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Research Paper: The Role of Health Hardiness and Anxiety on Immune System and Quality of Life Patients with HIV

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Abstract

The pattern of change in HIV from fatal diseases to chronic diseases due to improvement of treatment made a new challenge for diagnosis and care for the needs of people who live with HIV. This study reviews the role of health hardiness and anxiety on the immune system and quality of life in HIV patients. 125 men with HIV infected through injection participated in this study. They were asked to complete the revised health hardiness inventory, Spielberg state-trait anxiety inventory, and WHOQOL-brief. Data from four times of cd4 experiment with three-month intervals was obtained from the dossier. Data analysis was conducted using Pearson correlation, dependent t-test, multiple regression, and logistic regression. Results of this study show no statistically significant relationship between health hardiness, anxiety, and the immune system. The regression analysis indicates that the total score of quality of life with health hardiness and anxiety was statistically significant (0.0001). Subscales of perceived health (B=0.302), state anxiety (B=-0.305) and trait anxiety (B=-0.449) in equation relative to prediction quality of life were statistically significant (0.0001). Health hardiness and anxiety are not associated with a lowered immune system. The patients with higher anxiety had lower quality of life and those with higher health hardiness had higher quality of life.

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1. Introduction

In the mid-1990s, the pattern of HIV/AIDS changed from a deadly disease to a chronic disease because of advances in treatment that posed a new challenge in identifying and addressing the needs of people living with HIV/AIDS for long periods (Vetter, 2009). QOL drew the attention from regulatory authorities and health providers as an important outcome to evaluate the effectiveness of HIV treatment (Thu Vu, Tran, Hoang, & Hall, 2020). Over the last decade, the pattern of control and management of symptoms to improve the overall quality of life, especially in deadly diseases such as AIDS and cancer has changed significantly (Chandra, Deepthivarma, Jairma, & Thomas, 2003). Quality of life has been considered as an important measure of health, the improvement of which is an important goal (Vetter, 2009). Poor QOL is associated with a lower immune response, non-adherence, poor mental health, and greater disease severity (Thu Vu et al., 2020). Improving the quality of life of people living with HIV is an important area of therapeutic interventions, so that patients may abandon therapies that increase their lifespan. People prefer to have a shorter life but with an optimal quality of life (Zimpel, & Fleck, 2007). The important point is to improve the quality of life, so the factors that affect the quality of life must be identified (Deribew et al., 2009). Among these factors are health hardiness and anxiety. Kobasa (1979) introduces hardiness as a set of personality traits that help a person stay healthy in the face of stressful events. Pollack (1990) developed the concept of health hardiness to be used specifically for people with chronic illnesses. He hypothesized that health hardiness is a motivating factor in the physiological and psychological adjustment of chronic patients. Several studies have concluded that hardiness and quality of life are related (Asadi Sadeghi Azar, Vasudeva, & Abdollahi, 2006, Whetsell, 2006, Sttine, Chapman, Kobau, Balluz, & Mokdad, 2004).

Cross-sectional and longitudinal studies have suggested that anxiety and depression are related to a reduced quality of life in samples with and without specific diseases (Hohls, Konig, Quirke, Hohls, & Hajek, 2019). People who are anxious in addition to physical illnesses are four times more likely to feel helpless than those without anxiety (Sttine et al., 2004). Researchers have concluded that anxiety has a negative impact on patients' quality of life (Saevarsdottir, Fridriksdottir, & Gunnarsdottir, 2010, Alacaciogla, et al., 2010, Brenes, 2007, Khayam Nekoueiz, Yoasefi, Khayam Nekouiz, & Sadeghi, 2009) Studies have shown that some HIV-infected people show no symptoms and live longer than others. These studies show that psychological states and traits play a role in most of their lifetime (Locke, 1987). There is considerable evidence that psychosocial factors play an important role in the progression of HIV infection, mortality, and morbidity (Rendina, Weaver, & Millar, 2019). As a result, psychosocial factors that affect immune-endocrine interactions are associated with HIV/AIDS. Accumulating data from human studies suggest that a range of psychological factors may play protective roles against the deleterious effects of stressful events (Dantzer, Cohen, Russo, & Dinan, 2018). Here we discuss two factors that have received sufficient attention to address their potential effect on

the immune system. These factors include health hardiness and anxiety.

Although stress weakens the immune system in the long run and exposes the individual to various diseases, there are certain moderators known as stress-resistant resources that reduce the negative effects of stress on the body. Research has shown that people with low psychological hardiness will be afflicted with diseases in the long run, while people with high levels of hardiness are immune to the negative effects of stress (Seiler, Fagundes, & Christian, 2019). The individuals who scored lower on hardiness measures had a greater tendency to become ill when experiencing high levels of stress compared to hardy individuals. In other words, the findings suggest that hardiness is better at buffering the effects of stress on health (Kowalski, & Schermer, 2018). The study reported a positive relationship between the commitment subscale of hardiness and CD4 counts of HIV patients (Pandey, Srivastava, 2015). Studies show that psychological hardiness protects against the ill effects of stress on health and that hardiness operates as a moderator or buffer of stress (Bartone, Eid, & Hystad, 2016). Likewise, the results of studies (Dolbier, Cock, & Leiferman, 2001, Leaudoin, 1992; Bahrami, mohamadirizi, & Mohamadirizi, 2017) showed a significant relationship between hardiness and the immune system and diseases. However, the results of studies by Nickolas, and Webster (1993) and Lang (2001) showed no significant relationship between them.

Long-term negative emotions may reduce the immune function of people and destroy the balance of their normal physiological mechanisms (Li, Wang, Xue, Zhao, & Zhu, 2020). Stressful life events and the negative emotions they generate can dysregulate the immune response by disturbing the sensitive interplay among these systems (Seiler et al., 2019). Psychological stress has been implicated in altered immune functioning in many diseases. Altered immune function can lead to exacerbated symptoms of both physical and psychological illnesses (Morey, Bogger, Scott, & Segerstroww, 2015). Studies have shown that although anxiety may be associated with immune changes, the analysis of some studies have been contradictory (Arranze, Guayerbas, & Dela Fonte, 2007; Lutgendrof, et al., 2008, Thornton, Andersen, & Crespin, 2007; Antoni et al., 2000; Diego et al., 2001; Kawamura, Kim, & Asukai, 2001). However, studies assessing the effect of psychological variables on the patients with HIV are lacking in IRAN; therefore, the purpose of this study was to assess the effect of anxiety and health hardiness on the immune system and quality of life in the patients with HIV.

2. Method

The 125 HIV-infected men who were referred to the Behavioral Diseases Counseling Center of Imam Khomeini Hospital in Tehran and who were tested positive for HIV by Western blot were included in the study. These patients became infected with HIV through co-injection with a contaminated syringe. Their CD4 levels were above 200. Reviewing the medical record showed that they had neither a physical problem (other than HIV infection), nor a mental illness, who took no medication. The participants were informed that the aim of the study was to investigate the role of psychosocial variables on their immune system and quality of life and that they would not be

named and were included in the study if they gave their consent. First, the files of the patients referred to the Behavioral Diseases Counseling Center of Imam Khomeini Hospital were reviewed. If the patients were eligible, first the demographic characteristics of the patients including age, marital status, employment status, level of education, spouse infection (if married) were recorded. Then, the data about the research variables was obtained using the questionnaires. Then, in order to obtain information about the immune system, four CD4 tests of the patients with three-month intervals were recorded from their files. The aim of this cross-sectional study was to determine whether anxiety plays a role in lowering the immune system and reducing the quality of life of HIV-infected patients. In addition, what is the role of health hardiness in increasing the immune system and improving the quality of life of these patients? Using multivariate regression, the relationship between independent variables (health hardiness and anxiety) and quality of life was examined, and using logistic regression, the relationship between independent variables (health hardiness and anxiety) and the immune system was investigated.

The data required for this study were collected using three questionnaires.

Health Hardiness Questionnaire (RHHI-24): This questionnaire is a self-report questionnaire that has 24 items and is prepared by Gibhardt, Vanderduff, and Powell (Gebhardet, Vander Doef, & Paul, 2001). Each item of the questionnaire is in the form of a statement that refers to a person's health status and has a 5-point Likert scale from "strongly agree" to "strongly disagree." Health hardiness has four subscales: health value, internal health locus of control, external health locus of control, and perceived health competence. Cronbach's alpha was 0.83, 0.89, and 0.82 for the sample groups of students, normal people, and chronic patients, respectively. And the correlation coefficient obtained in the retest is 0.91 and for the subscales ranges from 0.74 to 0.91 (Torshabi, 2007).

Spielberger State-Trait Anxiety Test (STAS-Y): The first form of the questionnaire was developed in 1970 by Spielberger et al., which is known as Form X. Form X was revised in 1983 and was renamed Form Y. The revised form has 40 items. The scores range from 20 to 80. The higher a person's score, the higher his level of anxiety. In Form X, the retest coefficient on the Trait Anxiety Scale (0.84 for men and 0.76 for women) was higher than the state anxiety (0.33 for men and 0.16 for women). Internal consistency in the state anxiety scale was between 0.83 and 0.92 and in the trait anxiety scale range from 0.86 to 0.92. In form Y, the mean alpha coefficients in the state and trait anxiety scales were 0.90 and 0.93. Retest coefficients in trait anxiety ranged from 0.73 to 0.86 and those in state anxiety ranged from 0.16 to 0.62 (Spielberger, 1983). Dehdari et al. (2007) obtained an alpha coefficient of 0.90 in their study.

Quality of Life Short Form Scale (WHOQOL-BRIEF): The Global Health Quality of Life Short Scale was developed after integrating some dimensions and selecting a number of items from the World Health Organization Quality of Life Scale that justified most of the variance (Skevington, Lotfy, & O,Connel, 2004). This questionnaire includes two general health and quality of life items and one item for each of the 24 WOQOL-BRIEF subsets and has a total of four main dimensions of

physical health (four items), mental health (six items), and social relations (three items). And environmental health (eight items) (World Health Organization). Studies by Skevington, Lotfy, and O,Connel (2004), Zhao et al. (2006) have shown that this scale has sufficient reliability and validity. In Rafie, Sharifian, Rafiey, Behnampour, and Forozesh (2014) study, the internal consistency for the global score was 0.934. T-test reliability showed good results for global score (Spearman's correlation=0.89, ICC= 0.887). The concomitant validity and construct validity revealed a significant correlation between QLI with SF-36 questionnaire and Vaux questionnaire.

3. Results

The descriptive characteristics of the research variables are shown in Table 1.

Table 1. Descriptive characteristics of research variables

Scales	M	SD	Scales	Mean	SD
Health hardiness	67.05	13.33	Trait anxiety	44.73	12.79
Health value	14.25	2.91	Quality of life	76.11	15.67
External health locus of control	16.52	5.69	Physical health	29.94	5.27
Internal health locus of control	18.05	4.03	Mental health	19.72	4.72
Perceived health	17.70	4.61	Social relation	7.60	2.53
State anxiety	43.09	15.46	Environmental health	23.84	6.07

As shown in Table 1, in the hardiness variable, the internal health locus of control had the highest average. Also, in the quality of life, physical health has the highest average. The mean of trait anxiety is higher than state anxiety.

In order to investigate the role of predictor variables on the quality of life of these patients, first, the correlation between the variables was obtained. Table 2 shows the results of the correlations.

Table 2. Correlation coefficients of research variables

Variable	Quality of life
Health hardiness	0.500**
State anxiety	-0.599**
Trait anxiety	-0.636**

**P<0.01

The results of these correlations indicate that health hardiness has a significant positive correlation with the quality of life. Anxiety has a significant negative correlation with the quality of life.

A multivariate regression test was used to investigate the role of health hardiness and anxiety on quality of life in HIV-infected people. Table 3 shows the multivariate regression results of quality-of-life score in terms of predictor variables.

Table 3.Results of quality-of-life regression analysis test based on predictor variable

Source of variance	SS		Df	SM	F	Sig	r^2 adg
	13593.710		3	4531.237	32.494	0.0001	0.43
Scale	**Beta**	**T**	**Sig**	**Scale**	**Beta**	**t**	**Sig**
Health hardiness	0.172	2.038	0.044	Health value	-0.024	-0.297	0.767
External health locus of control	0.198	2.402	0.017	State anxiety	-0.305	-3.716	0.0001
Internal health locus of control	0.023	0.246	0.806	Trait anxiety	-0.449	-5.463	0.0001
Perceived health	0.302	3.740	0.0001				

As this table shows, a significant model is obtained using simultaneous regression. This model accounts for 43% of the variance in quality of life. Table 3 also shows the coefficients of the quality-of-life score prediction equation in terms of predictor variables. According to this table, the subscales of perceived health, state anxiety, and trait anxiety were significant in the equation related to predicting quality of life.

Paired t-test and logistic regression were used to investigate the relationship between independent variables and the immune system. The results of the paired t-test are shown in Table 4.

Table4. Paired t-test results to compare four CD4 tests

Paired variables	T	df	Sig
CD41 , CD42	-3.483	124	0.001
CD41 ,CD43	-3.219	123	0.002
CD41 , CD44	-2.310	121	0.023
CD42 , CD43	-0.103	123	0.918
CD42 , CD44	-0.609	121	0.544
CD43, CD44	1.03	121	0.303

To compare the average of four CD4 tests, t-test with Ben Foroni correction was used. To avoid the first type of error, the four CD4 tests are to be compared. The significant differences less than 0.0125 is considered. The results of Table 4 show that there is a significant difference between the first and second CD4 test period and the first and third CD4 test period. But there is no significant difference between the first and fourth, second and third, second, fourth, third, and fourth CD4 test period. Then, each CD4 test period was divided into two classes. The basis of division is the use of standard scores and normative distributions. According to the statistical model, the cut-off point +_1/64 in single-domain distributions and +_1/96 for dual-

domain distributions reflect critical boundaries. These points can then be used in the analysis and grouping of recorded CD4. According to this method, subjects with lower than average CD4 were divided into a low-boundary group and those with a higher CD4 were classified as a high-boundary group. Then, using logistic regression, the relationship between research variables and the two groups in each experimental period was analyzed. Table 5 shows logistic regression results and coefficients of independent variables in four CD4 test periods.

Table5. Logistic regression results and coefficients of independent variables in four CD4 test periods

Independent variable	B	Sd	Wald	df	Sig	Exp (B)
Health hardiness) CD_{41}(	0.000	0.015	0.001	1	0.978	1.000
Health hardiness)CD_{42}(	0.021	0.016	1.842	1	0.175	1.021
Health hardiness)CD_{43}(	0.001	0.015	0.001	1	0.969	1.001
Health hardiness)CD_{44}(	0.011	0.015	0.546	1	0.460	1.011
State anxiety) CD_{41}(	-0.016	0.013	1.521	1	0.217	0.984
State anxiety)CD_{42}(	-0.024	0.014	3.051	1	0.081	0.977
State anxiety)CD_{43}(	0.009	0.013	0.575	1	0.448	1.010
State anxiety)CD_{44}(	-0.009	0.013	0.469	1	0.493	0.991
Trait anxiety) CD_{41}(	-0.005	0.015	0.098	1	0.754	0.995
Trait anxiety)CD_{42}(	-0.019	0.016	1.459	1	0.227	0.981
Trait anxiety)CD_{43}(	0.021	0.015	1.900	1	0.168	1.021
Trait anxiety)CD_{44}(	0.004	0.016	0.059	1	0.808	1.004

According to Table 5, there is no relationship between predictor variables and test periods.

4. Discussion

The present study was designed to investigate the predictive effect of health hardiness and anxiety on the immune system and the relationship between them and quality of life in HIV patients. The findings of this study do not support the hypothesis that health hardiness has a predictive effect on elevating the immune system of HIV-infected patients. This finding is consistent with the results of studies (Nickolas, Webster, 1993; Long, 2001). However, it is not consistent with the results of studies Leaudoin (1992) and Bahrami, and Mohammadrizi (2017). This can be explained by the following probabilities: In this study, four-period CD4s were measured at approximately three-month intervals to measure immune changes. Because CD4 changes are slow and take longer to make significant changes. With this description, it seems that changes in the immune system may take longer to make more effective measurements. In addition to CD4 measurements, other measures, such as viral load, should be used to assess the effect of health hardiness on the immune system. The viral load will probably show the effects of psychological variables on the immune system better than CD4. The same argument can also be used to explain the lack of relationship between anxiety and the immune system.

The results of this study along with Farber, Schwartz, Schaper, Moonen, and Mc Daniel (2000) showed that health hardiness is associated with increased quality of life in people with HIV. As shown in Table 3, the Perceived Health Competency subscale positively accounts for 30% of the variance in quality of life. Perceived health competence refers to a specific range of self-efficacy constructs (Walston, 1992; cited in Gebhardet et al., 2001). There is a positive relationship between self-efficacy and quality of life. People with high self-efficacy use coping skills to manipulate stressful situations. They experience less stress, which leads to better physical and mental health. Because of their confidence in their abilities to face challenges, they have a greater sense of control, which leads to better well-being (Asadi Sadeghi Azar et al., 2006). People with high self-efficacy have the competence to face challenges to achieve a goal and succeed. The positive experiences and positive feedback that these people gain increase their self-esteem (Bandura, 1997; quoted by Asadi Sadeghi Azar et al., 2006). Self-esteem is the best predictor of life satisfaction (Levinsohn, Render, and Sili, 1991; quoted by Asadi Sadeghi Azar et al., 2006). And life satisfaction also ensures better mental and physical health, which are important components of quality of life (Asadi Sadeghi Azar et al., 2006). Perceived health is a subjective measure that is more closely related to the use of health care than any other objective measure of health. Poorly perceived health is associated with poor health outcomes (Buseh, Kelber, Stevense, Buseh, & Park, 2008). The low physical health of HIV / AIDS patients is associated with lower quality of life (Mak et al., 2007).

The results of this study is in harmony with the studies by Saevarsdottir et al., (2010), Alacaciogla et al., (2010), Brenes (2007), Khayam Nekoueiz, Yoasefi, Khayam Nekouiz, and Sadeghi (2009) showing that there is a relationship between anxiety and decreased quality of life. Physical symptoms of anxiety include physical stress, arousal of the autonomic nervous system, and other physical complaints (Little et al., 1987; cited in Brown, 2002). Anxiety is associated with negative consequences including decreased work productivity, impaired social, family, and occupational function and physical disability (Brenes, 2007). The low physical health of HIV-infected patients is associated with lower quality of life (Mak et al., 2007). Anxiety has a mediating effect on mental perception, psychological dimensions, social functioning, mental health, and energy quality of life (Renacoba-Puenta, Fernandez-De-Las-Penas, Gonzalez-Gutierrez, Miangolarra-Page, & Pareja, 2008). Behaviorally, anxious and depressed patients neglect their self-care and fail to follow the prescribed medications Moreover, there is a reciprocal relationship between negative emotions (anxiety and depression) and QoL (Aburuz, 2018). Despite the positive findings of the study, several limitations should be mentioned. Since the present study is a cross-sectional study, it is not possible to examine causal relationships, and other variables might have affected the observed relationship. Due to the low level of literacy of patients, the questionnaires were read to the patients, which may have affected the subjects' answers and caused bias in the answers. Thus, future studies may also be conducted in the form of systematic reviews and meta-analyses, for instance, on how health hardiness can be used as a

structure to investigate the efficacy of HIV interventions or treatments.

5. Conclusions

The results of this study showed that although health hardiness and anxiety do not have a predictive effect on the immune system of these patients, they seem to improve the quality of life of these patients.

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Conflict of interest

The author declares that there is no conflict of interest.

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