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Coping strategies and their correlation with depression, anxiety, and stress among HIV-positive patients referred to voluntary counseling and testing center, Tehran, Iran, 2019

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Abstract

Introduction: Human immunodeficiency virus (HIV)/acquired immune deficiency syndrome (AIDS) is one of the major global health problems and stressful experience for individuals; therefore, different strategies are engaged to cope with the disease and associated problems. Each of these strategies may have different outcomes, including increased depression, anxiety, stress, and decreased social functioning, achieve full mental health, and social well-being. The aim of this study was to evaluate the coping strategies in HIV-positive patients, determine the prevalence of depression, anxiety, and stress in these patients as well as to investigate the relationship between coping strategies with the prevalence of depression, anxiety, and stress.

Material and methods: In this study, 100 HIV-positive patients who were referred to voluntary counseling and testing (VCT) center from January to September 2019 were recruited by convenience sampling method to complete two validated questionnaires: ways of coping strategies (WOC) and depression, anxiety, and stress scale (DASS).

Results: The findings showed that the mean score of emotion-focused and problem-focused strategies were 44.90 and 44.51, respectively. There was a significant relationship between problem-focused strategies and participants' gender and both strategies with age of patients. The prevalence of depression, anxiety, and stress was 68%, 76%, and 73%, respectively. The prevalence of all three psychological conditions were correlated with gender. In addition, depression and anxiety were significantly correlated with the last educational level. Results also showed that using emotion-focused coping strategies was associated with depression, anxiety, and stress.

Conclusions: Considering the study results, it seems necessary to conduct regular screening programs, appropriate psychological interventions, and social support for this population.

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Introduction

Acquired immunodeficiency syndrome (AIDS) is one of the major global health problems. Human immunodeficiency virus (HIV) infection impairs the immune system, and could lead to high morbidity and mortality rates [1]. According to latest global statistics, by the end of 2019, the number of people living with HIV (PLWH) was 37.9 million [2]. According to statistics from the Ministry of Health of Iran, by the end of September 2018, the estimated number of HIV-positive patients was 60,000. Of the registered PLWH, 24,860 patients were alive, and out of those, only 12,035 people were being treated [3]. Given the large population affected by HIV/AIDS and associated risks, which have consequently plagued the global health, it is imperative to address issues associated with HIV [1].

Coping is the result of interaction between a person and a stressful experience, and involves a set of behavioral and psychological efforts that individuals make to endure, reduce, or minimize those stressful events [4, 5].

According to the reports of World Health Organization (WHO), depression is a common mental disorder recognized by sadness, lack of interest or pleasure, feeling of guilt or worthlessness, restless sleep or loss of appetite, fatigue, and decreased concentration. Depression could last for a long time, or it can recur after person's recovery [6]. Anxiety is an emotional manner characterized by an uncontrollable, diffuse, unpleasant, and persistent state of negative affect, including an apprehensive anticipation regarding unpredictable and unavoidable future danger, and accompanied by feelings of tension, recurrent worried thoughts, and physical changes, such as increased heart rate and blood pressure [7]. Stress is a mental or physical situation that results from a non-specific response of body to stressors. Stress can be raised from environmental, psychological, or social circumstances, diseases or undergoing medical procedures [8, 9].

HIV is a stressful trauma for PLWH, because they have to deal with problems, such as external and internal stigma, isolation, relationship problems, family conflicts, and economic and occupational difficulties in addition to enduring and treating a chronic disease and its' complications [10-12]. Therefore, PLWH try to deal with the problems in various ways, each of which may have different results, including increased anxiety, stress, and reducing performance to achieving welfare and complete social and mental health. Thus far, no study has been conducted in Iran to provide knowledge about coping strategies in PLWH. The present study examined the relationship between depression, anxiety, and stress with coping strategies engaged in PLWH using questionnaires with the least number of questions and acceptable reliability and validity. The study portrays a picture of the mental state of PLWH in Iran, and the knowledge gained in this study could be used to provide psycho-social supports appropriate to patients' coping strategies.

Material and methods

Study setting and design

In this study, 100 patients who were referred to the voluntary counseling and testing (VCT) center of Imam Khomeini Hospital Complex were recruited from January to September 2019 by convenience sampling method. Inclusion criteria were definitive diagnosis of HIV, age over 18 years, and provided written informed consent. Exclusion criteria were completing less than 80% of questionnaire, history of brain trauma and disorders, including dementia and forgetfulness, and mental illnesses, such as psychosis that undermines the validity of questionnaire answers. All participants completed both ways of coping questionnaire (WOC) and depression anxiety stress scale (DASS) questionnaires.

Instruments and measurement

Ways of coping questionnaire (WOC): This questionnaire contains 66 questions about thoughts and strategies that people use to deal with stressful situations. Answers are arranged on Likert scale, scoring from 0 to 3, with 0 = 'not to use' and 3 = 'use a lot'. Sixteen questions are different, and their scores are not calculated. This questionnaire examines two patterns of coping strategies: problem-focused and emotion-focused. Emotion-focused strategies include 4 sub-scales, with distancing, where individuals try to distance themselves from stressful issues without solving them, which in long-term could lead to stress and worsen general health; self-control, in which individuals try to regulate their feelings; responsibility acceptance, where individuals acknowledge their role in the problem and try to solve it, which helps them to deal effectively with the problem; and escape-avoidance, in which an individual tries to escape or avoid the problem that is known as an effective short-term strategy, but in long-term could prevent psychological adaptation and increase symptoms, e.g., depression. Problem-focused strategies also include 4 sub-scales: confrontation, in which an individual uses cognitive skills to solve the problem by applying an effective problem-focused coping strategy; seeking social support, where an individual seeks informational and emotional support, and could be helpful if it is accompanied by self-esteem; planful problem-solving, with direct exploration of the solution to deal with the problem, and psychological satisfaction is usually derived by finding appropriate solutions; and positive re-appraisal that provides an individual with the necessary facilities to actively deal with a stressful situation. This strategy calls for all the potential abilities of an individual to deal positively, solve the problem, and increases their chances of success.

This questionnaire has been translated into Persian language, and its' reliability and validity have been evaluated in a study conducted among 739 high school students in Tehran, with a reliability rate of 0.8 and validity of 0.3 [13].

Depression anxiety stress scale (DASS): This questionnaire consists of 42 questions, which are divided into 3 sub-sets of 14 questions, and each question must be given a score of '0 to 3: 0 = 'does not apply to me at all' and 3 = 'most of the time'. DASS questionnaire has been translated into Persian language, standardized according to the Iranian society, and can be used in cognitive and behavioral studies [14].

Data collection and analysis

Information, including basic demographic data, coping strategies, and psychological status of participants were recorded and collected in questionnaires. If participants were not able to read or write, questions were read by interviewers and patients provided their answers orally. After collecting questionnaires, the data were entered into SPSS version 22 statistical software, and analyzed using statistical tests, including one-way ANOVA, post-hoc test, independent t-test, χ^2 test, and Pearson's correlation.

Ethical consideration

Protocol of the present study was reviewed by institutional review board (IRB) of the Tehran University of Medical Sciences, and the researchers adhered to the Helsinki Declaration on studies involving human subjects and ethical principles approved by the Ministry of Health. Patients' anonymity and privacy were respected at all stages. Before data collection, study objectives were informed about purpose of the study and their questions were appropriately addressed. A written consent form, including title of the research, objectives, methods, ethical considerations, researchers' names and contacts as well as explaining optionality of participating in this research was distributed. All the participants signed the form before the survey.

Results

Socio-demographic characteristics of the study participants

Table 1 describes the participants' characteristics. As it is shown, the participants were aged between 20 and 52 years. None of the participants were illiterate. The mean CD4+ number of participants was 625.82 cell/µl, 78 participants knew their last CD4+ count level, the lowest of which was 193 cell/µl and the highest was 1,178 cell/µl. The average time since the diagnosis of HIV infection was 5 years, with the shortest time of 1 month and the longest time of 240 months (about 20 years) (Table 1).

Coping strategies of the participants

Descriptive findings of coping strategies were included in emotion-focused strategies, with a mean score of 44.9 and a standard deviation of 10.57. Problem-focused strategies resulted with a mean score of 44.51 and a standard deviation of 10.92.

Table 2 shows the mean score and standard deviation of each of the emotion-focused and problem-focused coping strategies in the participants by gender, age, marital status, level of education, etc. The mean score of problem-

Table 1. Gender, age, marital status, education level, therapy status, and CD+ count of the participants

Variable	Frequency, n (%)
Gender	
Male	58 (58.0)
Female	42 (42.0)
Total	100 (100.0)
Age (years)	
18-24	3 (3.2)
25-34	44 (47.3)
35-52	46 (49.5)
Total	93 (100)
Marital status	
Single	40 (40.4)
Married	45 (45.5)
Death of a spouse	5 (5.1)
Divorced	9 (9.1)
Total	99 (100.0)
Last education level	
Elementary	2 (2.0)
Junior high school	11 (11.1)
Senior high school	10 (10.1)
Diploma	43 (43.4)
Associate of Arts	6 (6.1)
Bachelor of Arts	19 (19.2)
Master of Arts	6 (6.1)
Doctoral and post-doc studies	2 (2.0)
Total	99 (100.0)
Using ART	
Yes	92 (92.9)
No	7 (7.1)
Total	99 (100.0)
Last CD4+ count (cells/µl)	
≤ 200	1 (1.3)
200-350	5 (6.4)
350-500	15 (19.2)
> 500	57 (74.0)
Total	78 (100.0)

Table 2. Relationship between coping strategies and demographic variables

Variables	Coping strategy					
	Emotion-focused			Problem-focused		
	Mean	SD	*p*-value	Mean	SD	*p*-value
Gender						
Male	44.68	11.09	0.813	46.65	10.49	0.021
Female	45.19	9.39		41.54	10.93	
Age						
18-24	28.00	7.21	0.017	17.66	11.67	0.001
25-34	45.31	11.21		42.81	10.01	
35-52	44.54	8.67		47.39	8.93	
Marital status						
Single	43.95	11.07	0.728	43.92	12.55	0.979
Married	45.11	10.71		44.93	9.21	
Divorced	45.33	7.81		44.55	11.39	
Death of a spouse	49.60	12.25		43.80	14.25	
Last education level						
Elementary	46.50	24.78	0.082	48.00	9.89	0.534
Junior high school	45.63	11.43		45.36	11.15	
Senior high school	48.10	11.62		46.80	15.78	
Diploma	45.76	9.85		45.41	10.59	
Associate of Arts	48.50	12.61		47.83	12.04	
Bachelor of Arts	37.89	8.17		39.31	9.07	
Master of Arts	51.16	8.77		46.83	8.81	
Doctoral and post-doc studies	43.50	7.77		44.00	5.65	
Time since diagnosis						
≤ 1	39.53	12.35	0.321	42.66	13.47	0.743
1-5	44.34	10.25		43.44	12.34	
5-10	46.61	12.32		43.22	10.21	
> 10	44.12	5.38		48.00	7.78	
Last CD4+ count						
≤ 200	56.00	–	0.588	47.00	–	0.812
200-350	45.20	10.20		48.00	10.36	
350-500	46.26	10.79		45.33	9.75	
> 500	43.82	10.24		43.77	10.79	
Using ART						
Yes	45.30	10.26	0.120	44.59	10.50	0.440
No	37.28	11.57		41.28	15.73	

focused strategies in male participants was higher than female participants (46.65 vs. 41.54), and the relationship between gender and problem-focused strategies was significant ($p = 0.021$). The mean score of emotion-focused and problem-focused strategies in the age group of 18-24 years was significantly lower than other age groups ($p < 0.05$). The mean score of using coping strategies in the ages of 18-24 years was lower than other age groups, and increases with the age of the participants. The highest mean score of using problem-focused strategies was in the age group of 35-52 years. The use of emotion-focused and problem-focused strategies with a *p*-value of 0.017 and 0.001, respectively, showed a significant relationship with the age of the participants. The use of emotion-focused strategies in participants with the death of a spouse was higher than others, with a mean of 49.60, while these participants had

the lowest mean among other groups in using the problem-focused strategies.

According to WOCS of Lazarus and Folkman questionnaire, coping strategies are divided into eight sub-scales, each of which falls into one of two major groups: emotion-focused and problem-focused. Each person may use one of these coping strategies or several strategies simultaneously. These sub-scales are calculated with relative scores. Relative scores indicate an effort ratio for each type of coping, and can be expressed as a percentage ranging from 0 to 100. Table 3 shows the mean and standard deviation of the relative scores of each of the sub-scales, and the frequency of using each of them by the participants in this study. As seen in Table 3, the highest mean was related to self-control and positive re-appraisal strategies. Positive re-appraisal with a frequency of 25 was the major strategy and distancing, with a frequency of 2 as the least used strategy among the participants. Also, a large percentage of participants (24%) used multiple coping strategies simultaneously.

Psycho-social characteristics of the study participants

Statistical indicators of depression, anxiety, and stress are presented in Table 4.

The severity of depression, anxiety, and stress was divided into 5 groups, including normal, mild, moderate, severe, and very severe. Based on the results of DASS questionnaire, 68% of the participants had depression and 17% of them had a very severe disorder (depression score $\geq$ 28). 76% of the participants suffered from anxiety, of which 27% experienced a very severe disorder (anxiety score $\geq$ 20). 73% of the participants suffered from stress, of which 14% experienced very severe disorder (stress score $\geq$ 34).

Table 5 shows the prevalence of psychological disorders according to DASS questionnaire, separately for different demographic variables. As it is shown, 81% of female and 58.6% of male participants suffered from depression, and the relationship between gender and depression was significant (p = 0.018). The prevalence of depression in those participants who reported death of their spouse was higher than other groups (100%), and then in divorced individuals with a prevalence of 77.8% was higher than in single and married individuals, with a prevalence of 67.5% and 62.2%, respectively. The prevalence of depression in patients with elementary school education, junior high school, and diploma degree was higher than in others (p = 0.025). Depression was more common in those with lower CD4+ counts.

The prevalence of anxiety disorder in female participants was 92.9%, and it was higher than in their male counterparts with a prevalence of 63.8%, and the relationship between gender and anxiety was significant (p = 0.001). The prevalence of anxiety was 100% in those aged 18-24 years, and also in individuals who reported death of their spouse. The prevalence of anxiety disorder in participants with elementary school education, junior high school, and diploma degree

Table 3. Statistical indicators of sub-scales of coping strategies

Coping strategies sub-scales	Mean	SD	Relative frequency percentage
Confrontation	9.4	3.5	3.0
Distancing	10.7	4.0	2.0
Self-control	15.1	3.4	16.0
Escape-avoidance	11.0	4.1	4.0
Seeking social support	11.8	5.4	8.0
Responsibility acceptance	13.7	3.3	11.0
Planful problem-solving	13.0	3.3	7.0
Positive re-appraisal	15.0	3.4	25.0
Using multiple strategies	–	–	24.0
Total	–	–	100.0

Table 4. Statistical indicators of depression, anxiety, and stress

Psychological disorder	Mean	SD	Minimum	Maximum
Depression	16.57	10.56	0	40
Anxiety	13.92	7.87	0	30
Stress	21.87	10.44	1	42

was higher than in others, and was zero in doctoral and post-doc groups (p = 0.001). The highest prevalence of anxiety based on the time passed since the diagnosis of the disease belonged to the 5-10 years group, with a frequency of 94.4% (p = 0.025).

The prevalence of stress in females was higher than in males, and the relationship between gender and prevalence of stress was significant (p = 0.001), as in the previous two disorders. Also, stress was more common in the age groups of 18-24 and 25-34 years. Stress was more common in people with a death of a spouse, divorced people, and single people, respectively. It was also more prevalent in participants with lower education.

Correlation between coping strategies and depression, anxiety, and stress

The results showed that the use of emotion-focused coping strategies has a weak positive correlation with depression (r = 0.275, p = 0.006), anxiety (r = 0.235, p = 0.019), and stress (r = 0.202, p = 0.044), respectively. But there was no significant relationship between the use of problem-focused strategies and these three psychological disorders. Also, among the sub-scales of emotion-focused coping strategy, a positive and significant correlation was observed between escape-avoidance with depression

Table 5. Prevalence of depression, anxiety, and stress in different demographic variables

Variables	Disorder					
	Depression		Anxiety		Stress	
	Prevalence	*p*-value	Prevalence	*p*-value	Prevalence	*p*-value
Gender						
Male	58.6	0.018	63.8	0.001	60.3	0.001
Female	81.0		92.9		90.5	
Age						
18-24	100.0	0.457	100.0	0.070	100.0	0.120
25-34	68.2		84.1		79.5	
35-52	65.2		65.2		63.0	
Marital status						
Single	67.5	0.331	70.0	0.486	75.0	0.257
Married	62.2		77.8		66.7	
Divorced	77.8		77.8		88.9	
Death of a spouse	100.0		100.0		100.0	
Last education level						
Elementary	100.0	0.025	100.0	0.001	100.0	0.093
Junior high school	54.5		63.6		63.6	
Senior high school	100.0		100.0		90.0	
Diploma	74.4		90.7		81.4	
Associate of Arts	50.0		66.7		50.0	
Bachelor of Arts	52.6		52.6		63.2	
Master of Arts	66.7		50.0		66.7	
Doctoral and post-doc studies	0.0		0.0		0.0	
Time since diagnosis						
≤ 1	53.3	0.112	53.3	0.025	60.0	0.065
1-5	58.6		82.8		69.0	
5-10	88.9		94.4		94.4	
> 10	62.5		62.5		62.5	
Last CD4+ count						
≤ 200	100.0	0.616	100.0	0.526	100.0	0.664
200-350	80.0		100.0		80.0	
350-500	53.3		66.7		60.0	
> 500	70.2		75.4		75.4	
Using ART						
Yes	68.5	0.678	77.2	0.223	73.9	0.337
No	57.1		57.1		57.1	

($r = 0.437$, $p = 0.001$), anxiety ($r = 0.425$, $p = 0.001$), and stress ($r = 0.416$, $p = 0.001$). However, in examining Pearson's correlation matrix between the sub-scales of problem-focused coping strategies with depression, anxiety, and stress, only a positive and weak correlations were found between the coping strategy of responsibility acceptance and depression.

Discussion

The aim of this study was to determine the coping strategies in PLWH, and to investigate the relationship between coping strategies used by PLWH with depression, anxiety, and stress. The mean scores and standard deviations of emotion-focused and problem-focused coping strategies were

44.90 ± 10.57, and 44.51 ± 10.92, respectively, by examining the results of WOC questionnaire. The mean of problem-focused strategies in males was higher than in females (46.65 vs. 41.54), and the relationship between them was significant ($p = 0.021$). Also, the use of emotion-focused and problem-focused strategies had a significant relationship with the age of the patients. Among the sub-scales of coping strategies, the highest means were related to 'positive appraisal' and 'self-control' strategies. 'Positive appraisal' and 'distancing' were the most and least used strategies. Additionally, a large percentage of participants (24%) used multiple coping strategies simultaneously.

In a study conducted in 2016 at Imam Khomeini Hospital VCT center using WOC questionnaire among PLWH, the average of emotion-focused and problem-focused strategies were reported to be 37.88 and 38.33, respectively, which shows a lower average of using coping strategies in these patients in comparison to our study [15]. Results of other studies conducted as a case-control using this questionnaire to evaluate coping strategies, indicated a higher average of using problem-focused coping strategies in healthy individuals compared with patient's group [16, 17]. Similar studies in other countries investigating coping strategies in PLWH were also in line with our research. For example, a study conducted by Kaneez et al. in India in 2016 examined the level of depression and relationship between depression and coping strategies. In this study, 30 PLWH who were being treated by ART were assessed using Beck depression inventory and brief cope scale, to assess the level of depression and coping strategies. Results of this study showed that female participants were more likely than males to use avoidance coping strategies, including religion and ventilation, and support coping. But in using active coping strategies, such as positive appraisal and taking action, no significant difference was observed between two genders [18].

Another study conducted in Nigeria in 2019 explored depression, behavioral lifestyles, and coping strategies among PLWH. In this research, as in the present study, Lazarus and Folkman ways of coping questionnaire was used to assess coping strategies. The researchers surveyed 419 patients using patient health questionnaire-9 (PHQ-9), a multifunctional tool for screening, diagnosing, monitoring, and measuring the severity of depression. A total of 227 respondents (54.2%) had depression, and various forms of unhealthy diet habits were common among them (≥ 70.0%). Only 84 (20.0%) and 147 (30.3%) of the respondents performed regular moderate exercise and moderate-intensity work, respectively. Depression level was higher in men, while women had better coping skills, but differences were not significant. The highest mean of coping strategies used by the participants in this study was planful problem solving, escape-avoidance, and seeking social support, respectively, with positive appraisal as the least used strategy [19].

Similarly, Talukdar et al. conducted a study in 2012 to examine the symptoms of depression and coping strategies among HIV-positive men and women in Kolkata, India. In this study, 164 recently diagnosed participants (within last 2 months) were surveyed by Beck's depression inventory, Lazarus and Folkman ways of coping questionnaire (1980), a 16-items coping scale, and coping with AIDS, Fleishman (CWAF) instrument, in which coping strategies are divided into 3 categories: positive coping, avoidance coping, and seeking social support. Among participants, only 32.1% of females and 59.8% of males were receiving ART, and mean CD4+ count level among female participants was 375 cells per microliter, higher than the average of 163 cells per microliter in male participants. The researchers reported better coping strategies among females, who presented more positive coping skills [20].

In a study conducted in China, 254 patients with HIV aged between 50 to 84 were analyzed to evaluate influential factors associated with coping strategies in elderly PLWH using a Chinese version of medical coping modes questionnaire (MCMQ) [21]. MCMQ included three sub-scales, i.e., confrontation, avoidance, and acceptance-resignation. These elderly sample tended to use the acceptance-resignation coping strategy more frequently, and the confrontation coping strategy was applied less compared to another study from China with a younger sample [22]. Also, female patients and those who lived with HIV for a longer time used the acceptance-resignation coping strategy more frequently. While patients with higher education levels were more prone to use the confrontation coping strategy to deal with their disease [21].

In an Indian study by Wani and Sankar in 2017, with a sample size of 100 people, the prevalence of depression, anxiety, and stress among PLWH using ADSS-BSPSA scale was randomly measured. Results showed a 100% prevalence of depression among participants (74% severe and 26% moderate). The prevalence of anxiety was 73% (59% severe and 14% moderate), and stress was 90% (63% severe, 35% moderate, and 2% mild). The results of this study also showed a higher prevalence of these disorders among women and married people compared with men and single individuals [23]. Another study in India reported that 59.5% of women and 84.1% of men living with HIV were diagnosed with depression [20].

In a study conducted in Guinea in 2018, hospital anxiety and depression scale (HADS) was used for measuring depression and anxiety in 160 HIV-positive patients, and multivariate logistic regression analyses were performed to identify factors associated with symptoms of anxiety and depression. The results showed that the prevalence of comorbid depression and anxiety among HIV patients was 8.1%, and the prevalence of anxiety and depressive symptoms among HIV-positive patients was 13.8% and 16.9%, respectively. The analysis showed that individuals who did not receive antiretroviral treatment (AOR = 18.93; 95% CI: 1.88-188.81) were significantly more likely to have depressive symptoms. Also, being under the age of 40 was significantly associated with anxiety (AOR = 2.81; 95% CI: 1.04-7.58) [24].

A study in Ghana was conducted by Kwakye in 2018 to investigate the prevalence and impact of depression, anxiety,

and stress on the number of CD4+ cells in HIV patients receiving ART. This cross-sectional study included 138 randomly selected PLWH. Psycho-social disorders were measured with DASS-21 questionnaire. The prevalence of depression, anxiety, and stress in participants was 87%, 78.3%, and 71%, respectively. The prevalence of these three disorders was higher among female participants as well as among people with lower education. The median CD4+ counts of participants with depression, anxiety, or stress disorders were significantly lower than participants without these disorders ($p < 0.001$). In addition, depression and stress were negatively correlated with participants' CD4+ cell count [25].

According to our finding, the prevalence of depression, anxiety, and stress was higher among females living with HIV, and a significant relationship was observed between the prevalence of these three disorders and gender. Results of Kaneez et al. [18], Wani and Sankar [23], and Kwakye [25] studies were in line with the present study, and showed that the prevalence of these disorders was higher in women, while in a Talukdar study, the prevalence of depression was reported higher in men than in women [20].

Our results also showed a higher prevalence of depression, anxiety, and stress in younger participants. The prevalence of all three disorders in people with elementary education was higher than others, and the relationships between depression and anxiety with education were significant. Additionally, the mean score and prevalence of all three psychological disorders were higher in individuals with lower CD4+ cell counts (< 200, 200-350 cells per microliter), but no significant relationship was found between CD4+ levels and the prevalence of depression, anxiety, and stress. Also, while the findings showed a lower prevalence of depression and stress in married people, and a very high prevalence of all three psychological disorders in patients who experienced death of a spouse and divorced people, but no significant correlation was found between marital status and depression, anxiety, and stress. In Kwakye's study, the prevalence of depression in married people was lower than others [25]. However, in studies of Wani and Sankar [23] and Duko et al. [26], the prevalence rate of these disorders in married people has been reported higher than others.

A study by Duko et al. in Southern Ethiopia was conducted in 2018 to assess the extent and factors associated with depressive and anxiety symptoms in PLWH among 363 PLWH. The prevalence of depression and anxiety was 32.0% and 34.4%, respectively. The prevalence of depression was higher in patients with primary education and married patients. Multivariable binary logistic regression analysis showed that childlessness, living alone, HIV-related stigma, and poor social support in these patients were associated with depression, and a previous history of psychiatric illness and poor social support were associated with anxiety [26].

A systematic review was conducted in 2017 to summarize all relevant data on the prevalence and factors associated with depression in PLWH from 2010 to 2017 in Ethiopia. According to results, the average prevalence of depression was 36.7% (range, 7.3-73.3%), and factors, such as aging,

death of a spouse, living alone, stigma, poor medication adherence, low income, poor social support, stages II and III of HIV, and hospitalization in recent month predicted a higher probability of depression in these patients [27].

Finally, the examination of a relationship between coping strategies of HIV-positive patients and the prevalence of depression, anxiety, and stress in the participants of the present study showed a significant weak positive correlation between emotion-focused strategies and depression, anxiety, and stress. However, there was no significant relationship between using problem-focused strategies and these three psychological disorders. There was also a significant positive correlation between confrontation coping strategies and escape-avoidance of emotion-focused strategies sub-scales with all three disorders of depression, anxiety, and stress. While among the problem-focused strategies, only a positive and weak correlations were seen between the responsibility acceptance coping strategy and depression.

Results of Kaneez et al. study in India also showed a positive and significant relationship ($r = 0.51$, $p < 0.001$) between depression and avoidant coping, while the relationship between depression and supportive coping ($r = 0.12$) and active coping ($r = 0.17$) were positive and negative, respectively, but were not significant [18]. Also, in a Talukdar study, a negative and significant correlation (correlation coefficient = –0.258, $p = 0.01$) was observed between higher score of depression scale (BDI score) and emotion-focused coping score. They found a negative coefficient because the emotional score was calculated in a reverse way, meaning that those who were not able to cope had higher scores [20]. But in Oko et al. study in Nigeria, no significant relationship was observed between level of depression and coping strategies used by participants [19].

A review composed of results of different countries showed that the prevalence of depression in PLWH in developing countries was higher than in developed countries. Results of a study by Bing et al. in the USA showed a 37% prevalence of depression in this group [28], and results of a meta-analysis performed in 2001 by Jeffrey et al. showed a lower prevalence of depression in PLWH compared to other studies (9.4%), but about twice the prevalence of depression in the control group (5.2%) [29]. A study of 416 HIV-positive patients in China in 2017 also showed a 36.3% prevalence of depression in this population [30].

A higher prevalence of depression in developing countries compared to developed countries could be related to higher levels of psychological, social, economic, and disease burden among PLWH in developing countries, such as being blamed for the cause of illness, stigma, discrimination, and social isolation. In addition, the belief that diagnosis of HIV is equivalent to death penalty also could contribute to higher levels of depression in developing countries [19].

High prevalence of psychological disorders could be associated with significant complications and risks in PLWH. Increased disease-related complications [18], causing psychological distress to PLWH as well as increasing the risk of physical injury and high-risk behaviors, which increase

HIV transmission [31] and reduce adherence to ART, are among the risks mentioned in other studies [32, 33].

In some studies, researchers have also observed that the use of mental health services among PLWH was associated with better adherence to treatment, maintaining low-risk sexual behaviors, exposing HIV status to sexual partners, and improving the overall quality of life [34-43].

Limitations

In this study, income level and socio-economic status of individuals, substance use, personal history or family history of psychological problems, and other possible factors affecting the prevalence of depression, anxiety, and stress in PLWH were not examined.

Conclusions

The results of the present study show that PLWH are exposed to many psychological distresses, and could develop several mental disorders throughout their lives, including depression, anxiety, and stress. Due to negative impacts of these disorders on lives of PLWH, regular screening and treatment of common psychological disorders, interventions, and supports, including individual and family counseling, training on coping strategies and problem-solving skills, and finally, providing easy access to support resources and counseling centers, are all essential. To achieve these goals, cooperation between government authorities, NGOs, psychologists, social workers, and psychiatrists is necessary.

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Conflict of interest

The authors declare no conflict of interest.

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