

ORIGINAL ARTICLE

EPIDEMIOLOGICAL PROFILE AND CHARACTERISTICS OF COINFECTIONS ASSOCIATED WITH SEROPOSITIVE PEOPLE

PERFIL EPIDEMIOLÓGICO E CARACTERÍSTICAS DE COINFECÇÕES ASSOCIADAS ÀS PESSOAS SOROPOSITIVAS

PERFIL EPIDEMIOLÓGICO Y CARACTERÍSTICAS DE LAS COINFECCIONES ASOCIADAS A PERSONAS SEROPOSITIVAS

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ABSTRACT

Objective: to determine the prevalence, epidemiological profile and characteristics associated with hepatitis A, B, C, syphilis and TB virus coinfection among HIV-infected individuals. **Method:** this is a quantitative, descriptive, cross-sectional study. The sample consisted of 161 patients, and data analysis was performed based on information from the medical records of patients co-infected with hepatitis B, C, syphilis and TB viruses among those infected with HIV. Results were presented in tables. **Results:** most of them were men (81.37%), aged between 21 and 40 years (67.08%), co-infected (89.90%), single (73.91%), homosexual (49.69%), with three or more partners during life (94.64%), being patients who used drugs (86.35%) and those who currently use drugs (64.60%). Condom use was reported as “sometimes” by 81.37% of the sample. **Conclusion:** it was concluded that all individuals infected with HIV have an epidemiological profile associated with hepatitis A, B, C, syphilis and TB viruses. The prevalence ratio showed that co-infected individuals tend to have syphilis and hepatitis B. **Descriptors:** HIV Seropositivity; AIDS-Related Opportunistic Infections; HIV Infections; Hepatitis B; Hepatitis C; Syphilis.

RESUMO

Objetivo: determinar a prevalência, o perfil epidemiológico e as características associadas à coinfeção pelos vírus das hepatites A, B, C, sífilis e TB entre indivíduos infectados pelo vírus HIV. **Método:** trata-se de um estudo quantitativo, descritivo, transversal. Compôs-se a amostra com 161 pacientes, e realizou-se a análise dos dados a partir das informações do prontuário de pacientes coinfectados pelos vírus das hepatites B, C, sífilis e TB entre infectados pelo vírus HIV. Apresentaram-se os resultados em forma de tabelas. **Resultados:** nota-se que a maioria eram homens (81,37%), na faixa etária de 21 a 40 anos (67,08%), coinfectados (89,90%), solteiros (73,91%), homossexuais (49,69%), com três ou mais parceiros durante a vida (94,64%), sendo pacientes que usaram drogas (86,35%) e os que usam drogas atualmente (64,60%). Relatou-se mais o uso de preservativos como “às vezes” por 81,37% da amostra. **Conclusão:** concluiu-se que todos os indivíduos infectados pelo vírus HIV apresentam perfil epidemiológico associado aos vírus das hepatites A, B, C, sífilis e TB. Mostrou-se, pela relação de prevalência, que indivíduos coinfectados tendem a possuir sífilis e hepatite B. **Descritores:** Soropositividade Para HIV; Infecções Oportunistas Relacionadas Com o HIV; Coinfeção Por HIV; Hepatite B; Hepatite C; Sífilis.

RESUMEN

Objetivo: determinar la prevalencia, el perfil epidemiológico y las características asociadas con la hepatitis A, B, C, la sífilis y la coinfección por el virus de la tuberculosis en personas infectadas por el VIH. **Método:** este es un estudio cuantitativo, descriptivo, transversal. La muestra consistió en 161 pacientes, y el análisis de datos se realizó con base en la información de los registros médicos de pacientes coinfectados con virus de hepatitis B, C, sífilis y TB entre aquellos infectados con VIH. Los resultados se presentaron en tablas. **Resultados:** la mayoría de ellos eran hombres (81.37%), con edades comprendidas entre 21 y 40 años (67.08%), coinfectados (89.90%), solteros (73.91%), homosexuales (49.69%), con tres o más parejas durante la vida (94.64%), siendo pacientes que usaron drogas (86.35%) y aquellos que actualmente usan drogas (64.60%). El uso de condones se informó como “a veces” en el 81,37% de la muestra. **Conclusión:** se concluyó que todas las personas infectadas con VIH tienen un perfil epidemiológico asociado con los virus de la hepatitis A, B, C, sífilis y TB. La razón de prevalencia mostró que las personas coinfectadas tienden a tener sífilis y hepatitis B. **Descriptor:** Seropositividad Para HIV; Infecciones Oportunistas Relacionadas con el SIDA; Infecciones por VIH; Hepatitis B; Hepatitis C; Sífilis.

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INTRODUCTION

Since its discovery 30 years ago, HIV has been known to cause serious problems for healthcare systems.¹ The socioeconomic impact of sexually transmitted infections (STIs) worldwide is a serious public health problem, especially in developing countries.² In 2016, 19.5 million of the 36.7 million people living with HIV had access to treatment, and AIDS-related deaths fell from 1.9 million in 2005 to one million in 2016. Given the continuity of these advances, the data puts the world on the right track to reach the global goal of 30 million people on treatment by 2020.³

It is noticed that the treatment of individuals with HIV / AIDS with the use of antiretroviral therapy (ART) increased survival, but in prolonged living with the virus, HIV infection assumed chronic degenerative characteristics, with effects related to their comorbidities and adverse effects of treatment.^{1,4} It is indicated by the high incidence of new cases of sexually transmitted infections (STIs) and HIV / AIDS in Brazil that other factors may influence sexual behavior regarding self-care and prevention of these infections.⁵

It was found, as a result of the increased expectation and quality of life provided by ART, that HIV / Hepatitis B (HBV), HIV / Hepatitis C (HCV) and HIV / *Treponema pallidum* (syphilis) co-infections have become important causal factors for morbidity and mortality among seropositive individuals who are more susceptible to co-infection with other STIs, and the frequency of this combination may be directly related to exposure and the predominant risk factors in this population. Due to the sexual risk associated with low adherence to condom use and the multiplicity of sexual partners, factors with high prevalence among HIV-positive people with co-infection are constituted.⁶

It is claimed that HIV infection makes room for other opportunistic infections, aggravating the decline in immunity and accelerating the emergence of AIDS. It is understood that a huge range of infections of microbial and parasitic origin are common, with hepatitis virus co-infection being some of the most relevant. Viral hepatitis B is caused by Hepadnaviridae, and transmission of the infectious agent may occur by solution of continuity, parenteral route, vertical

transmission and unprotected sex, which is the predominant route. Viable HBV remains long-term when outside the body, such as in a drop of blood where it is more likely to infect a susceptible individual than hepatitis C virus (HCV), which belongs to genus Hepacivirus of the family Flaviviridae, and the human immunodeficiency virus (HIV).⁷⁻⁸

Human immunodeficiency virus (HIV), hepatitis B virus (HBV) and hepatitis C virus (HCV) are attributed to the three most common chronic viral infections documented worldwide. Liver diseases are known to be a major cause of morbidity and mortality in co-infected patients, and with increased life expectancy due to highly active antiretroviral therapy (ART), the focus has shifted to the management of chronic HBV and HCV infections. The rate of coinfection in HIV patients may differ depending on each geographical area as this is affected by the mode of transmission and infection burden in the population.⁹

Hepatitis C virus infection is noted in individuals living with HIV / AIDS as a precursor to a moderate increase in cardiovascular disease, suggesting early treatment of hepatitis C virus.¹⁰ Hepatitis B virus is presented, however, as the biggest challenge to healthcare systems worldwide, mainly due to the high prevalence B. It is reported that the number of people infected with hepatitis C is greater than the number infected - between 350 and 400 million chronic carriers - compared with 35 million HIV carriers.¹¹

Another opportunistic disease is related to HIV / AIDS co-infection, syphilis, caused by "*Treponema pallidum*", which is a predominantly sexual transmission disorder. There is a wide variation in the prevalence of HIV / Hepatitis B, C and HIV / Syphilis co-infections, due to the sharing of contagion pathways and similar risk factors, being influenced mainly by sociodemographic differences, lifestyle, sexual behavior and access to health services.¹²⁻³ Worldwide, it is estimated that there are approximately 35 million people with HIV, 350 and 180 million people chronically infected with HCV and HBV respectively, and there are 12 million new cases of syphilis among HIV-positive people annually.¹⁴⁻⁵

It has been reported in previous research¹⁶⁻⁷ that approximately 20-30% of HCV carriers and four to 10% of chronically HBV-infected

individuals carry the HIV virus. HIV / Syphilis coinfection can be found in approximately 0.6% of the HIV-positive population, although the prevalence is higher among men who have sex with men (MSM), sex workers, incarcerated people and injecting drug users, with rates varying from 2.7% to 24.4%.¹⁸

Syphilis is reported as a serious public health problem due to its magnitude and transcendence, despite the existence of effective prevention and control measures. It is noteworthy that, in Brazil, congenital syphilis has been a compulsory notification disorder since 1986, however, pregnant syphilis and acquired syphilis became compulsory notification disorders only in 2005 and 2010, respectively.¹⁹ From 2010 to June 2016, 227,663 cases of adult acquired syphilis were reported in the country, and the State of São Paulo accounted for 44% of this total, with 9,976 and 25,909 cases of acquired syphilis reported in 2011 and 2015, respectively. . It is cautioned that, according to data available from SINAN, it is not possible to know the prevalence of co-infection between HIV and syphilis, as there are no co-infection data in the acquired syphilis or HIV / AIDS notification and investigation forms.²⁰

Tuberculosis, caused by the bacillus *Mycobacterium tuberculosis*, is an infectious disease, transmitted through saliva droplets containing the infecting agent, which causes intense inflammatory reactions in the affected tissues, commonly present among poor, but worldwide, populations considered since 1993 by the World Health Organization (WHO) as the world's first priority public health disease.²¹

TB-HIV co-infection is considered the leading cause of death in AIDS patients, as 22% of people diagnosed with co-infection died in 2015. Tuberculosis is believed to be the most common infectious disease in people living with HIV and has a major impact on the quality of life and mortality of this population because a person living with HIV is 28 times more likely to contract tuberculosis than a person living with HIV. You have no HIV. It is inferred that, in Brazil, the proportion of TB-HIV coinfection is 9.4%, that is, of the 69 thousand new cases of tuberculosis registered in 2016, 6.5 thousand also showed positive results for HIV.²²⁻³

Mortality rates among people living with HIV / AIDS (PLWHA) are still higher than rates in the general population, and tuberculosis-

led immunodeficiency-related diseases continue to contribute significant shares of deaths in developed and developing countries.²⁴⁻⁵ Nonetheless, prolonged antiretroviral drug-based treatments cause serious toxic effects, and this shows that while effective forms of combat exist, they are not being employed sufficiently effectively.²⁵

OBJECTIVE

- To determine the prevalence, epidemiological profile and characteristics associated with hepatitis A, B, C, syphilis and TB virus co-infection among HIV-infected individuals.

METHOD

This is a cross-sectional study, with descriptive design and qualitative approach, conducted through analysis of the notes of consultations made and documented in the outpatient card of the Communicable Chronic Diseases Complex of the Municipal Health Secretariat of São José do Rio Preto, São Paulo. Data were collected by the researcher using outpatient records from registered and / or follow-up patients, completed by the outpatient multidisciplinary team. The collection was performed from May to September 2018. Outpatient records of patients with hepatitis B, C, syphilis and TB co-infection among individuals infected with the human immunodeficiency virus were included.

Data was submitted to descriptive analysis, using the Statistical Package for Social Sciences (SPSS), version 23.0, presenting them as absolute and relative frequency, arranged in standardized descriptive cross-tables. Independent sociodemographic and behavioral variables were considered in the adopted statistical model and included in a multivariate analysis according to the Poisson regression model with robust variance. At this stage, the data were inferentially analyzed between the response variable (dependent) and the independent variables described above, in order to verify the level of dependence. In the analysis of possible associations between variables, the prevalence ratio (PR) and its 95% confidence interval (95% CI) were used as the association estimator.

RESULTS

314 outpatient records were selected. Data from 153 patient files were excluded from the final analysis because they did not contain at least 30% information regarding serology, sociodemographic data and risk factors or

were unavailable at the time of data collection.

One identified 161 outpatient records that met the inclusion criteria of patients with hepatitis A, B, C, syphilis, and TB co-infection among individuals infected with the human immunodeficiency virus (Table 1).

Table 1. Sociodemographic distribution of individuals infected with human immunodeficiency viruses with co-infection with hepatitis A, B, C, syphilis and TB viruses. Sao Jose do Rio Preto (SP), Brazil, 2018.

Characteristics	Co-infection - No		Co-infection - Yes		Total	
	n	%	n	%	n	%
Gender						
Female	25	22,32	5	10,20	30	18,63
Male	87	77,68	44	89,80	131	81,37
Age group						
Up to 20 years	9	8,04	3	6,12	12	7,45
21 to 40 years	76	67,86	32	65,31	108	67,08
41 to 60 years	21	18,75	12	24,49	33	20,50
> 60 years	6	5,36	2	4,08	8	4,97
Education						
Illiterate	1	0,89	0	0,00	1	0,62
Incomplete elementary school	5	4,46	1	2,04	6	3,73
Complete elementary school	1	0,89	1	2,04	2	1,24
Incomplete middle school	13	11,61	4	8,16	17	10,56
Complete middle school	1	0,89	0	0,00	1	0,62
Incomplete highschool	8	7,14	10	20,41	18	11,18
Complete highschool	35	31,25	14	28,57	49	30,43
Incomplete higher education	19	16,96	10	20,41	29	18,01
Complete higher education	29	25,89	9	18,37	38	23,60
Race/Color						
White	83	74,11	35	71,43	118	73,29
Black	2	1,79	3	6,12	5	3,11
Brown	26	23,21	11	22,45	37	22,98
Yellow	1	0,89	0	0,00	1	0,62
Occupation						
Inactive	13	11,61	1	2,04	14	8,70
Active	99	88,39	48	97,96	147	91,30
Marital status						
Single	81	72,32	38	77,55	119	73,91
Married	15	13,39	4	8,16	19	11,80
Separated	4	3,57	0	0,00	4	2,48
Divorced	3	2,68	0	0,00	3	1,86
Amassed	5	4,46	4	8,16	9	5,59
Stable union	0	0,00	1	2,04	1	0,62
Widow	4	3,57	2	4,08	6	3,73
Type of house						
Homeowner	28	25,00	17	34,69	45	27,95
Morgage holder	15	13,39	2	4,08	17	10,56
Leased	58	51,79	26	53,06	84	52,17
Given	8	7,14	3	6,12	11	6,83
Others	3	2,68	1	2,04	4	2,48
Income transfer programme						
Family welfare	3	2,68	0	0,00	3	1,86
Other	109	97,32	49	100,00	158	98,14
Total	112	100,00	49	100,00	161	100,00

Source: Outpatient records of registered and / or follow-up patients, completed by the multidisciplinary team of the Communicable Chronic Diseases Ambulatory of the Municipal Health Secretariat. São José do Rio Preto (SP), 2018.

Among the characteristics of sexual behavior and other vulnerabilities, (Table 2).

Table 2. Clinical characteristics and epidemiological history of individuals infected with the human immunodeficiency virus with co-infection with hepatitis A, B, C, syphilis and TB viruses. Sao Jose do Rio Preto (SP), Brazil, 2018.

Characteristics	Co-infection - No		Co-infection - Yes		Total	
	n	%	n	%	n	%
Sexual orientation						
Homosexual	51	45,54	29	59,18	80	49,69
Heterosexual	50	44,64	11	22,45	61	37,89
Bisexual	11	9,82	9	18,37	20	12,42
Three or more partners in life						
Não	6	5,36	1	2,04	7	4,35
Yes	106	94,64	48	97,96	154	95,65
Use of preservative						
Always	16	14,29	2	4,08	18	11,18
Never	9	8,04	3	6,12	12	7,45
Sometimes	87	77,68	44	89,80	131	81,37
History of other STDs						
No	63	56,25	4	8,16	67	41,61
Yes	49	43,75	45	91,84	94	58,39
Risk factors						
No	106	94,64	47	95,92	153	95,03
Yes	6	5,36	2	4,08	8	4,97
Use of drugs						
No	16	14,29	6	12,24	22	13,66
Yes	96	85,71	43	87,76	139	86,34
In Drug Use Currently						
No	42	37,50	15	30,61	57	35,40
Yes	70	62,50	34	69,39	104	64,60
Total	112	100,00	49	100,00	161	100,00

Source: Outpatient records of registered and / or follow-up patients, completed by the multidisciplinary team of the Communicable Chronic Diseases Ambulatory of the Municipal Health Secretariat. São José do Rio Preto (SP).

It was found that from the sample of 161 medical records of patients found in the outpatient clinic of the Communicable Chronic

Diseases Complex of São José do Rio Preto / SP (Table 3).

Table 3. Epidemiology distribution of individuals infected with the human immunodeficiency virus with co-infection with hepatitis A, B, C, syphilis and TB viruses.

Characteristics	Co-infection - No		Co-infection - Yes			Total	
	n	%	n	%	n	%	
Hepatitis A Virus							
HAV - No	112	100,00	46	93,88	158		98,14
HAV - Yes	0	0,00	3	6,12	3		1,86
Hepatitis B Virus							
HBV - No	112	100,00	42	85,71	154		95,65
HBV - Yes	0	0,00	7	14,29	7		4,35
Hepatitis C Virus							
HCV - No	112	100,00	47	95,92	159		98,76
HCV - Yes	0	0,00	2	4,08	2		1,24
Syphilis							
No	112	100,00	10	20,41	122		75,78
Yes	0	0,00	39	79,59	39		24,22
Tuberculosis							
No	112	100,00	48	97,96	160		99,38
Yes	0	0,00	1	2,04	1		0,62
Total	112	100,00	49	100,00	161		100,00

Source: Outpatient records of patients registered and / or followed-up, completed by the multidisciplinary team of the Communicable Chronic Diseases Complex of the Municipal Secretariat. Saúde de São José do Rio Preto (SP), Brazil.

The dependence between the variables was verified by the prevalence method, considering an error level of 5%, with a 95% probability of accuracy, using Poisson regression. It was also analyzed the prevalence ratio of the occurrence of the facts in relation to the beta value. In some inferential intersection blocks, it was necessary to apply the multiple linear

regression model, due to the fact that the variables that compose the model are not dichotomous definition (two possibilities of answers) or continuous variables (values). The results were analyzed in verification blocks, including clinical data, identification, data related to health and epidemiological situation.

In the analysis of the dependent variable “coinfection”, the Omnibus test showed that at least one of the model variables could be related to the dependent variable (coinfection). The value of p significance was presented when fitting the result (p = 0.000). It is understood that there is a real possibility

that at least one model variable is linked with “coinfection”. For the prevalence ratio (PR), the possible outcome of each analysis was analyzed, ie, through the Exp (B) analysis, the chance of the variable being linked to the variable “coinfection” was measured (Figure 1).

Variable	P Value	Prevalence Ratio	Outcome
HAV	0.000	3.80%	Addiction Evidence
HBV	0.014	27.90%	Addiction Evidence
HCV	0.000	3.80%	Addiction Evidence
Syphilis	0.000	4.40%	Addiction Evidence
TB	0.016	88.00%	Addiction Evidence

HAV = Hepatitis A virus; HBV = Hepatitis B virus; HCV = Hepatitis C virus; TB = tuberculosis; STDs = Sexually Transmitted Diseases.

Figure 1. Distribution of independent variables with the dependent variable of individuals infected with human immunodeficiency virus with co-infection with hepatitis A, B, C, syphilis and TB viruses. Sao Jose do Rio Preto (SP), Brazil, 2018.

Source: Outpatient records of registered and / or follow-up patients, completed by the multidisciplinary team of the Communicable Chronic Diseases Ambulatory of the Municipal Health Secretariat. São José do Rio Preto (SP).

The degree of dependence of the independent variables “condom use” (p = 0.041) and “history of other STDs” (p = 0.000) was observed.

Prevalence and characteristics associated with coinfection among people living with HIV/AIDS were analyzed using the Spearman

Correlation Test and statistical evidence of correlation with the variable “coinfection” was observed being the variable with the most power of correlation was syphilis (Figure 2).

Variable	Correlation	Significance	Level of correlation	Analysis
HAV	0.208	0.008	Low	Who has coinfection tends to have HAV
HBV	0.322	0.000	Moderate	Who has coinfection tends to have HBV
HCV	0.170	0.032	Low	Who has coinfection tends to have HCV
Syphillis	0.855	0.000	High	Who has coinfection tends to have syphilis
Occupation	0.156	0.048	Low	Who has coinfection tends to be active
History of other STDs	0.449	0.000	Moderate	Who has co-infection tends to have history of other STDs

HBV = Hepatitis B virus; HCV = Hepatitis C virus; STDs = Sexually Transmitted Diseases.

Figure 2. Distribution of correlation analysis of individuals infected with human immunodeficiency virus with co-infection with hepatitis A, B, C, syphilis and TB viruses. Sao Jose do Rio Preto (SP), Brazil, 2018.

Source: Outpatient records of registered and / or follow-up patients, completed by the multidisciplinary team of the Communicable Chronic Diseases Ambulatory of the Municipal Health Secretariat. São José do Rio Preto (SP), 2018.

DISCUSSION

In this study, the notes of consultations made and documented in the outpatient record at the Clinic of Communicable Diseases of the Municipal Health Secretariat of São José do Rio Preto, São Paulo, were analyzed. Data analysis was performed considering the following variables: coinfection, HAV, HBV, HCV, syphilis, TB, occupation, religion, marital status, race / color, gender, orientation of sexual desire, education, type of household, income transfer programs, past illnesses, condom use, three or more partners in their lifetime, history of other STDs, risk factors, drug use, and current drug use.

Among the 161 outpatient records, the sociodemographic data cited in Table 1 were analyzed, showing the predominance of males

(81.37%), with a mean age of 34 years ± 0.96 and a prevalent age range of 21 to 40 years (67.08%), complete high school (30.43%), self-reported white race / skin color (73.29%), active (91.30%) and single (73.91%). In comparison with a study conducted in ten municipalities in southwestern Goiás, from 2008 to November 2016, involving 323 records of co-infected seropositive patients registered in NCS / Jataí, that 175 (54.2%) were male and aged 35-54 years, and 22% had elementary school, self-declared brown were 58.8% and single, 57.3%. It is most likely due to the difference found in the item race / color to the characteristics of each region (southwestern Goiás and northwestern São Paulo), as well as the level of education.²³ It was evidenced by the socioeconomic, demographic, epidemiological and clinical

data of the 146 study participants, an important male prevalence (63.7%), with a mean age of 38.4 years.²⁴ In another study conducted in Goiânia, GO, it was shown that 353 respondents were at high risk for sexually transmitted infections. 81.3% were men, with a mean age of 36 years (range 18 to 86 years), elementary school with 53.3%, and self-reported multiracial (61%).²⁵

In a study conducted in the city of Tocantins, MA, 79% of 100 co-infected patients were men, with a predominant age range between 20 and 40 years (64%), self-declared brown race / color (42%) and educational level in elementary school (31%).²⁶ It was reported in the city of Ribeirão Preto, SP, after analyzing 498 medical records of patients undergoing clinical and outpatient follow-up, registered from 2004 to June 2010, in a referral center for people living with HIV / AIDS, 59.2% were male, with a mean age of 39.3 years, ranging from 17 to 71 years.²⁷ In a study conducted in Nepal in 2015, with 218 patients, 61% of whom were men, ranging in age from 20 to 65 years.²⁸

An investigation was conducted in the municipality of Caxias, MA, in the specialized care service, with the participation of 72 patients with HIV, and when compared with this study, 52.8% were female (against 18.63%), aged 30 to 40 years (versus 21 to 40 years), single marital status in 58.8% of the sample (versus 73.91%), with incomplete elementary school (54.2%), which contrasts with this study in which 30.43% had completed high school and self-declared browns were 68.1% versus 22.98% and active were 44.4% versus 91.30%.²⁹ It was found in a cross-sectional study conducted with 221 men and women treated at referral health services for the treatment of STIs in Fortaleza, that the majority, 132 (59.7%) were female, and the predominant age group was people aged 30 and over, 105 (47.5%). In terms of educational level, more than half reported having ten years or more of schooling, 132 (59.7%).

In addition, there was a predominance of participants who reported having brown skin color, 95 (43.0%), and coming from Fortaleza, 182 (82.4%). With regard to marital status, it was mentioned that 111 (50.2%) were in a consensual union, 68 (30.8%) said they were single and 19 (42.0%) revealed that they were married (civil and / or religious), and, in relation to occupation, 142 (64.3%) reported having employment.³⁰

It was considered that the studies cited, including this research, corroborate data from the literature regarding gender prevalence in most studies, which can be explained by the higher incidence of promiscuous behavior on the part of men, and this explanation seems to be insufficient.

Table 2 presents the clinical characteristics and epidemiological antecedents of individuals infected with the human immunodeficiency virus with hepatitis A, B, C, syphilis and TB co-infection. In this study, it was reported that, as for sexual orientation orientation, 49.69% were homosexual, 95.65% had three or more partners during life, 81.37% used condoms sometimes, 58.39% had a history of other STDs, 95.03% had no risk factors, 86.34% used drugs, and 64.60% are currently using drugs.

In a study conducted in Jataí, GO, it was pointed out that 30% were homosexuals, 20.6% had multiple partners, 33.3% used condoms and 30.3% used drugs.²³ A study was opposed to the results of this study showing that most of the 221 participants, 197 (89.1%), declared themselves heterosexual and 172 (77.8%) had a single sexual partner. Participants reported the use of alcohol and illicit drugs by 106 (48.0%) and ten (4.5%), respectively. Regarding condom use, 127 (57.5%) stated that they did not make use.³⁰

Heterosexuals showed that in a study conducted with 146 people with HIV in outpatient treatment, treated at a specialized care service of an integrated health center in the state of Piauí, Northeast region of Brazil, 86.3% of the sample.²³

Table 3 describes the epidemiological distribution of individuals infected with the human immunodeficiency virus with co-infection with hepatitis A, B, C, syphilis and TB viruses. It was evident that in this study, the prevalence of individuals infected with the human immunodeficiency virus with hepatitis A, B, C, syphilis and TB virus infection was not observed, therefore, the results of this study do not corroborate the literature data, It is notorious that HIV infection makes room for other infections, causing a drop in immunity and providing the rapid emergence of AIDS. Co-infection with hepatitis viruses was found to be some of the most relevant, and the most susceptible group is men over 40.¹

In a study conducted at Manipal Teaching Hospital, Nepal, between 2008 and 2013, 218

people with HIV were reported, 61% of whom were men, aged 20-65 years, and the overall rate of HBV coinfection and / or HCV was 7.3% (16 of 218 patients). Only seven (3.2% [CI 1.3, 6.5]) were found to be positive for markers of HIV and HBV infection and nine (4.1% [CI 1.9, 7.7]) were positive for markers of HIV and HCV infection.

It was explained by the authors that age-specific seroprevalence was not significantly different between HBV and HCV coinfection in HIV-positive patients, although it was marginally higher in the age group of 21 to 40 years, but HBV coinfection with HIV was higher among women than men [$p = 0.009$] and, curiously, all HCV-HIV coinfecting patients were male [$p = 0.014$]. Marital status has been found to be a significant factor. HCV coinfection was more closely related among HIV-positive unmarried patients to that of married patients [$p = 0.16$], and all HBV-HIV coinfecting patients were married [$p = 0.12$].²⁸

Regarding the prevalence ratio (PR), in this study, there was statistical evidence with all independent variables and those with the highest significance were HAV, HCV and syphilis. The highest rates of HIV coinfection found were TB (88.00%) and HBV (27.90%) (Figure 1). In addition, in a study conducted in the southern region of Santa Catarina, the prevalence of hepatitis B (HBV) was 23.1%; syphilis, 19.7%; 8.8% hepatitis C (HCV) and 8.8% HIV. Of the 13 HIV-infected patients, three were co-infected with HCV; four with syphilis and five with HBV, and the prevalence of HIV / Syphilis coinfection in the study was 16.2%.² In a study conducted in Jataí, GO, a prevalence rate of HBV coinfection (HBV: $p = 0.001$; RP = 1.09 - 1.01-1.16) and HCV ($p = 0.025$; RP = 1.02 - 1.01-1.03).

The main behavioral factors were mainly unprotected sex, multiplicity of partners and type of sexual intercourse with HIV / HBV coinfection, and drug use was determinant for *T. pallidum* contagion ($p = 0.040$; RP = 1.0), besides negatively influencing HBV coinfection.²³

It is believed that the reasons for the greater illness among tuberculosis cases in males may possibly be explained by their behavioral characteristics, such as their greater exposure to the disease or the difficulty in adhering to treatment.

CONCLUSION

It was concluded that all individuals infected with human immunodeficiency virus have an epidemiological profile of co-infection associated with hepatitis A, B, C, syphilis and TB viruses. It was found that there was statistical evidence of dependence between the coinfection variable with all variables independent of clinical data, and those with the highest significance were HAV ($p = 0.000$), HCV ($p = 0.00$) and syphilis ($p = 0.00$). The prevalence ratio showed that co-infected individuals tend to have syphilis and hepatitis B. The highest prevalence rates of HIV coinfection with TB (88.00%) and HBV (27.90%) were found. In the history of other STDs ($p = 0.00$), the explanatory power was higher in relation to the oscillation of the dependent variable (coinfection).

The contribution of this study to the advancement of scientific knowledge was found to address relevant aspects of the impact of sexually transmitted infections (STIs) on the health of HIV-infected individuals with co-infection with viral hepatitis, syphilis and TB. It was evident from the considerations and practical implications of the results that health professionals face challenges regarding patient reception and counseling, especially in view of the need to deal with diversity in sexual behavior and drug use. These challenges are directly related to personal perceptions and they are influenced by social, cultural and economic factors of the individuals involved in the process.

It is suggested, due to the high incidence of new cases of STDs and HIV / AIDS in Brazil, that other factors may influence sexual behavior regarding self-care and prevention of these infections. We need to reflect on why such an ancient infection, syphilis, is still a threat to public health. Health education and adherence to safe sexual practices become essential elements for the prevention of STD / AIDS.

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