2024, Retos, 51, 1014-1022

Comparación del Nivel de Estrés, el Nivel de Actividad física Habitual y el Perfil Inmunológico de Las Personas Que Viven Con el VIH

Comparison of Stress Level, Habitual Physical Activity Level and Immune Profile of People Living With HIV

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Abstract. The objective of this study was to compare the level of stress, the habitual level of Physical Activity and the immunological profile of people living with HIV. The present study had as sample 307 individuals of both sexes, $\bar{X} = 46.8 \pm 9.2$ years, with positive HIV serology. Socioeconomic information was collected using an instrument, CD4+ lymphocyte count and HIV viral load were collected from the patients' medical records. Stress level was assessed using Lipp's Stress Symptom Inventory (ISSL), and Baecke's questionnaire was used to classify physical activity level. The Man-Whitney test was used to compare the variables and the Spearman test to verify the relationship between the variables adopting $p < 0.05$ as the significance level. As a result, the study showed that 26.9% of the individuals are in the stress exhaustion phase, in relation to the level of physical activity, 28.2% were identified as "active", 23.1% as "very active", 23.1% as "insufficiently active", and 24.1% as "sedentary". The presence of stress was prevalent in sedentary individuals (13.6%) with longer duration of infection (27.3%) and with lymphocyte counts above 500mm (43.3%). The CD4+ count showed a significant result when compared to the level of stress, (U=1848.50; p=0.02). A relationship between depression/anxiety and stress was identified ($r = 0.407$; $p > 0.001$). We conclude that the presence of stress has an effect on TCD4+ count and that the higher the depression/anxiety symptoms the higher the stress level in PLHIV.
Keywords: Viral Load, CD4 Lymphocyte Count, Psychological Stress, HIV

Resumen. El objetivo de este estudio fue comparar el nivel de estrés, el nivel habitual de Actividad Física y el perfil inmunológico de personas viviendo con VIH. El presente estudio tuvo como muestra 307 individuos de ambos sexos, $\bar{X} = 46,8 \pm 9,2$ años, con serología VIH positiva. La información socioeconómica se recogió mediante un instrumento, el recuento de linfocitos CD4+ y la carga viral del VIH se recogieron de las historias clínicas de los pacientes. El nivel de estrés se evaluó mediante el Inventario de Síntomas de Estrés de Lipp (ISSL), y el cuestionario de Baecke se utilizó para clasificar el nivel de actividad física. Se utilizó la prueba de Man-Whitney para comparar las variables y la prueba de Spearman para verificar la relación entre las variables adoptando $p < 0,05$ como nivel de significación. Como resultado el estudio presentó que 26,9% de los individuos se encuentran en la fase de agotamiento por estrés, en relación al nivel de actividad física, 28,2% fueron identificados como "activos", 23,1% como "muy activos", 23,1% como "insuficientemente activos", y 24,1% como "sedentarios". La presencia de estrés fue prevalente en los individuos sedentarios (13,6%), con mayor tiempo de infección (27,3%) y con recuentos de linfocitos superiores a 500 mm (43,3%). El recuento de CD4+ mostró un resultado significativo cuando se comparó con el nivel de estrés, (U=1848,50; p=0,02). Se identificó una relación entre depresión/ansiedad y estrés ($r = 0,407$; $p > 0,001$). Concluimos que la presencia de estrés tiene un efecto sobre el recuento de TCD4+ y que cuanto mayores son los síntomas de depresión/ansiedad mayor es el nivel de estrés en las PVVIH.
Palabras clave: Carga viral, Recuento de linfocitos CD4, Estrés psicológico, VIH

Fecha recepción: 18-03-23. Fecha de aceptación: 04-07-23
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Introduction

The Human Immunodeficiency Syndrome (AIDS) was first described and identified around 1981, becoming, since then, a challenge to the world public health (MELO, 2019). In the first cases of contamination, in the 1980s, the presence of a retrovirus of the Lentiviridae family was identified in infected people, which significantly destroyed the body's defence cells, leaving the immunity of these people extremely low and susceptible to various types of infections. Thus, the world became aware of the Human Immunodeficiency Virus, HIV (ANDRADE, *et al.*, 2021).

A study by Leierer, *et al.,* 2021 investigated changes in mortality rates and predictors of all-cause mortality, as well as specific causes of death overtime among HIV-positive individuals associated with the use of antiretroviral therapy (ART). However, the study identified that with an increase in the duration of ART use) there was not only a decline in mortality rates, but also a change in causes of death. Although AIDS-related mortality remains an important public health problem, increasing numbers of deaths have been reported due to non-defining conditions of this disease, such as cancer, infections, liver disease and cardiovascular disease (LEIERER, *et al.*, 2021; MOURA, *et al.*, 2021).

Despite the great benefit of the institution of drug therapy in people living with HIV (PLHIV), ART also has potential side effects and does not guarantee the full health of the individual when used alone (KAY, *et al.*, 2018; LUO, et al., 2019).

Neuropsychiatric disorders such as nervousness, sleep disorders, depression and anxiety can arise as a direct consequence of drug treatment, as well as also due to aspects

of emotional and psychological origin that culminate in stress in PLHIV. What impairs immunity, viral load control and consequently the quality of life of these people. (MOURA, *et al.,* 2021; BILARDI, *et al.,* 2019; HIPOLITO, *et al.,* 2017).

The diagnosis of HIV infection brings about drastic changes in the patients' lives. Thus, the future perspective may be uncertain, with reformulation of personal and professional goals and relationships, as well as doubts may arise about the effectiveness of the treatment. Furthermore, the relationship with feelings of inferiority and devaluation as a result of suffering generated by discrimination and the presence of negative stereotypes about PLHIV is frequent. In this context, such circumstances have the potential to cause stress and consequently biological decline, leading to a low immune response and higher viral loads (CALVETTI, *et al.*, 2017; PATRÍCIO, *et al.,* 2019).

HIV related stigma is a factor that contributes to a series of psychosocial impacts, causing in the patient carrying the virus a succession of changes in interpersonal relationships, in the professional sphere and relationships, as well as in their beliefs regarding the treatment (SULLIVAN, *et al.*, 2020; GAMARAEL, *et al.,* 2018).

In this scenario, feelings such as shame for disclosing the diagnosis to sexual partners and family members, difficulty in accepting the disease and uncertainty about the future may arise. Thus, the social isolation experienced by these people allows them to be framed as a vulnerable population and more likely to have low family income, unemployment, drug/alcohol use and low education (KAY, *et. al.*,2018).

All these factors can contribute to an increase in stress in this population, irritability, as well as a greater propensity to present depressive mood. As a consequence, PLHIV may present worse disease control over the years (CALVETTI, *et al.*, 2017; GALANO, *et al.*, 2016).

Psychological stress and family disruption may be related to the lack of adaptation and acceptance of the HIV-positive condition, and may influence treatment adherence. This means not following the regular monitoring to the health service, irregular taking of medications with inappropriate doses and for inadequate time. This scenario shows the importance of family support as a way of preventing stressful situations and enabling conditions for a better adherence to treatment (CAMARGO, *et al.,* 2014).

Considering the above, this article aims to identify the level of stress and the immunological profile of people living with HIV with different levels of physical activity.

Materials and Methods

This research is an observational, cross-sectional study. The sample comprised 307 individuals aged between 18 and 60 years ($\bar{X}$= 46.8 ± 9.2 years) of both genders, being 155 (50%) females ($\bar{X}$= 47 ± 9.6 years) and 152 (50%) males ($\bar{X}$= 45.3 ± 8.9 years) all positive for HIV, All of them were HIV positive, had been receiving treatment for at least one year and were enrolled in the STD/AIDS program at a university hospital or at the Hospital Universitário Gaffrée e Guinle - HUGG, of the Universidade Federal do Estado do Rio de Janeiro - UNIRIO.

This study was approved by the Ethics Committee of the Hospital Universitário Gaffrée e Guinle - HUGG of the Universidade Estadual do Rio de Janeiro (5.261.483), and all ethical standards indicated by the Declaration of Helsinki were followed. All participants were informed about the characteristics of the project by the principal investigator and gave their written consent before participating in the study.

The interviews with patients were conducted on the days scheduled for collection of exams or medical appointments, in a private environment, from March to September 2022 and based on the application of questionnaires. People aged 18 years or older were eligible for the study; patients with confirmed HIV diagnosis and availability of viral load and CD4 results. Users of illicit drugs, carriers of acute infections or opportunistic diseases and pregnant women were excluded from the study. lactating women and people with cognitive impairment that precluded participation in the study.

Instruments

To collect socio-demographic data and clinical characteristics we used a specific instrument. Table 1 shows the characterization of the groups and variables used in the study.

Information on CD4+ count and HIV viral load was collected from the patients' medical records and through the Laboratory Test Control System (SISCEL). These exams were all performed by the same laboratory. CD4+ count was performed by flow cytometry and HIV viral load (CV) was quantified by nucleic acid sequence-based amplification technique (NASBA® Orga-non Teknica, Boxtel, Holland), with detection limit above 50 copies/ml.

The result of the laboratory test closest to the interview date of each participant was used, with a maximum of 6 months from the date of the interview.

To assess psychological stress, Lipp's inventory of stress symptoms (Lipp, 2000), validated by Lipp and Guevara (1994), was applied. The ISSL proposes an evaluation that allows the stress grading in four phases (alert, resistance, near-exhaustion and exhaustion).

The questionnaire is composed by 03 tables that totalize 53 stress symptoms, divided into Physical and Psychological. Scores above 06 in frame 1 allow the identification of stress in the alert phase, characterized by the presence of stress in the last 24 hours. Frame 2 takes into consideration symptoms of the last week and a score above 3 indicates presence of stress in the resistance phase and over 9, in the near exhaustion phase. In chart 3, a score above 8 in the last month indicates presence of stress in the exhaustion phase. A percentage of stress symptoms was obtained from each frame and the highest percentage was the phase the participant was in. In case of a tie, the most advanced phase was considered.

Table 1.
Categories of the groups and variables used in the study.

Groups	Variables	Questions	Categories
SOCIODEMOGRAPHIC	Sex	What is your gender? The biological criterion was used as the criterion for the dichotomization	Female Male
	Age Groups*	How old are you?	18 - 48 years old ≤ 60 years old*
	Education	What is your level of education? The median of the time of study noted in the database was adopted	Primary Incomplete Elementary School High School Higher Education Post-Graduation
	Marital Status	What is your marital status? We considered the references adopted in Brazil	Single Married/Living together Separated Widower
	Occupation	What has been your main occupation (job title/profession)?	Formal Work Informal Work
	Income (minimum wage/month)	What is your monthly income?	≤1 salary >1 - 3 salary > 3 - 5 salary > 5 salary
LIFESTYLE AND HEALTH DIAGNOSES AND SYMPTOMS	Smoking	Do you smoke frequently?	No Yes
	Alcohol	Consumption Do you often drink alcohol?	No Yes
	Physical Activity	You Practice Physical Activity?	No Yes
	Depression/Anxiety	Do you usually have bouts of depression and anxiety?	No Yes
	Comorbidities	Number of diagnosed diseases	0 1-2 3-4
CLINICAL FEATURES	Diagnostic Time	How many years ago were you diagnosed with HIV?	1 - 16 years ≤ 30 years
	Viral Load	Information from SISCEL database	Detected Not Detected
	Ways of Contagion	How do you think you became infected with HIV?	Don't Know Sexual Way Other**
	CD4/mm^3 blood	Information taken from the SISCEL database	≤ 200 >200 e ≤ 500 >500

* Age range and time of diagnosis were organized according to median group **blood transfusion, parental route, infected syringe use.

To assess the level of physical activity, the AFH Baecke Questionnaire was used, which is a self-administered questionnaire on habitual physical activity, made up of 16 questions that cover three scores of habitual physical activity over the last 12 months and that analyzes three main components, being These: 1) score two indices of non-work physical activities, with eight quests, 2) score two indices of non-lazer sport, with four quests, and 3) score two indices of lazer and locomotion physical activity, with four quests excluding or sport. Or score two indices of habitual physical activity or somatório two three indices. In this way, the higher the score, the higher the level of physical fitness of the individual, the question being used to stratify and create two groups (BAECKE; BUREMA; FRIJTERS, 1982). For the classification of two groups, an interquartile interval was considered (25th and 75th percentile).

Data Analysis Procedure

All statistical analyzes were performed in the IBM SPSS Statistics 25 program. (Inc., Chicago, IL, USA). The data were analyzed descriptively and presented as mean and standard deviation. For the categorical variables, the absolute and relative frequencies were used to represent two results. The analysis of the distribution of normality of two data of the sample was carried out by means of Kolmogorov-Smirnov. For the comparisons between the groups subdivided by variable stress, the Man-Whitney test was used. The Spearman correlation test was used to analyze the possible correlations between the study variables. The present study was admitted or the significance level of $p < 0.05$.

Results

Table 2 presents the characterization of the sample profile, according to the sociodemographic variables, lifestyle, health diagnosis and clinical characteristics. 307 people participated in the study, being 49.8% female and 50.2% male. The predominant age group in the research was 18 to 48 years old, presenting as mean ($\bar{X}$= 46.8 ± 9.2), or corresponding to 53.4% of the sample.

Table 2.
Characterization of the Sample Profile, according to the sociodemographic variables, lifestyle, health diagnosis and clinical characteristics.

Variables	Frequencies N (%) 307 (100)	Female n (%) 153 (49,8)	Male n (%) 154 (50,2)
SOCIODEMOGRAPHIC			
Age			
18 - 48 years old	164 (53,4)	79 (25,8)	85 (27,6)
≤60 years old	143 (46,6)	74 (24,2)	69 (22,4)
Education			
Primary Incomplete	27 (8,8)	10 (3,3)	17 (5,5)
Elementary School	104 (33,8)	45 (14,6)	58 (19,2)
High School	144 (46,9)	81 (26,6)	63 (20,3)
Higher Education	32 (10,5)	17 (5,5)	11 (5)
Marital Status			
Single	202 (65,7)	83 (27)	119 (38,7)
Married/Living together	54 (17,5)	33 (11)	21 (6,7)
Separated	35 (11,5)	27 (8,8)	8 (2,7)
Renda			
Sem Renda	38 (12,3)	26 (8,5)	12 (3,8)
≤1 salary	97 (31,6)	57 (18,6)	40 (13)
>1 - 3 salary	142 (46,1)	61 (19,9)	81 (26,2)
> 3 ≤ 5 salary	22 (7,3)	7 (2,2)	15 (5)
> 5 salary	8 (2,7)	2 (0,6)	6 (2)
Ocupation			
Formal Work	173 (56,3)	97 (31,7)	76 (24,7)
Informal Work	134 (43,6)	56 (18,3)	78 (25,4)
LIFESTYLE AND HEALTH DIAGNOSES AND SYMPTOMS			
Smoking			
No	264 (85,9)	136 (44,2)	128 (41,7)
Yes	43 (14,1)	17 (5,6)	26 (8,5)
Alcohol			
No	239 (77,8)	119 (38,8)	120 (39)
Yes	68 (22,2)	34 (11,1)	34 (11,1)
PA*			
No	147 (47,8)	73 (23,7)	74 (24,1)
Yes	160 (52, 1)	80 (26)	80 (26)
Depression/Anxiety			
No	168 (54,8)	92 (29,9)	76 (24,9)
Yes	139 (45,2)	61 (19,9)	78 (25,3)
Comorbidities			
0	124 (40,2)	62 (20,1)	62 (20,1)
1-2	162 (52,7)	75 (24,4)	87 (28,3)
3-4	21 (6,8)	21 (5,2)	5 (1,6)
CLINICAL FEATURES			
Diagnostic Time			
1 - 16 years	158 (51,5)	76 (24,7)	82 (26,9)
≤ 30 years	149 (48,5)	77 (25,3)	72 (23,2)
Viral Load			
Detected	79 (25,4)	38 (12,3)	41 (13,1)
Not Detected	228 (74,6)	115 (37,4)	113 (37,2)
Ways of Contagion			
Don't Know	5 (1,6)	2 (0,6)	3 (1)
Sexual Way	282 (91,8)	139 (45,5)	143 (46,3)
Other**	20 (6,6)	12 (3,9)	8 (2,7)
CD4/mm³ blood			
≤ 200	9 (2,9)	6 (1,9)	3 (1)
>200 e ≤ 500	61 (19,9)	17 (5,7)	44 (14,2)
>500	237 (77,2)	130 (42,5)	107 (34,7)

*Physical
Activity; **blood transfusion, parental route, infected syringe use

Regarding education, 46.9% of the participants showed that they have completed high school, where 26.6% correspond to females and 20.3% to males. The complete elementary level corresponds to 33.8% of the participants, of which 19.2% are males and 14.6% are females. The item marital status showed that 65.7% of the participants were single or had no fixed partner, in which 38.7% corresponds to males, while 17.5% of the total of the study participants said they were married, corresponding to 11% of females.

In the distribution of the participants according to family income, taking the current minimum wage as a base, it was verified that 46.1% of the interviewees declared to have a monthly family income of up to three minimum wages, where 26.2% corresponds to males. As for the distribution according to the occupation variable, it was verified that 34.5% of the researches were employed, while 24.1% of them said they were self-employed and 14.7% of them said they were unemployed.

Regarding lifestyle data, it was identified the prevalence of not drinking alcohol (77.8%) and not drinking alcoholic beverages (85.9%). Most participants (52%) said they engaged in physical activity; both groups presented the same

distribution.

As for the variables related to health diagnoses, it was possible to notice that 45.2% of the study participants reported being diagnosed with depression or anxiety, and more than half of the participants (52.7%) said they were diagnosed with one or two comorbidities.

In relation to clinical characteristics, a similar distribution was observed in the time of diagnosis, with 51.5% corresponding to the period from 7 to 16 years and 48.5% above 16 years. As for the viral load, the prevalence was of the "not detectable" group, representing 74.6% of the participants. The form of infection by sexual intercourse stood out, representing 91.8% of the participants, and the CD4 count above 500mm3 for 77.2%.

Figure 1 represents the distribution of the level of physical activity overall and between genders. The classification of physical activity level showed a similar distribution between the groups, with a prevalence of 28.2% for the "active" group of participants, of which 15.4% are female. While the "very active" and insufficiently active groups represented 23.1% of the sample each and 24.1% represented the sedentary group.

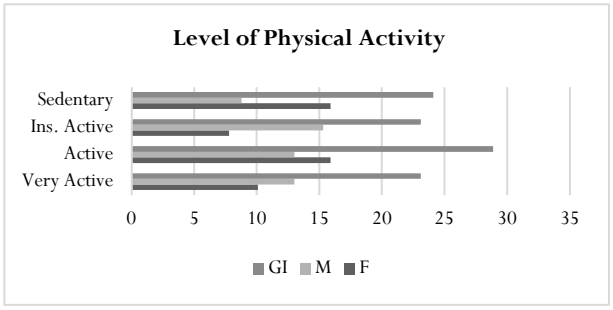

Figure 1. *Distribution of physical activity level overall and between genders.* Ins. Active: insufficiently active; GI: General Index; M: Male; F: Female.

Figure 2 shows the distribution of the stages of Stress. Although the number of people without stress corresponds to 46.2% of the sample. Adding up all the stages of stress, it is possible to see that about 53.2% of the sample presents stress symptoms. Of these, 26.9% are in the exhaustion phase, and the female gender corresponds to the majority of people who are in this phase (16.8%). The second most prevalent phase in the sample corresponds to the resistance phase with 23.7%, with prevalence for males (13%), while females correspond to 10.7% of this phase.

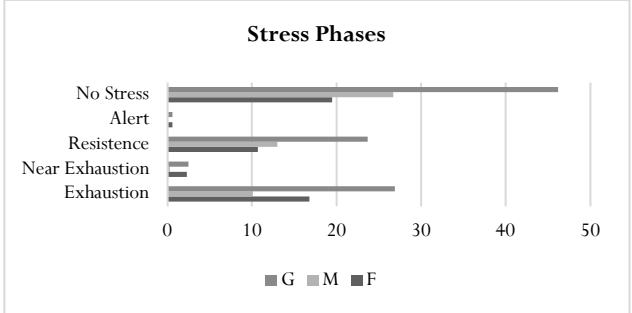

Figure 2. Graphic 2. *Overall distribution and by gender of the Stress Phases.* GI: General; M: Male; F: Female.

When comparing the presence of stress with the variables level of physical activity and clinical characteristics of PLHIV, it was observed that the CD4 count showed a significant association, and we can affirm that the presence of stress has an effect on the CD4 count (U=1848.50; p=0.02) as can be seen in table 3.

Table 3.
Comparison of the presence of stress, level of PA and TCD4+ NAF: Level of PA; ISSL: Adult Stress Symptom Inventory

Variables	ISSL			P
	Total 307 (100)	Absence 143 (46.5)	Presence 164 (53.5)	
IN F				
Sedentary	75 (24.4)	31 (10)	44 (14.3)	
Ins. Active*	71 (23.1)	29 (9.4)	42 (13.6)	0.42
Active	90 (29.3)	50 (16.2)	40 (13)	
very active	71 (23.1)	33 (10.7)	38 (12.3)	
TCD4+/mm ^{3}blood				
≤ 200	11 (3.5)	6 (1.9)	5 (1.6)	
>200 and ≤ 500	60 (19.5)	34 (17)	26 (8.4)	0.02
>500	236 (69.1)	102 (33.2)	133 (43.3)	
HIV Diagnosis Time				
1 - 16 years	154 (50.1)	74 (24.1)	80 (26)	0.60
≥ 16 years	153 (49.8)	69 (22.5)	84 (27.3)	

*Insuficientemente Activo

A 29.3% prevalence of stress was observed among PLHIV classified as co-active. There was also a predominance of stress symptoms in people with longer time of infection diagnosis (49.3%), being 27.3% male and with higher lymphocyte count (69.1%). When the correlation between the variables depression/anxiety symptoms and stress was verified, a moderate and directly proportional correlation was found ($r = 0.407$; $p > 0.001$).

Discussion

This study sought to identify the level of stress and immunological profile of PLHIV with different levels of physical activity. When verifying the profile of the participants it was possible to notice that the distribution for sex is very similar, even the prevalence being for the masculine sex, the difference between the distributions is of 0,2%. It is believed that the increase in the number of cases for the female gender refers to the phenomenon known as feminization of Aids.

The feminization of the epidemic has become a trend associated with a significant number of cases in the female population, due to their differential vulnerability and the lack of governmental action to place women in the centre of assistance policies, since this population is still not seen, many times, as a target public, sensitive to infection, which has contributed to the increase in the number of affected women. In addition, a greater number of women seek assistance and demonstrate greater health concerns, when compared to the male gender (VILLELA, et al., 2017; UNAIDS, 2020).

Studies state that most cases of HIV are associated with men with low levels of education. In this sense, education is an important issue for analysis, from the perspective that

cases of infection may be linked to lack of health education, since education is a key component to raise awareness about the modes of transmission, prevention and prejudice (BERTONI, et. al., 2010; GOMES, et al., 2017).

On another point, it is relevant to note as one of the striking characteristics of the sample studied the fact that most of them are characterized as informal workers, i.e., they have no fixed income. It should be considered that individuals with higher socioeconomic levels have greater access to information and understand the positive effects of treatment in the clinical evolution of the disease, and better internal and external resources to adapt to their serological profile (ELZI, et al., 2016).

Regarding lifestyle variables, it was possible to observe the prevalence of non-smoking, non-alcoholic participants, and physical activity practitioners. Lifestyle is a set of factors that are associated, among other aspects, with dietary patterns, behavioral patterns of a person, including their social interactions and socioeconomic status (GARCÍA-FLORES, et al., 2023).

The importance of physical activity and the benefits of maintaining physical activity for the physical and psychological well-being of the population are evidenced in the literature, affirming that physical fitness is the result of physical preparation that allows people to stay active and healthy in both physical and mental aspects (ALVES et al., 2016; CALDERÓN et al., 2023). It is important to highlight that regular physical exercise generates lower healthcare costs and reduces the risk of death from non-communicable chronic diseases such as diabetes and hypertension (MOSQUEIRAS &VARGAS, 2021).

However, due to the discovery of serology, PLHIV tend to limit their social circle, work activities, leisure and transport/locomotion, a fact attributed to stigma, discrimination and prejudice, influencing the low adherence to physical activity (MAGGI, *et al.,* 2017). This hypothesis was partially confirmed in this study, given that only 51%, a little more than half of the subjects are classified as active (28.9%) and very active (23.1%).

Systematized physical activities practiced for at least 150 to 300 minutes per week with moderate intensity provide benefits such as improvement in physical and psychological aspects and quality of life in this population (KAY, *et al.,* 2018; O'BRIAN, 2017; WHO, 2018).

Regarding health diagnosis, it is possible to identify that most PLHIV participating in the study present symptoms of depression or anxiety. PLHIV are more likely to present this psychiatric disorder, even though studies show variations in the prevalence of depression in this population, the consensus is that this disorder affects people affected with HIV twice as much as in the population without the virus (VIS-MARI, *et al.,* 2008; GONZALES, *et al.*, 2011; MAPSTONE, *et al.*, 2014).

Most research participants present up to two comorbidities. It is common to observe psychological effects such as agitation, confusion, anxiety, nightmares, hallucinations and depression, added to the physical and metabolic effects and cardiovascula-res problems as adverse effect to ART leading to a decrease in the quality of life of this population (JYANG, *et, al.,* 2019).

The study also allowed the identification of the highest prevalence related to the time of diagnosis that was between 1 to 16 years and the prevalence of one to two comorbidities. With the increase in life expectancy, several chronic complications have been evidenced. These complications are related to various mul-tifactorial processes such as the adverse effects of ART, and may contribute to the appearance of persistent comorbidities and inflammatory activation (NGUYEN, *et al.,* 2016).

It is necessary to reflect on the need to assess diseases associated with the adverse effects of ART as, for example, the metabolic syndrome, considering that this is a clinical tool in the recognition of individuals with greater vulnerability to the occurrence of cardiovascular diseases.

A high stress rate was verified in a significant part of the PLHIV, with emphasis on the exhaustion phase, being the female sex the group with the highest prevalence. Such finding corroborates with Melo et al., (2019), who showed stress in 47.6% of the study population using Lipp's inventory of stress symptoms. High levels of es-stress are often associated with PLHIV since the emergence of the virus.

Several factors may act as precipitants and perpetuators of stress in this population, as well as contribute to a significant decrease in quality of life and further progression of the infection. The PLHIV end up experiencing consequences that have repercussions in various sectors of their lives, whether in social, economic or interpersonal issues, making it difficult for them to fit into society. All this situation can trigger negative feelings such as stress, sadness, guilt, fear and denial (SILVA, *et al.,* 2020).

When comparing the variables CD4 count and stress it was possible to observe significant association between them, leading to consider that the presence of stress has an effect on the CD4 count. When the correlation between the variables depression/anxiety symptoms and stress was verified, they presented a moderate and directly proportional correlation, and it could be affirmed that the greater the symptoms of depression/anxiety, the greater the stress phase the individual will be in.

Stress and anxiety are increasingly prevalent issues in today's society. Through regular physical activity, it is possible to alleviate these problems. Therefore, physical activity represents a valuable tool in maintaining individuals' health (GARCÍA-TAIBO, et al., 2023).

It is worth noting that stress contributes to the decrease in the activity of the immune system, accelerating the progression of the virus, facilitating the appearance of opportunistic diseases and consequently contributing to the development of AIDS (CAL-VETTI, *et al.,* 2016; JIANG, *et al.,* 2019; CARDOSO, *et al.*, 2013).

A study that evaluated the effectiveness of different psychosocial treatments for PLHIV with mental health problems, identified that the implementation of psycho-social interventions has a positive effect on depression, anxiety,

showing that the most diverse types of intervention can be useful to improve the mental health of PLHIV (LUENEN, *et al.*, 2018).

According to Reis *et al.*, (2017) the implementation of group activities aimed at promoting socialization, self-esteem and the exchange of experiences can contribute to the expansion and strengthening of social support networks, working against vulnerabilities in mental health. Social support is a great ally for the prevention and recovery of diseases, health promotion and therapeutic adherence (GALVÃO, *et al.*, 2015).

In addition, social support acts as a mitigating factor in relation to stress and assists in participatory coping among individuals with HIV, with the health teams, the support networks and various obstacles presented during living with the disease (CALVETTI, *et al.*, 2016).

Thus, it is important to emphasize that a multidisciplinary follow-up including evaluations of physical and psychological manifestations of PLHIV is essential and necessary for prevention and treatment. These evaluations can be done during home, hospital or outpatient care.

Conclusion

It was concluded that the PLHIV treated by a university hospital in Rio de Janeiro have a predominance of individuals aged 18 to 48 years, informal workers, with an average level of education, non-smokers, non-drinkers and practitioners of activities physical. They also present symptoms of depression/anxiety and the presence of co-morbidities. The main form of transmission was identified through sexual contact, lymphocyte count above 500mm3, viral load not detected, prevalence at diagnosis time from 1 to 16 years. High stress level, with prevalence in active individuals, with longer diagnosis time and higher lymphocyte count. The presence of stress has an effect on TCD4+ infection and that the more symptoms of depression/anxiety, the higher the level of stress in People Living With HIV.

Acknowledgments: "This study was partly financed by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior – Brasil (CAPES) – Finance Code 001"(scholarship)

Financing

This research has not received specific support from public sector agencies, the commercial sector or any other non-profit organisations.

Conflict of interest

None of the authors have conflicts of interest

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