



# Effect of hardiness on CD4+ count among injection drug users

## Abstract

**Aim:** The purpose of the present research work was to examine the relationship among hardiness and immune response (cluster of differentiation 4 [CD4+] cell count) of injection drug users (IDUs) in Bilaspur district of Chhattisgarh state, India. **Method:** Total of 160 male human immunodeficiency virus (HIV) positive IDUs, enrolled in anti-retroviral therapy (ART) centre of Bilaspur were taken for study. To assess hardiness of the participants, Psychological Hardiness Scale (PHS-SA) was used. **Result:** The hierarchical multiple regression analysis model as controlling for socio-demographic factors, i.e. age, education, and locale was employed to analyse the obtained data. Results revealed overall contribution of hardiness variance predicted 39.8% for criterion variable CD4+ count; whereas the contribution of hardiness components, i.e., commitment, control, and challenge predicted 20.7%, 9.8%, and 9.3% respectively. All these findings showed significant positive association among criterion variable CD4+ count. **Conclusion:** Hardiness (personality trait) shows a vital role for enhancing the immunity level (CD4+ count) of HIV infected IDUs.

**Keywords:** Personality. HIV. Immunity.

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## Introduction

The empirical evidences reveal role of hardiness in both psychological and physical wellbeing among different populations in health sectors in the area of human immunodeficiency virus (HIV); the role hardiness is considered an important element for better health.[1] Cluster of differentiation 4 (CD4+) cell count is a type of protein molecule in human blood which is present on the surface of 65% of individual T-cells. It is a receptor of HIV; mostly it damages a positive patient's immunity level.[2] CD4+ count is to measure the strength of the immune function of the person diagnosed with HIV infection; normal CD4+ count range in adults is 500-1500 cells/mm<sup>3</sup>. [3] Hardiness is comprised of three components as personality characteristics- commitment, control, and challenge, and these three components are considered as the sub-dimensions of hardiness in the present research.

Hardiness is one of the personality traits and it functions as a psychological defensive source in fighting against stressful conditions.[4-7] It is a combination of attitudes that provide the necessary courage, motivation, and capability to eradicate developmental and ecological stresses by the opportunities for development in mental and physical health.[8] Significant association is found between hardiness control subscale and percentage of circulating T-cells.[9] Hardiness component subscales are associated with CD4+ counts among men infected with HIV.[10] Control subscale of hardiness shows an effect of interaction with initial CD4+ count among HIV people.[11]

Hardiness is found to be associated with physical as well as mental illness.[5,12] Hardiness is playing a role of moderator of stress.[13-15] There is significant association among commitment and CD4+ count.[2] Hardiness indirectly affects physical health via psychological wellbeing.[16,17] Hardiness is associated with immune change of people living with HIV/AIDS (PLWHA).[1] Various studies have reported relationship between personality traits,[18-20] and link between mind and immune system.[21] Individuals who were spirituality oriented, and having meaning and purpose in lives were also hardier.[22]

## Aim

The main aim of this study was to find the relationship between hardiness and immunity (CD4+ count) of HIV positive IDUs.

## Objectives

1. To see the effect of hardiness on immune response (CD4+ count) of IDUs.
2. To see the effect of hardiness components, i.e., commitment, control, and challenge on immune response (CD4+ count) of IDUs.

## Method

### Participants

One hundred and sixty HIV positive male patients on ART, mean age 30 years, range 21-40, enrolled in ART centres

and non-governmental organisations (NGOs) of Bilaspur district of Chhattisgarh state, India were selected on the basis of purposive sampling. Chhattisgarh State AIDS Control Society, Raipur permitted for the research work.

**Materials**

To measure the proposed variables, different tools were administered on the subjects.

Socio-demographic variables with the written informed consent of participants’ information were obtained with the help of a self-report questionnaire.

The immune response was assessed by CD4+ cell count and CD4+ counts of participants were noted from their ART centre report cards.

Hardiness was measured through Psychological Hardiness Scale (PHS-SA) developed by Singh.[23] It consisted total 30 items divided into three subcomponents, i.e., commitment, control, and challenge. It is self-reporting, Likert type scale. Reliability of the scale was depicted through Cronbach  $\alpha$  coefficient that was found to be 0.79, and the scale has satisfactory validity.

**Procedure**

Participants who met inclusion criteria were requested to participate after getting the informed consent. Participants were interviewed and assessed by various measures considered in the study by the researcher.

The inclusion criteria of the participants in the study includes -

- HIV diagnosed male participants.
- Those who were able to read and speak in Hindi language.
- Able to write and fill a questionnaire.

The exclusion criteria of the participants in the study excludes -

- Below 100 and above 750 CD4+ counts in cells/mm<sup>3</sup>.
- Illiterate participants.
- Those who were having other chronic diseases, i.e. hepatitis B, tuberculosis, cancer, etc.

**Statistical analysis**

In this study, correlational design was used. The data obtained from this investigation were analysed with the hierarchical multiple regression analysis with stepwise method to find out the relationship between hardiness and its components, i.e. commitment, control, and challenge (predicting variable), and CD4+ count (criterion variable) of participants, using the Statistical Packages for Social Science (SPSS) 24 version. Variance Inflation Factor (VIF) was examined to detect multicollinearity, considering ranges are 1.0 to 4.0.[24,25]

**Result**

Table 1 shows the description of all the variables.

Total 160 men participated in the study. The participants’ age range was between 21-40 years. Out of 160 participants, 131 (82%) participants were from age group 21-30 and 29 (18%) were from age range 31-40 years. This higher percentage of IDUs in the age range of 21-30 years indicated that young population was more infected.

Fifty five (34.4%) participants were from rural area and 105 (65.6%) were from urban area. This information about sample from IDUs population indicated that mostly they were from urban area. Ninety two (57.5 %) participants’ educational qualification was school level and 68 (42.5%) respondents were undergraduate. It means that the educational status

**Table 1:** Percentage, mean, and standard deviation (SD) with ranges of all the variables

Variables	N=160			
	Frequency	Percentage (%)	Mean	SD
CD4+count in cells/mm <sup>3</sup> (range)			424	167.92
100-350	36	22.4		
351-500	78	48.8		
501-750	46	28.8		
Hardiness			110.43	15.46
Age in years (range)			30	5.24
21-30	131	82		
31-40	29	18		
Education				
6th-12th standard	92	57.5		
1st-3rd year (graduation)	68	42.5		
Locale				
Urban	105	65.6		
Rural	55	34.4		

**Table 2:** Hierarchical multiple regression analysis of predictive variables for CD4+count

Predictors	Model 1		Model 2		Model 3	
	$\beta$	VIF	$\beta$	VIF	$\beta$	VIF
Commitment	0.455*	1.000	0.363*	1.087	0.283*	1.156
Control			0.326*	1.087	0.275*	1.115
Challenge					0.323*	1.121
R	0.455		0.552		0.631	
R <sup>2</sup>	0.207		0.305		0.398	
R <sup>2</sup> change	0.207		0.098		0.093	
F change	F (1,158)=41.35*		$\Delta$ F (1,157)=34.47*		$\Delta$ F (1,156)=34.38*	

VIF: Variance Inflation Factor, \*p<0.01

of many participants was only school level, indicating less awareness about the health.

The CD4+ T lymphocyte count indicated immunity status of IDUs group. Thirty six (22.4%) participants had lower CD4+ count within the range of 100-350 cells/mm<sup>3</sup> and 78 (48.8%) of range 351-500 cells/mm<sup>3</sup>; they are considered as borderline of the danger zone. Forty six (28.8%) participants' physical status was normal, between 501-750 cells/mm<sup>3</sup>. Composite score of hardiness mean score was M=110.43; hardiness mean value reveals that IDUs participants hold moderate level of hardiness.

Table 2 shows the hierarchical multiple regression analysis and subsequently the interpretations have been discussed.

In model 1, factor commitment made significant contribution in variation of the CD4+ count [F(1,158)=41.355, p<0.01] and explained 20.7% of the variance in CD4+ count (R<sup>2</sup>=0.207,  $\Delta$ R<sup>2</sup>=0.207). The standardised beta value ( $\beta$ =0.455, p<0.01) indicated significant positive association between predictor commitment and CD4+ count. In model 2, factor control made significant contribution in variation of the CD4+ count ( $\Delta$ F(1,157)=34.478, p<0.01). The introduction of factor control explained additional 9.8% variance in CD4+ count with overall 30.5% (R<sup>2</sup>=0.305,  $\Delta$ R<sup>2</sup>=0.098). The predictor control was found to have significant positive association ( $\beta$ =0.326, p<0.01) with CD4+ count. In model 3, factor challenge made significant contribution in variation of the CD4+ count ( $\Delta$ F(1,156)=34.385, p<0.01) and explained overall 39.8% of variance in CD4+ count (R<sup>2</sup>=0.398,  $\Delta$ R<sup>2</sup>=0.093); the model explained additional 9.3% of the variance in CD4+ count. The results indicated significant positive association between predictor challenge and CD4+ count ( $\beta$ =0.323, p<0.01). In the final model, all three predictor variables were found to be statistically significant with challenge recording a slightly higher beta value ( $\beta$ =0.323, p<0.01) compared to commitment ( $\beta$ =0.283, p<0.01) and control ( $\beta$ =0.275, p<0.01).

Findings clearly indicated that age and education (control variables) did not contribute significantly in the variation of CD4+ count; factors commitment, control, and challenge were found to be significantly correlated with immunity of the participants. Result indicates the explaining percentage of all predictors was 39.8%; this total of the variance included 20.7% for commitment, 9.8% for control, and 9.3% for challenge.

VIF ranged from 1.000 to 1.156, which was distant from the 1.0 to 4.0, criteria that may indicate multicollinearity concern.[24,25] It means that multicollinearity found significant correlation between all predicting variables.

## Discussion

The present study finds that the factors commitment, control, and challenge were significantly positive and directly associated with CD4+ count indicating higher the hardiness, higher the CD4+ count. Studies reveal hardy people are able to deal with stressful condition.[26] Self-care is very important, which protects one's body functioning and engaging them in the activities which keep the body healthy.

Result clearly indicates that commitment, control, and challenge factors positively increase CD4+ counts of participants. Researchers have also found significant positive relation between hardiness and CD4+ count in their individual studies.[2,12,15,27,28] Hardy individuals feel meaningful, value themselves and their activities that shows commitment attribute.[29] Higher hardiness is related to lower illness.[5,10] Hardy individuals are open to new experience and tend to accept the change for their development as sign of control.[29] Control subscale of hardiness shows an effect of interaction with CD4+ count among HIV positive people.[1] Significant positive association is found between control subscale and CD4+ cell percentage with chronic disease.[9]

## Conclusion

For better immunity level, the IDUs must have positive thought, mind set or mental construct for themselves and for other persons of the society, and this positivism reduces negativism. Their social activity, relationship with family, friends, and colleagues need to improve for better immune response in HIV positive persons.

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