

# Depression and physical activity among HIV-positive people: integrated care towards 90-90-90

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## Abstract

**Introduction:** Considering the high prevalence of depression and the positive effects of physical activity on human immunodeficiency virus (HIV)-positive patients, the current study was conducted. The aim was to determine the prevalence of depression and to investigate its association with physical activity among people living with HIV (PLWH).

**Material and methods:** This descriptive-analytic study was conducted on 122 PLWH aged over 18 years. The participants referred to the Counselling Centre for Behavioural Diseases in Kerman City, Iran in 2018. The data collection tools were the Beck Depression Inventory and the Baecke Physical Activity Inventory.

**Results:** The mean scores of physical activity were 6.97 and 7.03 in depressed and non-depressed people, respectively. However, no significant relationship was observed between physical activity and depression. More than 70% of patients were affected by different types of depression; mild, moderate, and severe. Except the education and occupation factors ( $p = 0.01$ ), no statistically significant difference was observed between participants' demographic characteristics and depression status.

**Conclusions:** Considering the high prevalence of depression and low levels of physical activity among PLWH, and in order to achieve the 90-90-90 goals, serious measures should be taken in this regard. The PLWH are required to pay more attention to their physical activity along with their medicines. Furthermore, sports facilities should be provided for these patients. It is also recommended that they use the instructions provided by the psychologists and sports specialists in the Counselling Centres for Behavioural Diseases.

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## Introduction

According to official statistics, 34,949 human immunodeficiency virus (HIV) patients were reported in Iran by April 2017 [1]. Use of antiretroviral therapy (ART) has increased the health and life span of people living with HIV (PLWH) [2]. Chronic HIV disease has changed the medical demands of the patients. Neurological disorders and depression are also common in HIV-positive patients, and half of the adults with HIV have experienced mental disorders [3, 4]. Several studies showed that depression affected more than 50% of PLWH [5]. Severe depression was reported in more than 30% of cases in a study [6]. The prevalence of depression in PLWH has adverse consequences [7], which lead to non-achievement of 90-90-90 goals [8]. Cook conducted a study on PLWH and reported that depressed people had poor adherence to drug therapy [9].

One of the effective behavioural interventions to reduce depression is physical activity (PA) [10]. Several studies [11-13] confirmed the positive effect of PA on reducing the neurological disorders and depression in PLWH. The current PA guidelines recommend all adults to have at least 30 minutes of moderate PA five days per week or 150 minutes of moderate PA per week, which is equal to 10,000 steps per day [14]. Despite the paucity of information about the effects of PA on the neurological mechanisms, research has confirmed the direct effects of PA on reduction of cognitive impairment [15]. Fazelizadeh *et al.* showed that active lifestyles were associated with better cognition and performance levels among older PLWH [16]. Moreover, exercising had a significant effect on ART and prevention of its anti-inflammatory side effects [13]. Regardless of the broad benefits associated with exercising, a study showed that many PLWH were not active enough [17].

A relatively limited number of studies have been conducted on PA among PLWH worldwide [10, 16, 18]; however, to the best of our knowledge, no study has addressed the PA in HIV-positive patients in Iran. So, the current study aimed to determine the prevalence of depression and its association with PA among PLWH. Our assumption was that PA would reduce depression in the study samples.

## Material and methods

### Study design and setting

This descriptive-analytic study was carried out on PLWH over the age of 18 years, who referred to the Counselling Centre for Behavioural Diseases in Kerman City, Iran in 2018.

### Participants and sampling

The samples were selected using the convenience method, due to the limitations in accessing the medical records and the confidentiality of information. The sample size was estimated as 122 by Cochran formula. The inclusion criteria

were: age of 18 years and older, taking antiretroviral drugs for six months, and a willingness to participate in the study.

## Instruments and data collection

### Beck Depression Inventory (BDI-II)

The Beck Depression Inventory (BDI-II) is a widely used measure to diagnose depression and to determine its severity. Kanmogne *et al.* validated the French version of this questionnaire in Cameroon [19]. The BDI-II includes 21 items covering the emotional factors of depression, including hopelessness, irritability, feelings of guilt, pessimism, worthlessness, self-dislike, and suicidal thoughts, as well as somatic symptoms such as loss of appetite, fatigue, and sleep and concentration difficulties. The questions were scored on a four-point scale (0-3), and the total score was calculated for each participant. The severity of depression in the range of 0-13 represents the normal state, 14-19 indicates mild depression, 20-28 shows moderate depression, and 29-63 suggests severe depression [7]. In this regard, we categorised people with scores of 0-13 in the normal non-depressed group, whereas the others were classified as the depressed group.

### Baeck Physical Activity Inventory

The Baeck questionnaire was used to assess physical activity. The questionnaire consists of 16 items and three subscales of labour (items 1-8), exercise (items 9-12), and leisure time (items 13-16), which calculate the level of physical activity. Except item 9, the questions in the questionnaire have five options (1 to 5). For items 2 and 13, we subtracted the scores from 6. Finally, we calculated the average of each index, which was a measure from 1 to 5. Later, these three indices were added to calculate the total score of physical activity. Therefore, the final score of the physical activity was measured as a rate of 3-15; higher scores meant higher levels of physical activity. The reliability of the questionnaire was calculated by Florindo *et al.* on PLWH in 2006, which was 85, 70, 72, and 44% for the three indices of labour, exercise, and leisure time, respectively. Its validity was also estimated to be above 80% based on the views of experts [20].

## Ethical considerations

The Ethics Committee affiliated with Jiroft University of Medical Sciences approved this study as well as its consent procedure (IR.JMU.REC.1397.10). Thus, we made the coordination in order to conduct the study. A covering letter explaining the purpose and the procedure of the study was provided to the eligible participants for data collection. Then, verbal agreement of the participants was obtained, and they were ensured of the confidentiality of the data and voluntary participation in the study. Informed consent forms were also obtained after they completed the questionnaires.

**Table 1.** Mean and standard deviation of depression based on the demographic characteristics

Characteristic	Depression				$\chi^2$	p-value
	Yes		No			
	n	%	n	%		
<b>Gender</b>						
Female	41	47.1	17	48.6	0.02	0.8
Male	46	52.9	18	51.4		
<b>Marital status</b>						
Single	26	29.9	3	8.6	7.01	0.07
Married	38	43.7	19	54		
Divorced	6	6.9	5	14.3		
Widow	17	19.5	8	22.9		
<b>Education</b>						
< Elementary	36	22.9	36	41.4	6.9	0.03
Middle school	18	42.9	18	20.7		
Diploma and more	33	34.3	33	37.9		
<b>Job</b>						
Housewife	29	33.3	10	28.6	11.1	0.01
Free	28	32.2	15	42.9		
Employed	3	3.4	6	17.1		
Unemployed	27	31	4	11.4		
<b>CD4 count</b>						
Less than 100	6	6.9	4	11.4	4.3	0.2
101-200	14	16.1	2	5.7		
201-350	13	14.9	9	25.7		
Higher than 350	54	62.1	20	57.1		
<b>Income</b>						
< 60 US\$	55	63.2	16	45.7	3.1	0.07
> 60 US\$	32	36.8	19	54.3		
<b>Disease stage</b>						
HIV*	83	95.4	35	100	1.6	0.2
AIDS	4	4.6	0	0		
<b>Risk factor</b>						
No	37	42.5	16	45.7	0.1	0.7
Yes	50	57.5	19	54.3		
<b>BMI</b>						
Less than normal (less than 18.5)	13	15.1	3	8.6	1.7	0.6
Normal (18.5-24.9)	49	57	19	54.3		
25-29.9	15	17.4	9	25.7		
More than 30	9	10.5	4	11.4		

\*Fisher's exact test; the  $\chi^2$  test was used for the rest.

### Statistical analysis

Descriptive and inferential statistics were used to describe and analyse the data. Regarding the non-normality of data, the Mann-Whitney test was used to assess the difference in age between the two depression groups. The  $\chi^2$  test

was also applied for the rest of the demographic data. Moreover, the independent *t*-test was run for the labour index and the total index. The Mann-Whitney test was applied for the exercise and leisure indices. In order to analyse the data we applied SPSS version 24. The significance level was set at 0.05.

## Results

A total of 122 PLWH participated in the study, with a mean age of  $41.88 \pm 9.46$  years. We found that 53.3% of the participants were male, 46.7% were married, and 36.9% had a diploma or higher degree. Regarding their occupation, 54.1% were unemployed and 45.9% were employed. The results showed that 33.6% had no children and the rest had at least one child. Considering their incomes, 41.8% of the participants had an income of more than 46 US\$ and the disease was transmitted by intercourse in 37.7% of participants. Body mass index was normal in 46.7% of cases. The CD4 count was more than 350 in 59% of cases, and 93.4% of the samples were infected with HIV. Viral load was less than 100 in 63.9% of patients. Regarding the risk factors, 41.8% did not mention any risk factors, such as drug abuse. The participants' mean BMI was  $23.5 \pm 5.49$  years.

No statistically significant difference was observed between the demographic characteristics and depression, except for education and occupation ( $p = 0.01$ ) (Table 1).

The prevalence of depression in PLWH was 71.3%; 29.5% had severe depression and the rest had moderate to low depression. We found that 28.7% of participants did not have depression (Table 2).

According to our results, the mean scores of physical activity in depressed and non-depressed people were 6.97 and 7.03, respectively. These rates were lower than the total achievable mean score from the questionnaire, i.e. 9. Therefore, physical activity in both groups was less than moderate, and the two groups did not differ in all aspects of physical activity (Table 3).

## Discussion

The results of this study showed that the prevalence of depression was more than 70% among PLWH, and their

PA was lower than the moderate level. The average level of PA was higher in non-depressed than in depressed people, but the difference was not significant. So, the research hypothesis was rejected, and physical activity had no effect on depression, but depression had a significant relationship with education and occupation.

Despite the positive effect of PA on depression in previous studies [11, 21], we did not find any significant difference in PA levels based on different levels of depression. This result can be due to the type of information collected by the research tool, sample size, and population. For example, in the study conducted by Dufour [11], the sample size was larger, and the study population was older than in our study. In addition, PLWH may make mistakes in comprehending the concept of PA and consider walking with any intensity and frequency as PA. Various self-reporting questionnaires have reported different ways to evaluate PA and depression among PLWH; their results showed that the participants' levels of PA were less than moderate [22-24]. In other words, no study was found to show high levels of PA in PLWH. One of the causes of low PA in PLWH can be the high prevalence of depression. Similarly to the current study, Coleman [25] reported that the prevalence of moderate to severe depression was more than moderate depression, but other studies [26-28] showed inconsistent results, which can be due to the following reasons. Contrary to the present study, Shah *et al.* [28] investigated people over 45 years old, and Kanmogne *et al.* [7] included both women and men. The sample size in the Kanmogne *et al.* study was almost twice the sample size in our study [7]. Moreover, differences in age, environment, and culture can be among other contradictory reasons.

The results showed that higher levels of education led to lower levels of depression. In this regard, our results were consistent with the results of Kanmogne *et al.* [7]. However, Mobaiein *et al.* [29] reported no significant difference between the degree of depression in PLWH and the education levels. In the Mobaiein study, samples included low-educated addicts; so, in the case of using participants with higher education, no inconsistency would be observed in the results [29]. The results of this study indicated that people with higher education paid more attention to depression and the ways to overcome it. In the study by Kanmogne *et al.* [7], similarly to the present study, depression was higher in housewives in comparison with other occupations. Given that women do housewifery, they are less likely to interact with other community members, and this can be a reason for higher depression in this group.

**Table 2.** Severity of depression in people living with HIV

Variable/Severity	<i>n</i>	<i>p</i>
Depression		
Mild	32	26.2
Moderate	19	15.6
Severe	36	29.5
Normal (no)	35	28.7
Total	122	100

**Table 3.** The difference in the scores of physical activity and its dimensions based on the grouping depression

Variable	Depressed ( <i>n</i> = 87)		Non-depressed ( <i>n</i> = 35)		Independent- <i>t</i> -test	<i>p</i> value
	Mean	Standard deviation	Mean	Standard deviation		
Labour index	2.48	0.82	2.53	0.79	0.27	0.78
Exercise	2.35	0.51	2.23	0.43	-1.30	0.19
Leisure time	2.13	0.69	2.27	0.55	1.18	0.23
Total score of physical activity	6.97	1.26	7.03	1.41	0.23	0.81

In the studies by Capitão *et al.* [30] and Kanmogne *et al.* [7], no difference was observed between depression and CD4, but the difference was significant in the study by Ickovics *et al.* [31]. This discrepancy in the results can be due to application of various instruments to measure depression and the exact date of recording CD4.

One of the strengths of our study is use of an HIV-specific and reliable tool to measure the PA level by investigating the three indicators of labour, exercise, and leisure time. Moreover, we studied two groups of women and men in this study.

Among the main limitations of this study, we can mention: 1) the data were collected in the winter; different results might be obtained in other months and seasons; 2) the duration of the study was short; 3) a self-report tool was used; the self-reported data are addressed to bias; and 4) the participants (PLWH) did not have a proper level of collaboration. Therefore, in order to make accurate conclusions, we recommend that other researchers conduct studies with long-term follow-up periods, to investigate the barriers of exercising among the PLWH, and to apply other methods of data collection such as observation (pedometer or accelerometer).

## Conclusions

According to the results of the current study, no significant difference was observed between the level of physical activity and degrees of depression. However, due to the high prevalence of depression and low level of physical activity among HIV/AIDS patients, we suggest these patients attend physical events in addition to consumption of medications. In this regard, better sports facilities should be provided, and these patients should be referred to the psychiatrists and sports specialists in the Counselling Centres for Behavioural Diseases.

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## Conflict of interest

The authors declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

## References

1. CDC. Unpublished AIDS report. Iranian Ministry of Health and Medical Education, 2017.
2. Smit M, Brinkman K, Geerlings S, et al. Future challenges for clinical care of an ageing population infected with HIV: a modelling study. *Lancet Infect Dis* 2015; 15: 810-818.
3. Heaton R, Clifford D, Franklin D, et al. HIV-associated neurocognitive disorders persist in the era of potent antiretroviral therapy CHARTER Study. *Neurology* 2010; 75: 2087-2096.
4. Morowatisharifabad MA, Movahed E, Farokhzadian J, et al. Antiretroviral therapy adherence and its determinant factors among people living with HIV/AIDS: a case study in Iran. *BMC Res Notes* 2019; 12: 162.
5. Nyamukapa C, Gregson S, Wambe M, et al. Causes and consequences of psychological distress among orphans in eastern Zimbabwe. *AIDS Care* 2010; 22: 988-996.
6. Nakimuli-Mpungu E, Bass JK, Alexandre P, et al. Depression, alcohol use and adherence to antiretroviral therapy in sub-Saharan Africa: a systematic review. *AIDS Behav* 2012; 16: 2101-2118.
7. Kanmogne GD, Qiu F, Ntone FE, et al. Depressive symptoms in HIV-infected and seronegative control subjects in Cameroon: effect of age, education and gender. *PLoS One* 2017; 12: e0171956.
8. Bemelmans M, Baert S, Negussie E, et al. Sustaining the future of HIV counselling to reach 90-90-90: a regional country analysis. *J Int AIDS Soc* 2016; 19: 20751.
9. Cook JA, Burke-Miller JK, Grey DD, et al. Do HIV-positive women receive depression treatment that meets best practice guidelines? *AIDS Behav* 2014; 18: 1094-1102.
10. Chapman SB, Aslan S, Spence JS, et al. Shorter term aerobic exercise improves brain, cognition, and cardiovascular fitness in aging. *Front Aging Neurosci* 2013; 5: 75.
11. Dufour CA, Marquine MJ, Fazeli PL, et al. A longitudinal analysis of the impact of physical activity on neurocognitive functioning among HIV-infected adults. *AIDS Behav* 2018; 22: 1562-1572.
12. Zlatar ZZ, Towler S, McGregor KM, et al. Functional language networks in sedentary and physically active older adults. *J Int Neuropsychol Soc* 2013; 19: 625-634.
13. Wirth MD, Jagers JR, Dudgeon WD, et al. Association of markers of inflammation with sleep and physical activity among people living with HIV or AIDS. *AIDS Behav* 2015; 19: 1098-1107.
14. Garber CE, Blissmer B, Deschenes MR, et al. American College of Sports Medicine position stand. Quantity and quality of exercise for developing and maintaining cardiorespiratory, musculoskeletal, and neuromotor fitness in apparently healthy adults: guidance for prescribing exercise. *Med Sci Sports Exerc* 2011; 43: 1334-1359.
15. Brown B, Peiffer J, Martins R. Multiple effects of physical activity on molecular and cognitive signs of brain aging: can exercise slow neurodegeneration and delay Alzheimer's disease? *Mol Psychiatry* 2013; 18: 864.
16. Fazeli PL, Marquine MJ, Dufour C, et al. Physical activity is associated with better neurocognitive and everyday functioning among older adults with HIV disease. *AIDS Behav* 2015; 19: 1470-1477.
17. Frantz JM, Murenzi A. The physical activity levels among people living with human immunodeficiency virus/acquired immunodeficiency syndrome receiving high active antiretroviral therapy in Rwanda. *SAHARA J* 2013; 10: 113-118.
18. Jagers JR, Prasad VK, Dudgeon WD, et al. Associations between physical activity and sedentary time on components of metabolic syndrome among adults with HIV. *AIDS Care* 2014; 26: 1387-1392.
19. Kanmogne GD, Kuate CT, Cysique LA, et al. HIV-associated neurocognitive disorders in sub-Saharan Africa: a pilot study in Cameroon. *BMC Neurol* 2010; 10: 60.
20. Florindo AA, Latorre Mdo R, Santos EC, et al. Validity and reliability of the Baecke questionnaire for the evaluation of habitual physical activity among people living with HIV/AIDS. *Cad Saude Publica* 2006; 22: 535-541.
21. Gajewski PD, Falkenstein M. Physical activity and neurocognitive functioning in aging – a condensed updated review. *Eur Rev Aging Phys Act* 2016; 13: 1.
22. Roos R, Myezwa H, van Aswegen H. "Not easy at all but I am trying": barriers and facilitators to physical activity in a South African cohort of people living with HIV participating in a home-based pedometer walking programme. *AIDS Care* 2015; 27: 235-239.
23. Montoya JL, Wing D, Knight A, et al. Development of an mHealth Intervention (iSTEP) to promote physical activity among people living with HIV. *J Int Assoc Prov AIDS Care* 2015; 14: 471-475.



24. Dirajlal-Fargo S, Webel AR, Longenecker CT, et al. The effect of physical activity on cardiometabolic health and inflammation in treated HIV infection. *Antivir Ther* 2016; 21: 237-245.
25. Coleman CL. Health related quality of life and depressive symptoms among seropositive African Americans. *Appl Nurs Res* 2017; 33: 138-141.
26. Nobakht A, Mohraz M, Rahimzadeh M, et al. The effect of cognitive behavioural therapy on depression, anxiety, and stress in women with HIV. *HIV AIDS Rev* 2018; 17: 218-223.
27. Prasithsirikul W, Chongthawonsatid S, Ohata PJ, et al. Depression and anxiety were low amongst virally suppressed, long-term treated HIV-infected individuals enrolled in a public sector antiretroviral program in Thailand. *AIDS Care* 2017; 29: 299-305.
28. Shah KN, Majeed Z, Yoruk YB, et al. Enhancing physical function in HIV-infected older adults: a randomized controlled clinical trial. *Health Psychol* 2016; 35: 563-573.
29. Mobaein A. Compression of depression frequency in HIV positive and HIV negative among IV drug abusers. *Journal of Guilan University of Medical Sciences* 2011; 19: 71-76.
30. Capitão CG, Finotelli I Jr, de Macena CS. Evaluation of depression and anxiety on HIV/AIDS in-patient. *J AIDS HIV Res* 2011; 3: 240-246.
31. Ickovics JR, Hamburger ME, Vlahov D, et al. Mortality, CD4 cell count decline, and depressive symptoms among HIV-seropositive women: longitudinal analysis from the HIV Epidemiology Research Study. *JAMA* 2001; 285: 1466-1474.