuana and cocaine has varied among countries and even between regions. Our study arrived at similar results to those found with regard to sex, age, and the prevalence of the use of a firearm in another study also conducted in Brazil¹⁵. A high percentage of the

metabolic rate of cocaine and marijuana in the urine sample was observed in this work. In a study similar to this, carried out in the Federal District of Brazil, data of individuals involved in fatal events were collected and associated with substances found in their bodies, and men were found to be involved in more than 90 percent of the cases¹⁶. Most of the individuals were between 18 and 30 years old.¹⁶ Our study corroborate with these findings, since we found that most victims were young men. In the study above mentioned, cocaine was present in 21.6 percent of the urine samples analyzed, and THC in 17.5 percent¹⁶. In our research, the percentage of victims testing positive for cocaine was higher and the presence of THC was about three times higher than the amount found by Campelo and Caldas¹⁶. In a toxicological study of victims of murder in Trinidad and Tobago, performed on 1,780 victims, the results were positive for marijuana in 32% of individuals and for cocaine in 7%. The proportion of victims who tested positive for marijuana increased significantly from 2001 to 2007¹⁷. In Ribeirão Preto, Brazil, the profiles of 799 victims were analyzed. They were mostly male, with women accounting for only 51 cases. The percentage of homicides caused by firearms increased about 10 percent in 1995, compared to previous years, which had remained at a constant level¹⁵.

Studies in other countries have shown that young male victims are predominant, with variations in the levels of cocaine and marijuana use. This fact was also observed in the present study, although it was not possible to correlate it with the type of illicit drug metabolite. In the United States, 25% of those who died violently used cocaine in the previous 24 to 72 hours before death¹⁸. In a study conducted in New York City, of 722 homicide victims, 221 (29%) were identified as drug users¹⁹.

Victims of homicides related to drug use were more frequent than other types of homicides, with the majority being males between 25 and 34 years old. However, there was no significant difference among races¹⁷. In a retrospective review of all autopsies performed in St. John Parish, between January 1992 and June 1995, the overall prevalence of illicit drugs or alcohol detected in homicide cases autopsied was 60 percent. Cocaine was the most prevalent substance, found in 40 percent of the homicide victims. This study also describes a prevalence of armed violence among homicide cases, with young black men being the population most frequently detected with some level of drugs or alcohol at the time of death²⁰. In a study in Thailand, drug-positive cases were predominantly male

(85%), with the most common age group being 21-30 years (35.4%). Homicide by gunshot wounds was the most common cause of death in 69.2%, followed by hanging (15.4%), electrocution (7.7%), and poisoning (7.7%)²¹. Hispanics and blacks were more likely to test positive for cocaine, though whites were more likely to test positive for opiates. Cocaine use seems to be related to increased risk of death by firearms²².

In a review conducted by Degenhardt *et al.*²³, the overall mortality among cocaine users was evaluated. Standardized mortality rates suggested that mortality was four to eight times higher among cocaine users than in the general population of the same age and sex. Marijuana use was not found to pose the same danger. An analysis of the racial profile of homicides committed between 1997 and 2005 in Newark, New Jersey showed that the majority of homicide victims were blacks (81.4%), followed by Hispanics (14.8%). Caucasians represented only three percent of homicide victims in that area²⁴. Black individuals are six times more likely to die at the hands of a murderer than Caucasian Americans²⁵. In Brazil, historically, miscegenation has led to a high proportion of the population classifying themselves as of mixed race, which accounted for the majority of victims evaluated in this study.

Our results tie with the findings of many studies carried out in different countries of the world, particularly with regard to young males who are killed mostly by gunfire. A direct relationship was found only among young people killed and marijuana use. But the levels of metabolites of cocaine and marijuana have varied in different localities, as well as the race most commonly affected. This is partly explained by the characteristics of the local availability of drugs and the race more socially exposed. Our study was conducted in a small area and with a relative low number of participants. This is indeed a limitation of the research we conducted. However, we may say that our findings point to the urgent need of raising awareness about the use of illicit drugs, emphasizing the fact that it does not only affect the drug user but also seriously impact the surrounding community.

CONCLUSION |

This study demonstrates a strong relationship between homicide victims and the use of marijuana and cocaine. A high prevalence of violence, mainly caused by firearms,

was also observed among young men of color. There are relatively few toxicological studies of illicit drugs in homicide victims. This study provides a basis for comparing future toxicological studies in the community, serving as a useful reference for planning policing strategies and monitoring the groups that are most exposed.

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