Alchool use, adherence to antiretroviral treatment, immunological and virological parameters, surviral and religiosity/spirituality among persons living with HIV - over 4 Years

Uso de álcool, adesão ao tratamento antirretroviral, parâmetros imunológicos e virológicos, sobrevivência e religiosidade/espiritualidade em pessoas vivendo com HIV - 4 Anos

Consumo de alcohol, adherencia al tratamiento antirretroviral, parámetros inmunológicos y virológicos, supervivencia y religiosidad/espiritualidad entre personas que viven con el VIH - 4 años

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Abstract
Religiosity and spirituality have been associated with healthier behaviors and less depression in people living with HIV (PVHV) who attend monthly religious services. However, studies evaluating hospitalized patients and follow-up adherence to antiretroviral therapy (ART) are lacking. The aim of this study was to examine the influence of religiosity/spirituality on alcohol and substance use, depression, ART, immunological and virological parameters, hospitalizations, hospital costs, and survival among 84 PVHV hospitalized. Cohort study with follow-up of 4 years. The findings of this study show that patients with less use of alcoholic beverages are more likely to practice individual religious activities. Higher CD4 cell counts, lower viral load counts during hospitalization, better adherence to ART, and lower mortality over 4 years are associated high intrinsic religiosity in PLWH. Practice individual religious activities are associated with less use of alcoholic beverages, and spirituality with better adherence to ART, and lower mortality. In view of the benefits shown in this study and the literature, spiritual complementary approaches should be encouraged in hospitals and health institutions as an integrative approach to health.
Keywords: HIV; Spirituality; Religion; Antiretroviral therapy, highly active; Survivorship.

Resumo
Religiosidade e a espiritualidade têm sido associadas a comportamentos mais saudáveis e menos depressão em pessoas vivendo com HIV (PVHV) que frequentam cultos religiosos mensais. No entanto, faltam estudos avaliando pacientes hospitalizados e acompanhamento da adesão à terapia antirretroviral (TARV). O objetivo deste estudo foi examinar a influência da religiosidade/espiritualidade no uso de álcool e substâncias, depressão, adesão à TARV,

parâmetros imunológicos e virológicos, internações, custos hospitalares e sobrevida entre 84 pessoas vivendo com a imunodeficiência humana (PVIH) hospitalizadas. Estudo Coorte com seguimento de 4 anos. Os achados deste estudo mostram que pacientes com menor uso de bebidas alcoólicas são mais propensos a praticar atividades religiosas individuais. Contagens mais altas de células CD4, contagem de carga viral mais baixa durante a internação, melhor adesão à TARV e menor mortalidade em 4 anos estão associadas à alta religiosidade intrínseca em PVIH. Prática de atividades religiosas individuais estão associadas ao menor uso de bebidas alcoólicas e espiritualidade com melhor adesão à TARV e menor mortalidade. Diante dos benefícios demonstrados neste estudo e na literatura, as abordagens complementares espirituais devem ser incentivadas em hospitais e instituições de saúde como uma abordagem integrativa da saúde.
Palavras-chave: HIV; Espiritualidade; Religião; Terapia antirretroviral de alta atividade; Sobrevivência.

Resumen
La religiosidad y la espiritualidad se han asociado con comportamientos más saludables y menos depresión en las personas que viven con el VIH (PVHV) que asisten a servicios religiosos mensuales. Sin embargo, faltan estudios que evalúen pacientes hospitalizados y seguimiento de la adherencia a la terapia antirretroviral (TAR). El objetivo de este estudio fue examinar la influencia de la religiosidad/espiritualidad en el consumo de alcohol y sustancias, la depresión, la adherencia a TAR, los parámetros inmunológicos y virológicos, las hospitalizaciones, los costos hospitalarios y la supervivencia entre 84 personas que viven con la inmunodeficiencia humana virus (PVHV) hospitalizados. Estudio Cohorte con un seguimiento de 4 años. Los hallazgos de este estudio muestran que los pacientes con menor uso de bebidas alcohólicas son más propensos a practicar actividades religiosas individuales. Los recuentos de células CD4 más altos, los recuentos de carga viral más bajos durante la hospitalización, una mejor adherencia al TAR y una mortalidad más baja durante 4 años están asociados a la alta religiosidad intrínseca en las PLWH. La práctica de las actividades religiosas de los individuos está asociada al menor uso de bebidas alcohólicas y espiritualidad con una mejoría en el TAR y la menor mortalidad. En vista de los beneficios mostrados en este estudio y la literatura, los enfoques espirituales complementarios deben ser fomentados en hospitales e instituciones de salud como un enfoque integrador de la salud.
Palabras clave: VIH; Espiritualidad; Religión; Terapia antirretroviral altamente activa; Supervivencia.

1. Introduction

From data obtained worldwide, up to 37.7 [30.2-45.1] million people are living with the human immunodeficiency virus (HIV) (UNAIDS). In 2020, 1,5 million people were infected with HIV and 680,000 [480,000–1 million) people died from diseases related to acquired immunodeficiency syndrome (AIDS).

According to the Joint United Nations Programme on HIV/ AIDS (UNAIDS), the projection to 2030 is that AIDS becomes the third leading cause of death (Ministry of Health, 2011; 2012). The advance of health treatment and technological resources presents increased survival and reduction of secondary infections. However, HIV opportunistic infections and difficulties about soropositivity can bring different impacts on peoples' lives (Brazilian Institute of Geography and Statistics, 2012). Thus, the search for coping strategies for this condition has been addressed in many studies.

Religiosity/spirituality (R/S) are considered important constructs in facing problems for HIV/AIDS-infected patients (Caliari et al., 2018). The involvement R/S has also been correlated with improved mood, fewer depressive symptoms, greater well-being and less self-blame among individuals infected by HIV (Doolittle et al., 2018; Koenig, 2012), besides being associated with reduced mortality in the general population (VanderWeele et al., 2017). However, studies that assess the influence of R/S on behavioral habits, infection parameters and mortality in people living with HIV (PLWH) are lacking during hospitalization.

Aims and Hypotheses

This study assessed the influence of R/S on behavioral habits, adherence to antiretroviral therapy (ART), immunological and virological parameters, hospitalization, hospital costs, and survival among 84 PLWH hospitalized and followed up for 4 years. Our hypothesis was that high R/S would be associated with less use of alcohol and substances, greater adherence to treatment with antiretroviral drugs, preservation of CD4 lymphocyte cells, better control of viral load (VL), fewer hospitalizations and hospital costs, and greater PLWH survival.

2. Methodology

Search Strategy

This cohort study was designed and developed during one year and follow-up of four. Sampling selection was defined by convenience, since it is a closed sector, with population limited to a maximum number of nine patients, at Unit of Infectious and Parasitic Diseases (UDIP) of the Clinics Hospital of the Federal University of Triângulo Mineiro (HC/UFTM).

Sample

Consecutive patients admitted to the UDIP for 1 year were screened for HIV infection. Patients were eligible if they were 18 years of age or older, diagnosed with HIV and had sufficient cognitive ability to undergo a questionnaire assessment.

Of these, 101 respondents agreed to be interviewed; however, seventeen participants were excluded for not properly completing the survey instrument. Therefore, 84 PLWH were included in the study.

Data Extraction

At baseline, the clinical diagnosis was taken from the clinical record, and the VL and CD4 cell parameters were recorded during the hospital stay. Patients answered the questionnaire with sociodemographic interview about gender, age, education, marital and professional status (have a job and income), behavioral habits and at the 4-year follow-up.

Measures

The immunological and virological parameters in PLWH hospitalized were assessed VL and CD4 copies/ml cells count. These parameters were recorded during hospital stay and 4-year follow-up (2016-2019).

As adherence measures, we opted for objective measures of ART withdrawal using the Medication Logistic Control System of the Pharmacy Service (Siclom) and VL count.

According to the recommendations of the Ministry of Health (MS), the intake of 95% of the prescribed doses is considered necessary to successfully reduce VL. Siclom data-from the dates of medication withdrawal and the number of pills dispensed after the first and fourth years of hospitalization-allowed the identification of the regularity of withdrawal at the pharmacy, and whether patients would have enough medication to reach the measurement of MS membership. To calculate the follow-up period, the beginning of each year was recorded. Patients who stayed at least 90% of the time or more in follow-up with medication each year were considered adherent to ART.

Furthermore, all patients who adhered to ART and achieved viral suppression were considered adherent, indicating the presence or absence of undetectable VL (below 50 copies/ml). In this study, we considered viral suppression below 40 copies/ml (Günthard et al., 2016).

For survival assessment, the description of death in the patient's electronic medical record or information from the resident physicians of the UDIP was considered.

R/S involvement was evaluated by the Duke Religion Index (DUREL), a five-item scale (Koenig et al. 1997), translated into Portuguese (Moreira-Almeida et al., 2008) and validated for Brazil (Lucchetti et al., 2012), which measures three of the main dimensions of the religious involvement related to health: organizational religious activity (ORA), refers to the frequency at religious gatherings such as masses, cults, ceremonies, study or prayer groups, among others; nonorganizational religious activity (NORA), which includes frequency of private religious activities as prayers, meditation, reading of religious texts, listen to or watch religious programs on television or radio, etc; and intrinsic (or subjective) religiosity (IR), concerning the search of internalization and also the experiences of religiosity as the main objective of the

individual. Immediate ends are considered secondary and are achieved in line with the basic religious principles (Koenig & Bűssing, 2010).

Regarding the calculation of the score of the instrument, the domains are analyzed separately. The study findings with poor income sample demonstrated high internal consistency and suitable discriminant validity. The scores from ORA and NORA range from 1 to 6 and from IR, between 1 and 5. For categorical division between high and low ORA and NORA, the cutoff point higher or equal to 3 was used, and for IR, higher or equal to 10 points, according to a previous study (Stroppa & Moreira-Almeida, 2013).

Patients who met the inclusion criteria were invited to participate in the research, being informed about the objectives, methods, risks and benefits of the work, the voluntary nature of the participation and the confidentiality to be maintained.

Statistical analysis

For data analysis the SPSS software (Statistical Package for Social Science) version 21.0 was used. Data were submitted to descriptive analysis through simple, mean and standard deviation frequencies. In bivariate analysis, the nominal variables were re-categorized, becoming dichotomous: marital status (with or without partner), education (up to 8 years or over), income (with or without), professional (employed or unemployed), smoking (yes or no), alcohol use (yes or no), illicit drug use (yes or no), CD4 cell count (≤ 250 or ≥ 251) and VL (≥ 41 or ≤ 40), Adherence to ART (regular: VL ≤ 40 and Dispensing antiretrovirals ≥ 10 months; irregular: VL ≥ 41 and Dispensing antiretrovirals <10 months). Then, the Chi-square or Fisher exact tests were applied among dichotomized variables in order to verify association and Poisson regression analysis. Student's T and Mann-Whitney tests were used for quantitative variables, and Kaplan Meier for survival analysis. P <0.05 considered significant.

Ethical aspects

This study is part of the research entitled "Impact of spirituality/religiosity in the context of health in individuals", approved by the Research Ethics Committee of the Federal University of Triângulo Mineiro, under opinion No. 2.770.936, CAAE 53403115.9.0000.5154. All participants signed the Free and Informed Consent.

3. Results and Discussion

Results

Sample Characteristics and **Demographic Variables**

In total, 84 PLWH were included in the study. Of the respondents, 59.5% were male. The average age was 41 years ($\pm$ 12.58), most of them (61.9%) had not completed elementary school, 66.6% received until 3 minimum wages, and 23.81% had no income (Table 1).

Table 1 - Sociodemographic characteristics of the study sample (N=84).

Variables	N	%
Sex		
Male	50	59,52
Female	34	40,48
Breed		
White	22	26,19
Non-white	62	73,81
Profession		
Retired	19	22,62
From home	11	13,10
Employee	16	19,05
Autonomous	22	26,19
Unemployed	16	19,05
Education		
Illiterate	3	3,57
Incomplete fundamental	52	61,90
Complete fundamental	17	20,24
High school	6	7,14
Graduation or more	6	7,14
Marital status		
Single	34	40,48
Married or with a partner	34	40,48
Widower	9	10,71
Divorced	7	8,33
Income (BRL)		
No income	20	23,81
Up to 1 (MW)	24	28,57
More than >1 to 3 MW	32	38,10
More than >3 a 5 MW	7	8,33
More than >5 a 10 MW	1	1,19

Legend: N: sample size; %: Percentage; MW: minimum wage. Source: Authors.

The study population cited in Table 1 was mostly non-white, with low education and family income.

Alcohol and substance use

As for use of psychoactive substances, 44% were considered in relation to tobacco, 36,9% related to alcoholic beverages and 17.8% to drug addiction. Table 2 shows participants' religious designation, clinical diagnoses, and alcohol and substance use.

Table 2 - Participants' religious designation, clinical diagnoses, HIV time and behavioral habits (N =84).

Variables	N	%
Religion		
Catholic	36	42,86
Evangelical	19	22,62
Spiritist	12	14,29
Without religion	7	8,33
Another religion	7	8,33
More than one religion	1	1,19
Ignored	2	2,38
Clinical diagnosis		
Retrovirus	17	20,24
Lung diseases	14	16,67
Neuropathies	15	17,86
Heart disease	2	2,38
Kidney disease	4	4,76
Digestive diseases	10	11,90
Herpes	1	1,19
Hematological diseases	1	1,19
More than one clinical diagnosis	6	7,14
Others	14	16,67
HIV time		
< 6 months	23	27,38
6 months to 5 years	10	11,90
5 years to 10 years	18	21,42
> 10 years	21	25,00
Ignored	12	14,29
Smoker		
No	34	40,48
Yes	37	44,04
Stopped	12	14,29
Ignored	1	1,19
Smoking score		
No and/or stopped smoking	46	55,42
Yes	37	44,58
Alcoholism		
No	34	40,48
Yes	31	36,90
Stopped	18	21,43
Ignored	1	1,19
Alcoholism Score		
No and/or stopped drinking	52	62,65
Yes	31	37,35
Illicit drug use (IDU)		
No	52	61,90
Yes	15	17,86
Stopped	15	17,86
Ignored	2	2,38
UDI score		
No and/or stopped	67	81,71
Yes	15	18,29

Legend: N: sample size; %: Percentage. Source: Authors.

Most of the participants described in Table 2 reported being Catholic, 27% had a recent HIV diagnosis and most had been diagnosed for more than 5 years.

Religiosity/Spirituality

When questioned about how often they go to a church, temple or other religious gathering, 37.5% of the patients answered they attend it once a week or more; 17% twice or three times per month; 14.8% some times a year or less; 18.2% once a year or less, and 12.5% reported never attending. "Never" was considered for the patients who had not attended any religious meeting in the last year.

Concerning the frequency with which patients spend their time with individual religious activities, such as prayers, meditations, Bible reading or other religious texts, 47.8% reported doing such practices once or more times a day; 4.5% twice or more times a week; 17% a few times per month and 19.3% rarely or never.

Regarding the assessment of the IR, 63.6% reported being "completely true" that "in my life, I feel the presence of God" (or the Holy Spirit), while 22.7% answered "It is not true". Regarding the sentence "My religious beliefs are really behind all my way of life", 37.5% reported being "completely true for me" and 31.8% said "It is not true". Moreover, with respect to the sentence "I make huge efforts to live my religion in all aspects of life," "totally true" was chosen by 33% of the patients and 38.6% answered "It is not true." In terms of the analysis of ORA, NORA and IR, the majority, 54.5% 59.1 and 56.8%, were respectively high.

Immunological and Virological Parameters

For the analytical parameters of infection, it was found a mean CD4 and VL of 239,36 ± 262.57 and 207.192,80 ± 681168,24 in hospitalization, respectively. During follow-up, the CD4 and VL values were 389.20 ± 286.36 at 1 year; 328.46 ± 239.94 in 2 years; 328.46 ± 239.94 in the 3rd year and finally, 424.11 ± 288.70 in the 4th year.

In the total PLWH with analytical values of VL (81%), only 25 subjects (29.8%) had undetectable count in blood (≤40 copies/mL) during hospitalization, which corresponds to a null value of log (HIV). During follow-up, we observed a reduction in the outpatient follow-up of HIV-infected patients. In 1 year 57.1% had analytical values of VL, which 34 (40.5%) were undetectable; 59.5% had analytical values of VL in 2 year with 35 (41.7%) undetectable count of LV; at 3 year, 51.2% had an analysis of LV with 32 (38.1%) with undetectable values; and 42 (50%) had analysis of VL, however only 28 (33.3%) were undetectable.

Length of stay and deaths

With regard to follow-up, we observed a reduction in the number of hospitalizations by ≥ 4 days during the follow-up period. Nine (11.5%) deaths occurred during hospitalization and 17 (23.3%) during follow-up (Table 3).

Table 3 - Length of stay and deaths.

Variables	N	%
Internation - 1-year of follow-up		
< 4 days	57	91,94
≥ 4 days	5	8,06
Internation - 2-yeasr of follow-up		
< 4 days	53	94,64
≥ 4 days	3	5,36
Internation - 3-year of follow-up		
< 4 days	47	92,16
≥ 4 days	4	7,84
Internation - 4-year of follow-up		
< 4 days	45	100,00
≥ 4 days	0	0,00
Death - year of admission		
No	69	88,46
Yes	9	11,54
Death - 1-year of follow-up		
No	63	91,30
Yes	6	8,70
Death - 2-years of follow-up		
No	60	95,24
Yes	3	4,76
Death - 3-years of follow-up		
No	59	98,33
Yes	1	1,67
Death - 4-years of follow-up		
No	52	88,14
Yes	7	11,86
Death during follow-up		
No	53	72,60
Yes	17	23,29
Ignored	3	4,11

Legend: N: sample size; %: Percentage. Source: Authors.

We observed in 4-years of follow-up that there were no prolonged hospital stays ($\geq$ 4 days), as described in Table 3. Regarding ART dispensing, 29.6% were regular in 1-year follow-up and only 26.8% had regular dispensing.

In bivariate analysis, the practice of individual religious activities, in NORA dimension, PLWH with alcoholic beverage use have 0,405 chance of having low NORA, compared to patients who are not alcoholics (p= 0,040), see Table 4. The other variables showed no significant difference in the outcomes assessed.

Table 4 - Association between NORA and anxiety, depression, alcohol use, ART dispensing, and death in PLWH.

Variables	NORA		p
	Low N (%)	High N (%)	
Anxiety score			
Low	15 (39,47)	23 (60,53)	0,734
High	19 (43,18)	25 (56,82)	
Depression score			
No	14 (35,90)	25 (64,10)	0,330
Yes	20 (46,51)	23 (53,49)	
Alcohol use			
No	17 (32,70)	35 (67,30)	**0,040***
Yes	17 (54,80)	14 (45,20)	
ART dispensing score - 1-year of follow-up			
Irregular	8 (33,33)	16 (66,67)	
Regular	26 (46,61)	31 (54,39)	0,306
ART dispensing score - 4-years of follow-up			
Irregular	9 (40,91)	13 (59,09)	0,844
Regular	26 (43,33)	34 (56,67)	
Deaths during hospitalization			
No	23 (43,40)	30 (56,60)	0,872
Yes	7 (41,18)	10 (58,82)	

Legend: N: sample size; %: percentage. *P<0.05: statistical significance. Pearson's Chi-square test. Source: Authors.

Patients with high IR had higher ART dispensing scores and lower VL counts at 1 year of follow-up (p=0,038) and 4 year of follow-up (p=0,005), in addition to fewer deaths at 4 years of follow-up (Table5).

Table 5 - Association between anxiety, depression, adherent to ART and death during hospitalization and follow-up in PLWH.

Variables	IR		p
	Low N (%)	High N (%)	
Anxiety			
Low	15 (39,47)	23 (60,53)	0,453
High	21 (47,73)	23 (52,27)	
Depression			
No	15 (38,46)	24 (61,54)	0,344
Yes	21 (48,84)	22 (51,16)	
ART dispensing scores + VL at 1-year of follow-up[1]			
Irregular + VL≥41	22 (56,4)	17 (43,600)	
Regular + VL≤40	12 (33,30)	24 (66,70)	**0,038***
ART dispensing scores TARV+ VL at 4-years of follow-up[1]			
Irregular + VL≥41	20 (62,50)	12 (37,50)	
Regular + VL≤40	8 (26,70)	22 (73,30)	**0,005***
Deaths during hospitalization			
No	23 (43,40)	30 (57,70)	
Yes	10 (58,82)	7 (41,18)	0,268
Deaths during 4-year of follow-up			
No	22 (42,30)	30 (56,60)	
Yes	6 (88,70)	1 (14,30)	**0,038***

Legend: N: sample size; %: percentage.; VL: viral load; *P<0.05: statistical significance. Fisher's Exact Test. Source: Authors.

The IR dimension was associated with greater adherence to ART during the follow-up period and less death in 4 years of follow-up, cited in Table 5.

In the analysis of immunological and virological parameters (CD4 and VL), number of hospitalizations, and hospital costs throughout the study period, we observed significantly higher CD4 cell counts and lower VL counts during hospitalization. Table 6 presents the results.

Table 6 - Relationship between R/S and immunological and virological parameters, number of hospitalizations and costs throughout the study.

Variables	ORA		P
	Low Mean ± SD	High Mean ± SD	
CD4 during hospitalization (n=68)[1]	232,68 ± 292,96	245,30 ± 236,40	0,534
CD4 at 4-years of follow-up (n=26)	453,53 ± 328,91	394,69 ± 252,15	0,613
VL during hospitalization (n=68)[1]	323449,2 ± 911833,4	115411,5 ± 410997,7	0,342
VL at 4-years of follow-up (n=42)[1]	19012 ± 68496,47	14517,5 ± 52106,97	0,685
Total number of hospitalizations	2,63 ± 3,68	2,28 ± 3,59	0,785
Mean Billed Amount	908,03 ± 778,66	1204,22 ± 1227,79	0,105
Total amount spend	1913,48 ± 1730,44	2129,84 ± 2052,75	0,843
hospitalization costs	902,84 ± 600,74	1168,189 ± 1144,20	0,502
NORA			
CD4 during hospitalization (n=68)[1]	223,48 ± 205,17	249,82 ± 296,38	0,577
CD4 at 4-years of follow-up (n=26)	314,58 ± 219,92	518,00 ± 314,31	0,072
VL during hospitalization (n=68)[1]	301918,8 ± 975191,4	152119,6 ± 433936,5	0,880
VL at 4-years of follow-up (n=42)[1]	18566,88 ± 57856,57	15359,52 ± 62152,65	0,119
Total number of hospitalizations	3,00 ± 4,41	2,1 ± 3,01	0,412
Mean Billed Amount	901,43 ± 758,60	1193,93 ± 1218,30	0,133
Total amount spend	2065,75 ± 1938,07	2000,50 ± 1895,91	0,082
hospitalization costs	842,53 ± 627,01	1199.42 ± 1100,47	0,076
IR			
CD4 during hospitalization (n=68)[1]	125,20 ± 157,76	324,25 ± 293,06	**0,002***
CD4 at 4-years of follow-up (n=26)	303,4 ± 233,95	499,56 ± 300,48	0,092
VL during hospitalization (n=68)[1]	341223,5 ± 955519,2	124221,5 ± 427862,2	**0,004***
VL at 4-years of follow-up (n=42)[1]	41176,2 ± 95408,49	3036,37 ± 13738,8	0,067
Total number of hospitalizations	3,62 ± 4,87	1,60 ± 2,02	0,098
Mean Billed Amount	978,79 ± 758,69	1149,54 ± 1260,38	0,721
Total amount spend	1405,33 ± 1074,11	2496,60 ± 2237,29	0,907
hospitalization costs	1045.27 ± 756,03	1048,95 ± 1087,93	0,543

Legend: SD: standard deviation; *P<0.05: statistical significance. Student's T test[1]; Mann-Whitney test. Source: Authors.

In addition, patients with low RI were hospitalized twice as often (3.62 ± 4.87) as those discharged (1.60 ± 2.02), although the difference was not significant (p= 0.098), cited in Table 6. Regarding the survival of PLWH over the course of the study, we found a significant difference between patients with high IR and those with lower mortality only at 4 years of follow-up (p= 0,038) (Figure 1).

Figure 1 - Cumulative survival and Intrinsic Religiosity throughout the study.
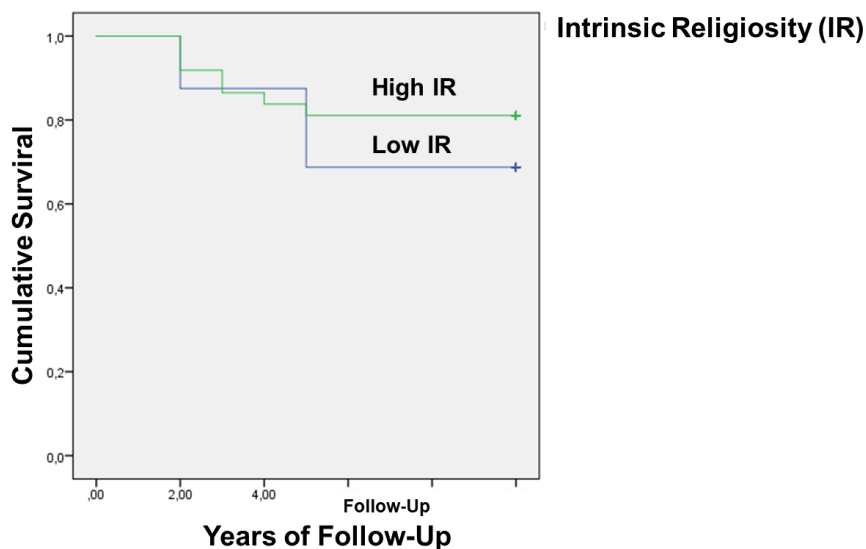
Source: Authors

Discussion

The analysis of the results showed that patients with high practice of individual religious activities have less use of alcoholic and high IR is associated with better immunological and virological parameters during hospitalization, greater adherence to ART, and lower mortality over 4 years.

Regarding the use of alcoholic beverages, the research found that an increase in NORA was associated with less alcohol intake. This result is consistent with that of a review of studies, in which religious people have better behavioral habits. Religions often influence health behavior decisions, discouraging the use of excessive amounts of alcohol, which is associated with negative consequences for health (Kaplan & Berkman, 2011). Furthermore, a meta-analysis showed that individuals who used alcohol were twice as likely to be nonadherent to ART (34% nonadherence among alcohol users vs. 18% among nonusers). The combined effect of alcohol use was associated with viral non-suppression (Velloza et al., 2020).

In this study, HIV-infected patients with high IR had betters immunological indicators during hospitalization, higher CD4 and lower VL counts, good adherence to ART, and fewer hospital admissions throughout the study, and therefore, greater 4-year survival. Cohort studies conducted in other countries have shown that good adherence enhances the survival rate of patients with PLWH (Siraj et al., 2022; Abuto et al., 2021; Kebede et al., 2020). ART enhances the survival of HIV-positive patients by reducing VL and increasing CD4 counts. When the CD4 count increases, patients are more protected against opportunistic infections and HIV transmission is reduced (Siraj et al., 2022).

Studies have shown that patients reporting an increase in spirituality after HIV diagnosis had lower rates of loss of CD4 cells and long survival was significantly related to both frequency of prayer (Ironson et al., 2002; 2006; 2016), including those who were followed up in outpatient clinics (Pinho et al., 2017; Emlet et al., 2018). In study with women infected-HIV,

the authors highlighted the importance of spirituality in physical and mental health and wellbeing in this population (Arrey et al., 2016). A recent meta-analysis elucidating the mechanism of the influence of R/S on physiological markers of health showed that measures of extrinsic and intrinsic religiosity are significantly associated with health (Shattuck et al., 2020). Additionally, review of several studies has shown that religious involvement is associated with reduced mortality in the general population (VanderWeele et al., 2017).

Finally, it is necessary to point out the limiting factor for the selection of participants in a convenience sample since it involved only hospitalized patients. However, the results found and similar studies are relevant to sensitize health professionals who care for PLWH to be aware of the possible facilitators of healthy coping with infection as well as to subsidize religious/spiritual care interventions during hospitalization. In addition, there was no replication of the religiosity questionnaire to assess whether, after hospitalization, the patients became more religious and/or spiritualized. As follow-up occurred only in patients who were followed up at the outpatient clinic, it was not possible to identify whether the hospitalizations were only for HIV-related reasons. Another limitation was not identifying the beginning of ART, considering that early initiation of ART is crucial to the survival rate of HIV-infected patients. Patients who started ART at WHO stage I had better survival outcomes than those with stage IV disease (Siraj et al., 2022).

4. Conclusion

Less alcohol use is associated with a high practice of individual religious activities. Higher CD4 cell and lower viral load counts during hospitalization, better adherence to ART, and lower mortality over 4 years are associated high intrinsic religiosity in PLWH. In view of the benefits shown in this study and the literature, spiritual complementary approaches should be encouraged in hospitals and health institutions as an integrative approach to health.

Further investigations are needed in long follow-ups of adults and children living with HIV, requiring strict adherence to treatment, regarding their medical conditions. Future studies should evaluate the benefits of R/S interventions in people living with a variety of chronic medical conditions.

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