

Article

Assessment of quality of life (QoL) among human immunodeficiency virus positive/acquired immunodeficiency syndrome patients: A cross sectional study at antiretroviral therapy center at Gwalior Madhya Pradesh, India

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Abstract: Context: HIV/AIDS is known to affect an individual not only physically but also mentally, socially, and financially. It is a syndrome that builds a vacuum in a person affecting his/her life as a whole. Quality of life (QOL) of human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS) patients has emerged as a significant medical outcome measure in recent times.

Aims: The purpose of the present observational study is to evaluate the quality of life (QOL) of people living with HIV/AIDS (PLHIV) receiving ART and its association with different social and clinical variables.

Materials and Methods: 140 patients of ≥ 18 years with HIV attending the tertiary level ante-retroviral treatment (ART) center were interviewed with using a validated standard version of the World Health Organization QOL (WHO-QOL BREF). Data on sociodemographic and clinical profile e.g., BMI, and CD4 were gathered. Mean scores were calculated in each domain. Descriptive statistics, independent t test, ANOVA and logistic regression were done to analyze the results.

Results: The overall QOL score of the subjects was moderate; Mean quality of life score was highest in the environmental domain (Mean=13.2 \pm 4.2). PLHIV with lower BMI also had poorer QOL ($P < 0.05$). Employment significantly affected the social health domain and psychological domains of the subjects. Men reported poorer level of independence and physical health while women reported poorer social relationships and environment. All the six domains correlated significantly with the overall QOL indicated by the G-facet.

Conclusion: Attention toward improving the social status by enhancing sociopsychological supports such as social sensitization, mental health care of patients, and interventions to reduce stigma of PLHIV should be accorded with high priority to ensure improvement in the overall QOL of PLHIV.

Keywords: HIV/AIDS patients (PLHIV); Quality of life (QOL); ART centre; Social and clinical factors.

1. Introduction

Human immunodeficiency virus (HIV) infection/acquired immunodeficiency syndrome (AIDS) is one of the serious public health problems with severe impact on various facets of human life [1]. At present, in the world, around 36.9 million people are suffering from HIV/AIDS. Every year around 2 million people are infected by this virus [2]. With an HIV prevalence of 0.26% in the adult population, India has an estimated 2.1 million people living with HIV. According to recent National AIDS Control Organization data, India had demonstrated an overall reduction of 57% in estimated annual new HIV infections from 0.24 million in 2000 to 0.16 million in 2011 [3]. Since the availability of antiretroviral treatments (ART), HIV has been turned from a fatal disease to a manageable chronic disease. Hence, people living with HIV (PLHIV) have longer life spans, which create new challenges for health care systems [4]. A PLHIV has to cope up with a range of HIV related symptoms for their entire life. Symptoms may be related to the infection itself, co morbid illnesses, or iatrogenic effects from HIV related 6medications [5,6]. Many of the HIV patients struggle with numerous

social problems such as stigma, discrimination, poverty, depression, substance abuse, and cultural beliefs, which can affect their QOL [7]. Depression is most prevalent in PLHIV. Stressful life events experienced by PLHIV again increases the risk of development of depression by three to five times more. Hence, HIV/AIDS infection compromises the quality of life (QoL) in PLHIV [8].

Traditional health indicators such as mortality and morbidity are used to measure impact of disease burden and outcome of an intervention. These indicators only quantify the disease, but do not measure quality of life (QOL) of patients, which has been described as "the missing measurement in health?". Even though the survival of people living with HIV (PLHIV) has improved with the advent of antiretroviral therapy (ART), their life is affected by social factors like stigma/discrimination. Hence, quality of life (QOL) which gives a holistic picture of their health status has gained importance [9].

Quality of life is a multi-dimensional concept convey an overall sense of well-being. There is a lack of universally agreed definition of QOL. WHO defines QOL is a subjective feeling as individuals' perceptions of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards, and concerns [9]. There are various studies conducted across the globe which report that as the HIV infection progresses, it affects the QOL of the individual [10–12]. Various factors apart from physical and mental health like employment status, age, gender, income, education, HIV stage, severity of HIV infection, etc. are found to impinge on the QOL of PLHIVs [13,14]. Also, QOL is identified as a useful medium to measure or determine the efficacy of treatment or interventions like dietary interventions [15]. There are limited studies to assess the QOL among PLWHA in this part of the country. Therefore, the present study investigates the QOL of Indian PLHIV receiving ART and examines some socio - demographical and clinical factors that may affect it.

2. Materials and Methods

2.1. Study Design and sampling

This cross-sectional study was conducted during March 2021 - April 2022, based on a sample of 140 HIV patients recruited from the ART Centre of G R Medical College, Gwalior. HIV patients above 18 years willing to participate in the study were included in the study. Those HIV patients who were critically ill during the study period were excluded from the study. Ethical clearance was obtained from ethical committee of G R Medical College, Gwalior. Data was collected at the ART centre of JA group of Hospitals by face-to-face structured interview schedule method. Formal permission was obtained from NACO CMHO Office Gwalior. Consent was taken from subjects after explaining them about the study. The researcher herself conducted face to face interview with the subjects sparing approximately 45 minutes for each study.

2.2. Questionnaire (Description of study tool)

The pre-structured questionnaire consisted of 2 parts. Quality of life was assessed by WHOQOL-HIV BREF questionnaire. Each item using 5-point Likert scale, where 1 indicates lowest (negative) perceptions and 5 indicates highest (positive) perceptions. These items were in 6 domains namely physical, psychological, level of independence, social relationships, environment and spirituality/religiousness/personal belief (SRPB). The mean score was transformed to 4-20 range. Higher the scores, better is the quality of life [8]. Another part of the questionnaire included demographic information such as age, gender, place of residence, educational level, employment status and per capita monthly income. HIV related characteristics like time since diagnosis, ART use, and CD4 count were also collected [8].

2.3. Sample size calculation

Statistically valid sample size was drawn, based on reported 74% as the prevalence rate of adherence to ART among HIV-infected persons receiving care in private clinics in Mumbai, India by Shah *et al.*, The sample size of the study group was calculated by using the formula given below [16]:

$$N = Z^2 \frac{\alpha}{2} PQ/L^2$$

$$Z \frac{\alpha}{2} = 1.96,$$

Value of the standard normal variate corresponding to level of significance alpha 5% It comes as:

$$N = 3.84 \times \frac{PQ}{L^2},$$

where P is the expected prevalence= 74%, Q = 100-P = (100- 74) %= 26%, L is the allowable error (10-20% of P). For the present study, this has been taken as 10% of P. N, Sample size = 137 patients Considering 10% incomplete or unusable questionnaires, a total of 140 patients were registered & interviewed.

2.4. Collection of data

The study subjects were identified during study period at ART centre, at G R Medical College, Gwalior. Daily 3 patients were randomly selected from the OPD register of ART centre and the process was continued till the desire sample of 140 patients was reached. Every patient, who was fulfilling the inclusion criteria and visiting the ART centre was approached during each interview period. All the subjects were informed about the purpose of the study. After obtaining the informed consent, they were interviewed separately in privacy, in a language understandable to the subjects, using a pre structured questionnaire based on WHOQOL-HIV Bref [9]. All the information collected was based on patients' self-report, with the exception of CD4 count, BMI (Body mass index) and opportunistic infection at the start of the treatment and at present, this information was collected from the medical records.

2.5. Data analysis

The information collected on the study schedule was transferred on the pre-designed classified tables in Microsoft excel sheet and then it was cleaned for missing values and typing errors. After which it was imported in to statistical package for social sciences (SPSS free version 22) dataset and various analysis were run as per suitability and our aim and objectives. For all the tests, a "p" value of <0.05 was considered for the statistical significance. Associations were found out using Chi Square test for categorical variables. Student-t test and ANOVA were used for comparisons among continuous variables.

3. Results

A total of 140 patients were enrolled in this study with a mean age of 33 ± 15 years. More than half 88(62.9%) of participants were males, married 107(76.4), middle school education 77(55.0). Maximum patients i.e., 96(68.6%) were residing in rural area while 44(31.4%) in urban area. According to Agarwal AK social classification by per capita income [17], majority of patients were belonged to lower (poor) 51 (36.4%) and lower middle 47 (33.6) socio-economic classes. Heterosexual mode of HIV/AIDS transmission was prominent among 114 (81.4%) of the studied sample and no definite route could be ascertained in 08 (5.7%) patients (Table 1). The leading age group affected with HIV/AIDS was from the reproductive age group that was 31-40 years 49(35.0%) followed with 18 - 30 years 52(37.1%). Among 107(76.4%) married HIV patients, spouses of 86 (61.4%) were found HIV positive. Considering the occupation of HIV patients, the highest percent was among the housewives 38 (27.1%), non-skilled (labourer) 33 (23.6%), and skilled workers 27 (19.3%) respectively. Habits of substance used e.g., smoking, alcohol and chewing tobacco were present in 62 (44.2%) patients.

Table 2 shows the mean scores of the 6 domains of quality of life. The mean score of HQoL was the highest for the environmental domain (13.2 ± 4.2), followed by the social domain (12.6 ± 3.1), physical domain (11.3 ± 4.6), the level of independence (10.7 ± 4.8), the psychological domain (10.1 ± 2.5), and spiritually/religion/personal belief (SRPB) (9.4 ± 3.6). Overall mean score was derived to be 12.82 ± 2.8 . Correlation index of WHOQOL-HIV domains with overall QOL and among individual domains, calculated by Pearson's statistics, are shown in Table 3. Each domain was significantly related with overall QOL using two-tailed 't' test ($p < 0.05$). Moreover, each domain was significantly related with others ($p < 0.001$). Strong correlations were observed between physical and level of independence ($r = 0.875$, $p < 0.001$). The weakest correlation was observed between social relationship and physical domains ($r = 0.363$, $p < 0.05$).

The association between the mean scores of HQoL domains and the socio-demographic characteristics and disease related variables was examined. Based on the independent samples t test and one-way ANOVA

performed on different socio-demographic characteristics and disease related variables. The sex and age of participants were significantly associated with the physical and psychological health respectively. Patients who live in urban areas showed higher level of environmental score compared to those who live in rural areas. The educational status of the respondents was found to be strongly associated with the all domains of HQoL, social relationship and environmental health. In addition, social & economic status was significantly associated with the physical, psychological, environmental health and spiritually/religion/personal belief [SRPB] of the respondents but there was not found significant association of marital status with different domains (Table 4).

In study population, around 46% participants had BMI lower than normal (<18.5), 59.28% subjects were having their CD4 count below 350, 61.43% were have WHO clinical stage I (asymptomatic), 60% were adherence to ART and more than half had opportunistic infection. Those who had CD4 level ≤ 350 cell/cm³, WHO clinical stage IV, BMI lower than normal, nonadherence to ART and those who had opportunistic infection had a greater proportion of poor quality of life and showed significantly association with different domains of HQoL statistically significant level after performing t test or one way ANOVA (p-value=0.05) (Table 5).

4. Discussion

The present study shows that out of total 140 participants, 104 (74.3%) of our patients were diagnosed through clinical symptoms, while 36 (25.7%) of patients were asymptomatic at the time of presentation and were diagnosed during routine scanning or came for testing due to high-risk behaviour. CD4 count is one of most reliable investigation for clinical staging of patients and used to make decision on treatment initiation along with opportunistic infections. With advance research and treatment options to slow disease progression, patients are living longer after diagnosis and initial treatment. Hence, interest has been increasingly focused on the quality of life of patients. The present study specifically evaluates QOL among HIV/AIDS patients. WHO has defined quality of life as 'individuals' perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns. Globally several instruments have been specifically developed to assess the QOL of people living with HIV/AIDS (PLHA) like medical outcome study (MOSQOL), [18] AIDS Health Assessment Questionnaire AIDS-HAQ) etc., [19] but among many QOL instruments used globally, WHOQOL-HIV has been used widely QOL refers to the degree of excellence in a person's life at any given period that contributes to satisfaction and happiness of the person and benefits society. QOL is multifaceted, incorporating physical, material, psychological, social, and spiritual well-being [20]. It is also important to note that QOL relates both to adequacy of material circumstances and feeling about these circumstances. It is said to include overall feelings of well-being that are closely related to moral happiness and satisfaction [21]. In addition, as health is generally seen as one of the most important determinants of overall QOL, it has been suggested that QOL may be uniquely affected by specific disease such as HIV/AIDS [20]. Overall domain score of 12.82 ± 2.8 was derived in our study which is slightly lower but comparable to other studies of Rajeev *et al.*, [22] and Mahalakshmy *et al.*, [23] who have reported 11.5 and 13.5 overall domain scores respectively [5,6]. Highest mean score (13.2 ± 4.2) was for Domain V (Environmental) whereas the lowest for SRPB domain (9.4 ± 3.6). Similarly, Mahalakshmy *et al.*, [23] and Meena *et al.*, [24] also reported highest score for level of independence and environmental respectively and lowest score for SRPB domain. 6 Contrarily Anand *et al.*, revealed highest score for SRPB domain (14.5) and lowest for level of independence (11.8) [16,24]. Each domain was significantly related with each other's (p<0.05) and with overall QOL using two tailed t test (p<.05). Similar findings were reported by Marashi *et al.*, [25], Gupta *et al.*, [26], and Arya *et al.*, [27] in their studies.

In this study, female respondents showed a higher HQoL score than men with significant in physical domain. Some studies have also documented higher performance for women in some aspects of HQoL [28] while in some other studies had shown the opposite [29,30]. This can be attributed to many factors including, but not limited to, increased natural resistance of women following the regular use of ART [31]. The mean age in this study (43.7 years old) was higher than that reported in studies about QoL of PLWHA in Brazil. Indeed, the mean age of a study carried out in the southern State of Rio Grande do Sul was 40.9 years [32]. Studies conducted in Sao Paulo found mean ages of 39 (Reis *et al.*, 2011) [33] and 38.2 years old [34]. We found that PLWHA older than 44 had better QoL than younger PLWHA. This data contrasts to those reported by Ferreira and Paniago [35] showing that younger PLWHA (20 to 39 years) had better mean scores for QoL, and is in

Table 1. Demographic characteristics of patients with HIV / AIDS (n=140)

Variables	No (%)	
Sex	Male	88(62.9)
	Female	52(39.1)
Age Group	18-30	52(37.1)
	31-40	49(35.0)
	41-50	29(20.7)
	>50	10(7.1)
Residence	Urban	44(31.4)
	Rural	96(68.6)
Caste	UR	57(40.7)
	SC	20(14.3)
	ST	10(7.1)
	OBC	53(37.9)
Educational status	Illiterate	42(30.0)
	Middle	77(55.0)
	Secondary	16(11.4)
	=Graduate	3(2.1)
Marital Status	Married	107(76.4)
	Unmarried	18(12.9)
	Widowed/ Divorced/Separated	15(10.7)
HIV status of spouse	Positive	86 (61.4)
	Negative	54 (38.6)
Family Type	Nuclear	107(76.4)
	Joint	33(23.6)
Occupation	Skilled/	27 (19.3)
	Not Skilled	33 (23.6)
	Shopkeeper/Farmer	25 (17.8)
	Unemployed	17 (12.1)
	Housewives	38 (27.1)
Socio Economic Status (According to per capita income)	Upper [Class I]	07(5.0)
	Upper Middle [Class II]	35(25.0)
	Lower [Middle Class III]	47 (33.6)
	Poor [Class IV]	51 (36.4)
Substances used (n= 62 (44.2%))	Smoking	34 (24.3)
	Tobacco use	39 (27.9)
	Alcohol intake	36 (25.7)
	Injection drug user	9 (6.4)
	Not used	78 (55.7)
Mode of transmission / Risk factors	Heterosexual	114 (81.4)
	Homosexual	08(5.7)
	Intravenous Drug Use	9 (6.4)
	Not specified	08 (5.7)
	Blood transfusion	1 (0.7)

Table 2. WHO QOL individual domain score

WHO QOL domain (Type)	Mean Score \pm SD
Domain I (Physical)	11.3 \pm 4.6
Domain II (Psychological)	10.1 \pm 2.5
Domain III (Level of independence)	10.7 \pm 4.8
Domain IV (Social Relationship)	12.6 \pm 3.1
Domain V (Environmental)	13.2 \pm 4.2
Domain VI (Spiritually / religion / personal belief [SRPB])	9.4 \pm 3.6
Overall perception of HQoL	12.82 \pm 2.8

Table 3. Inter-domain correlation matrix of HQoL in HIV patients at baseline

Domain I	Domain II	Domain III	Domain IV	Domain V	Domain VI
11					
0.717**	1				
0.875**	0.835**	1			
0.363**	0.502**	0.458**	1		
0.745**	0.774**	0.788**	0.540**	1	
0.696**	0.642**	0.730**	0.529**	0.820**	1

Table 4. Difference in QOL domains score according to socio-demographic factors

Groups	N	Physical Domain Mean Score (SD)	Psychological Domain Mean Score (SD)	Level of independence Mean Score (SD)	Social domain Mean Score (SD)	Environmental domains Mean Score (SD)	SRPB domain Mean Score (SD)	
Gender	Male	88	10.7 (4.6)	9.9 (2.5)	10.3 (4.8)	12.8 (2.8)	12.9 (4.5)	9.2 (3.6)
	Female	52	12.3 (4.5)	10.3 (2.4)	11.5 (4.7)	12.4 (3.5)	13.7 (3.5)	9.7 (3.7)
	t Test, p Value		0.05*	0.32	0.32	0.50	0.26	0.46
Age Group [Years]	18-30	52	12.3 (4.9)	11.1 (2.7)	12.1 (5.1)	13.4 (3.3)	14.5 (4.7)	10.2 (3.9)
	31-40	49	11.0 (4.7)	9.6 (2.3)	10.4 (4.9)	12.4 (3.1)	12.5 (4.0)	9.1 (3.9)
	41-50	29	10.2 (3.5)	9.4 (1.7)	9.2 (3.3)	11.3 (2.1)	11.9 (2.6)	8.2 (2.0)
	>50	10	10.6 (4.6)	9.3 (2.3)	9.5 (5.2)	13.8 (2.5)	14.0 (4.0)	10.1 (3.5)
	ANOVA test P value		1.496, 0.219	4.409, 0.005*	2.706, 0.048*	3.512, 0.017*	3.343, 0.021*	2.249, 0.85
Residence	Urban	44	12.3 (4.5)	10.9 (2.6)	11.7 (4.6)	12.6 (2.7)	13.8 (4.7)	9.2 (3.3)
	Rural	96	10.9 (4.6)	9.7 (2.3)	10.2 (4.8)	12.6 (3.2)	12.9 (3.9)	9.5 (3.8)
	t Test, p value		0.054, 0.816	3.195, 0.076	0.545, 0.462	1.799, 0.182	5.223, 0.024*	0.851, 0.358
Education	Illiterate	42	11.1 (4.6)	9.7 (2.2)	10.6 (4.6)	11.8 (4.8)	12.7 (3.7)	8.9 (3.8)
	Up to Middle	72	13.3 (4.3)	10.7 (2.4)	12.5 (4.9)	13.8 (2.4)	14.8 (3.9)	11.2 (3.5)
	Up to Secondary	22	13.3 (4.1)	11.8 (1.7)	12.4 (2.0)	15.2 (3.0)	15.6 (2.9)	9.6 (1.4)
	Graduate/PG	4	13.3 (4.6)	11.7 (4.6)	13.7 (5.8)	14.0 (2.7)	19.3 (5.5)	12.7 (2.3)
	ANOVA test p value		5.54, 0.00*	5.73, 0.00*	4.85, 0.00*	5.94, 0.00*	8.39, 0.00*	5.05, 0.00*
Socio Economic Status	Upper	7	16.6 (2.2)	12.3 (1.8)	15.0 (2.0)	13.8 (1.8)	17.8 (4.2)	11.1 (2.5)
	Upper Middle	35	12.1 (4.6)	10.7 (2.3)	11.4 (3.8)	12.8 (3.4)	14.7 (3.9)	10.3 (3.3)
	Lower Middle	47	9.6 (4.4)	8.8 (2.1)	8.7 (4.4)	13.2 (2.4)	11.3 (4.2)	8.0 (3.6)
	Poor	51	12.1 (5.2)	9.7 (2.4)	9.7 (2.4)	12.0 (3.1)	12.2 (4.1)	9.9 (4.5)
	ANOVA test p value		5.06, 0.001*	4.598, 0.002*	3.193, 0.015*	1.066, 0.376	6.690, 0.000*	2.794, 0.029*
Marital Status	Married	107	11.6 (4.5)	10.2 (2.3)	10.9 (4.6)	12.8 (3.2)	13.3 (3.9)	9.6 (3.5)
	Unmarried	18	10.0 (4.7)	10.0 (3.3)	10.3 (5.8)	11.7 (2.3)	13.0 (5.2)	8.4 (3.8)
	Widowed Divorced/ Separated	15	10.5 (5.2)	8.9 (2.3)	9.3 (5.1)	12.7 (2.6)	13.1 (4.4)	9.5 (4.5)
	ANOVA test (p) value		1.21 (0.30)	1.99 (0.14)	0.87 (0.42)	0.92 (0.40)	0.04 (0.96)	0.79 (0.45)

Table 5. Difference in QOL domains score according to HIV (Disease) related factors

Groups	N	Physical Domain Mean Score (SD)	Psychological Domain Mean Score (SD)	Level of independence Mean Score (SD)	Social domain Mean Score (SD)	Environmental domains Mean Score (SD)	SRPB domain Mean Score (SD)	
CD4 count	>350	83	10.3 (4.1)	09.7 (2.1)	10.8 (3.2)	12.1 (2.7)	12.7 (3.8)	9.2 (3.1)
	<350	57	14.6 (4.3)	12.3 (1.9)	14.8 (3.7)	14.7 (2.9)	15.5 (3.4)	11.7 (3.6)
	t Test (p value)		5.98 (0.001*)	7.48 (0.001*)	6.82 (0.001*)	5.43 (0.001*)	4.47 (0.016*)	4.39 (0.002*)
BMI	<18.5(Underweight)	64	1.1 (4.4)	9.0 (2.4)	9.5 (4.7)	12.8 (3.2)	12.3 (3.6)	8.9 (3.7)
	18.50-24.99 (Normal Range)	72	12.2 (4.5)	10.6 (2.4)	11.7 (4.8)	12.8 (2.9)	13.9 (4.5)	9.7 (3.6)
	>25.00 (Overweight)	4	15.0 (3.5)	12.4 (0.5)	13.0 (2.3)	13.0 (3.5)	16.7 (3.2)	10.0 (2.3)
	ANOVA test, p value		5.320, 0.006*	5.947, 0.003*	4.017, 0.020*	0.236, 0.790	4.022, 0.020*	0.776, 0.462
WHO Clinical staging	Stage I (Asymptomatic)	86	12.8 (4.4)	10.9 (2.4)	12.4 (4.5)	12.9 (3.1)	14.3 (4.1)	10.1 (3.5)
	Stage II (Mild syms)	10	13.0 (4.5)	10.5 (2.1)	12.0 (3.8)	12.8 (2.4)	15.2 (4.2)	10.6 (3.7)
	Stage III (Advanced syms)	31	7.5 (3.0)	8.1 (1.7)	6.6 (3.3)	11.6 (3.0)	10.4 (2.8)	7.7 (3.4)
	Stage IV (Severe syms)	13	9.2 (4.3)	9.3 (1.6)	8.3 (3.2)	13.1 (2.8)	11.2 (3.4)	7.6 (3.3)
	ANOVA test p value		14.9, 0.00*	12.5, 0.00*	16.9, 0.00*	1.6, 0.18	9.8, 0.00*	9.8, 0.002*
ART adherence	>90%	84	12.5 (4.6)	11.3 (2.7)	11.9 (4.6)	12.9(3.3)	14.9 (4.2)	11.2 (3.6)
	<90%	56	10.7 (4.5)	9.8 (1.9)	9.8 (3.6)	11.4 (2.9)	12.2 (3.5)	9.7 (3.2)
	t test, p value		2.298, 0.043*	3.856, 0.002*	3.02, 0.005*	2.83, 0.009*	4.12, 0.001*	2.58, 0.019*
Opportunistic Infection	Yes	76	10.0 (3.9)	9.2 (2.2)	8.9 (4.2)	12.1 (2.8)	12.4 (4.1)	9.8 (3.5)
	No	64	12.8 (4.9)	11.2 (2.3)	12.9 (4.6)	13.2 (3.2)	14.2 (3.5)	7.7 (3.7)
	t test, p value		3.69, 0.004*	2.67, 0.015*	5.33, 0.000*	2.14, 0.064	2.80, 0.01*	0.412, 0.68

agreement with Passos and Souza (2015) [32], who revealed that PLWHA younger than 47 years had lower QoL in all domains, except in the independence level domain. Gaspar *et al.*, [36] reported that women over 50 years with low social and economic levels had lower QoL scores in the independence level domain.

In our study subjects from rural area were having better score in SRPB while physical, Environmental and level of independence domains score were higher among urban subjects but not found significant statistically. Similarly, Meena *et al.*, [36] was found better score in psychological, environment, level of independence, and SRPB domain of QOL, whereas Kumar *et al.*, and Shukla *et al.*, [37,38] observed subjects from urban area were having better score in all domains. Meena *et al.*, and Shukla *et al.*, [24,38] has found better score in physical, psychological and environment domains among rural subjects while the higher score in social domain in urban subjects.

Education, an indicator of socioeconomic status, has also been shown to influence QOL of people living with HIV and AIDS [37]. We also found that subjects with secondary or more education reported better QOL in physical and environmental domains ($P < 0.05$). Studies has shown that patients with higher education reported better QOL, possibly due to better knowledge about their treatment and disease, access to health services, or functional status and more enlightened attitude towards the disease with the increasing public awareness of HIV [39–41]

The individual income of the population studied was very low. Around more than one third (36.4%) of patients belong to poor class and had significantly low score in all domains except social domain. our findings are similar to those reported previously revealing that individuals without income or with an income lower than one minimum wage had low QoL scores in various domains [42]. Reis *et al.*, [33] pointed out that higher income implies higher scores in all domains, except social relations. We found that low economic status was associated with low QoL in all domains. According to Anuradha and Antonio [35,43], belonging to a given socioeconomic level is a variable related to other factors such as income, level of education, and social support network, which might affect QoL.

In our study higher scores were observed in all domain for the marital subjects as compared to unmarried and widow / widower but was not significant statistically. Unlike our study Wig *et al.*, Liping *et al.*, and Meena *et al.*, observed significant difference in the environment, psychological and social relationship domain scores of the patients in relation to the marital support. [24,40,41]. It was observed in our study that mean scores for all six domains score of subjects who were underweight have BMI < 18.5 were significantly (0.05) lower than those having normal range of weight. Michael *et al.*, in their study observed that 49(19.5%) of males and 75(29.5%) of females were undernourished. Physical, independence and environmental QoL domains were significantly reduced among undernourished patients in both genders. Furthermore, undernourished females had 2.2 times poorer psychological QoL compared with well-nourished counterparts [44]. Similar findings were also observed by Akinboro *et al.*, [45] and Thapa *et al.*, [46].

According to Shan *et al.*, and Liping *et al.*, HIV-infected persons with worse health conditions with other comorbidities are inclined to have worse QoL. One of the most acknowledged clinical variables associated with QoL of PLHIV is the breakdown of immunity which is the main cause of symptoms in HIV and is associated with lower QoL [41,47]. Similarly, it was observed in our study that mean scores of stage I (asymptomatic) was significant better (< 0.05) for all domain of HQoL except social relationship. Thapa *et al.*, also found the mean QoL scores to be significantly higher among PLHIV who were at WHO clinical stage I and II [46]. Similar findings was also observed by Surur *et al.*, [29]. Paton *et al.*, [10] found that the differences between the disease stages and correlations with CD4 counts extended to nearly all the subscales of physical and mental health. However, some investigators have reported absence of a clear association between scores on psychological domains and the stages of HIV infection, thus signifying the need to combine ART with psychological intervention [48].

Whole domain of HQoL. Similarly, Liping *et al.*, showed that patients with $CD4^+$ T-lymphocyte cell count below 350 had worse scores in the physical and independence domains [41]. Gifford *et al.*, [49] found that patients with $CD4^+$ T-lymphocyte cell counts above 500 cells/mm³ evaluated their lives better than patients with $CD4^+$ T-lymphocyte cell counts below 500 mm. In consonance with the present study Mahalaxmi *et al.*, [23] also found significant correlation of CD4 count with SRPB domain and Meena *et al.*, [24] found positively correlated with psychological and SRPB domain. Unlike our study they did not found correlation of CD4 count with psychological domain. ART adherence is known to contribute to the QOL of people living with HIV and AIDS, and QOL is in turn believed to positively influence adherence, as persons with better QOL may have a

greater ability to adhere to their ART regimens; studies have also shown that adherence and QOL share some determinants. Both QOL and adherence have been shown to be associated with HIV RNA levels, HIV disease stage, and symptoms. QOL and ART adherence share an inverse relationship with HIV RNA levels: lower adherence rates predict higher HIV RNA levels, and this virological failure has been associated with lower QOL scores. [48,50,51] Similarly, our study was found a statistical difference in all 6 domains in according to HIV patients with adherence to ART. In our study opinion, this suggests that ART works in combination with such other factors as education and socioeconomic status to affect the desired improvement in the QOL of people living with HIV and AIDS. The findings in the present study shows that 33.5% subjects had one or more co-morbid conditions and in 22.2% subjects no co-morbidity was found. mean score of HR-QOL was higher in all domains for those who did not have any co-morbid condition. The difference was found significant in physical and level of SRPB domain ($p < 0.05$). Similar findings was observed by Melaku *et al.*, [52] and Langebeek *et al.*, [53].

5. Limitations of study

There were several limitations in our study. First, in view of the fact that HIV-patients were recruited solely from single medical facility which may have increased the possibility of selection bias or decreased generalizability. However, convenience sampling is a common practice in HIV research work, and it would be difficult to obtain a truly representative sample because of stigma related to the disease. Second, that during asking questions the recall bias may influence the information obtained. Third, this study is only a cross-sectional design survey, thus, it is difficult to make any causal conclusion of between socio-demographic and disease-related variables and QOL. However, based on the data analysis, we can say factor such as ART adherence, economic and social supports tend to have beneficial effects on the QOL of PLWHA.

6. Conclusion

The six domains of HQoL were found to be moderate. The physical health and spirituality of the patients were relatively higher than their social relationship. Sex, age, educational status, residence and marital status were significantly associated with at least one domain of HQoL. Moreover, WHO clinical stage, CD4 count was strongly associated with all HQoL domains. Strategies to improve psychological supports and environmental health, and strengthening social relations seems relatively more demanding than other domains of HQoL. Primary health care support can be used to improve the psychological and environmental health of PLWHA. In this aspect health care providers can use the findings to focus their interventions to address the social aspects of the problems of their patients in addition to the clinical aspects. Social sensitization to avoid stigma and discrimination can improve those domains of HQoL since it may help to create a sense of safe living conditions or help PLWHA to receive a necessary support from their friends.

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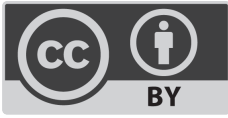
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