

ORIGINAL ARTICLE

Relationships between Antiretroviral Therapy Adherence with Personality Traits and Presence of Psychological Distress among Adults with Human Immunodeficiency Virus in Northwest Peninsular Malaysia: A Cross-Sectional Study

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ABSTRACT

Introduction: Treatment adherence with antiretroviral therapy (ART) and its related factors have hitherto been the subject of clinical concern. However, research focusing on the relationships between ART adherence and the presence of psychological distress and selected personality traits have yet to be concluded. Therefore, our study aimed to remedy this. **Methods:** A multicentre hospital-based cross-sectional study was conducted in northwest Peninsular Malaysia on HIV outpatients given ART from July 1st, 2018, till April 31st, 2020. Participants were recruited via purposive sampling. Data were collected through an interviewer-guided questionnaires: Hospital Anxiety and Depression Scale (HADS) and Zuckerman-Kuhlman personality test (ZKPQ-M-40-CC), and interviewer-guided Timeline Follow-back (TLFB) for the assessment of adherence to ART. **Results:** A total of 229 patients completed the study. Majority (n=220, 96.1%) were considered adherent to ART. Among those who were non-adherent, two (22.2%) had anxiety disorder and five (55.6%) had depressive disorder. There was no significant association between treatment adherence and the presence of anxiety nor depression. However, sociodemographic factors determined that age group (p=0.033) and marital status (p=0.044) were significantly associated with treatment adherence. Multivariate analysis determined that 'Active' personality trait increases the likelihood to better treatment adherence by 1.14 times (95% CI: 1.02, 1.28, p=0.018). **Conclusion:** We did not find any association between treatment adherence and the presence of anxiety or depression. However, higher scores in 'Active' personality trait increases the likelihood of better treatment adherence among adult HIV on ART.

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INTRODUCTION

Human immunodeficiency virus (HIV)-infected cases have increased tremendously over the years, with the cumulative reported cases in 2014 were reported at 105,189 cases (1). Although the transmission continues, new cases of HIV/AIDS infections and new HIV/AIDS-related deaths have significantly decreased with antiretroviral therapy (ART). As Malaysia has increased the accessibility and availability of ART to government hospitals and public health facilities across the country, new HIV/AIDS infections and related deaths between 2000 and 2015 have significantly reduced (2).

As opportunities to enrol in life-saving ART are open to all Malaysians for free, the adherence rate became a growing concern for policymakers. United Nations uses the cut-off period of 12 months of adherence as an indicator of an anticipated effective response to ART (3) and an early warning for ART resistance (4). As per the World Health Organization (5), a minimum adherence level of 95% is needed to define treatment success. Recent evidence suggests that with 95% adherence to ART, the viral suppression may approach up to 78% (6–8). On the other hand, poor treatment adherence will lead to treatment failure, subsequently causing treatment-resistant and disease progression, eventually death (5). Low viral suppression does not only endanger individual health but also increases disease transmission.

Previous local reports cited that the rate of adherence to ART was only at 80% among HIV patients in Hospital

Sungai Buloh, Selangor, Malaysia in 2015 (9). This is indeed concerning as we are still far behind the global recommended target. Treatment adherence is a complicated behaviour that is influenced by various factors, such as disease-related, personal-related, health-related, cognitive, psychosocial factors (10,11) or the adverse effect of ART itself (12,13).

A systematic review revealed that personality traits were associated with treatment non-adherence (14). Neuroticism, openness to experience, hostility, and extraversion were associated to poor treatment adherence whilst conscientiousness, and agreeableness correlates to good treatment adherence. It was suggested that individuals with openness, conscientiousness and extraversion personality traits have better self-efficacy and are less likely to be involved in risk-taking behaviour; thus, they have more positive outcomes than individuals with neuroticism and agreeableness personality traits. Furthermore, openness, conscientiousness, and extraversion personality traits have a crucial role in slowing disease progression as they are more likely to accept their illness, hence are better at coping and would adhere to the treatment regime (15,16).

On the other hand, the presence of anxiety or depression is strongly related to reduced treatment adherence (12,17–20). Severe anxiety at the beginning of ART initiation was a strong predictor of treatment non-adherence (18). The presence of anxiety among PLHIV was generally common, with a recent study among 357 HIV positive women in two public hospitals in Ethiopia revealed that the prevalence of anxiety was 28.9% (21). Another recent study (22) in the Southwest Region of Cameroon revealed that the prevalence of depression was 26.7% (95% CI 20.6–33.7%) among those on ART and they significantly contributed to 75.0% among those with poor adherence to ART as compared to those without depression, 37.3%.

Although adherence to ART has long been recognised as a serious concern for global public health, there is still a lack of research focusing on the association between treatment adherence with personality traits and psychological distress among adult HIV patients in Malaysia. Furthermore, to the best of our knowledge, there is currently no regional study to determine the association of personality traits with ART adherence among adult patients with HIV. Hence, our paper aimed to discuss on these aspects.

METHODS

This cross-sectional analysis was conducted in two outpatient HIV clinics in northwest peninsular Malaysia, from July 1, 2018, to April 31, 2020. Adult patients aged 18 years old and above and were diagnosed with HIV for at least 12-month prior to the study conduct were identified and invited to participate in the study until

the minimum required sample size was completed through purposive sampling. Patients requiring hospital admission for any reason (including those with low CD4 count) during the outpatient assessment, or those with severe medical or psychiatric illnesses were excluded. Each subject will only be recruited once throughout the study period. Written consent was obtained prior to study participation.

Study instrument

Upon retrieval of informed consent, two sets of guided, self-administered questionnaires (Hospital Anxiety and Depression Scale and the Zuckerman-Kuhlman personality test) were distributed.

For the sociodemographic data, the cut-off point at 30 years old was used based on the mean derived from the normal distribution curve, whereas the MYR1,500 cut-off for the household income was as per findings from the Department of Statistics Malaysia (DOSM) on the national median wage in the year 2020 among Malaysian citizens (23).

The hierarchical clinical staging system for HIV was based on the World Health Organization (2005) which denotes Stage 1 as asymptomatic; Stage 2 as mildly symptomatic including unexplained weight loss of less than 10% of total body weight, recurrent respiratory infection and a range of dermatological condition; Stage 3 denotes moderately symptomatic stage in the presence of more than 10% weight loss, prolonged unexplained diarrhoea, pulmonary tuberculosis and severe systemic infection and mucocutaneous condition; and Stage 4 is the severely symptomatic stage which includes all AIDS-defining illnesses (24).

The Hospital Anxiety and Depression scale (HADS) is a widely recognised scale to screen for anxiety and depression symptoms. This study utilised the validated Malay version of HADS with 14-items. The reported sensitivity for the anxiety scale was 90%, and the reported specificity was at 86.2%, whereas for depression, the reported sensitivity was at 93.2%, and 90.8% for the specificity (25).

With regards to the determination of personality traits, prior study had affirmed the similar constructs between the NEO Five-Factor Inventory-Revised (NEO-FFI-R) and the ZKPQ-50CC (26). The validated Malay-version Zuckerman-Kuhlman personality test (ZKPQ-M-40-CC) was used in this study, which had five domains with a total of 40 items. The reliability testing was good with the reported Cronbach alpha of between 0.76 and 0.84 (27). The five personality domains assessed include 'Activity', 'Sociability', 'Aggression-Hostility', 'Impulsive Sensation Seeking', and 'Neuroticism-Anxiety'. Each domain comprises of eight questions. Higher scores indicate a higher propensity towards that a particular personality domain.

On the other hand, treatment adherence was measured through (i) Timeline Follow-Back (TLFB) (28) and (ii) viral load count. TLFB is based on day-to-day recall via the visual calendar to measure the quality of adherence in the recent past 14 days. Good adherence is defined as following the prescribed 14-day doses for 100% of the time (29). Apart from that, individuals with poor treatment adherence to ART therapy are also expected to have low viral load suppression as compared to individuals with good adherence (30). Hence, the second approach was based on the laboratory measurement of viral load. Good treatment adherence as per viral load count is defined as having viral suppression of below 20 copies/ml in the last six months.

We decided to use both techniques in the assessment of treatment adherence as achieving an undetectable viral load is not always synonymous with adherence, nor does failure to accomplish this goal are attributable to non-adherence in view of the many other factors that may mediate this relationship (31). However, therapy adherence in this study is largely determined by the results of the TLFB self-rated questionnaire.

Sample size calculation

The sample size calculation was performed using the population proportion formulae. Prior data indicated that the prevalence of ART adherence in a tertiary level hospital in Malaysia was 0.82 (13). Therefore, in the targeted population size of 925 patients, with the preset Type I error probability and precision of 0.05 and 0.05, respectively, the required sample size was 183 samples. With an addition of 20% dropout rate and accommodation for missing data, the minimum required sample size was 229 subjects.

Ethical considerations

The study had received ethical clearance from the Human Research and Ethics Committee (JEPeM) of Universiti Sains Malaysia, Kelantan (USM/JEPeM/18030187), and the Medical Research and Ethics Committee (MREC) of the Ministry of Health Malaysia, KKM/NIHSEC/P18-1032(15) with the registration identification NMRR-18-966-39521. The study was conducted according to the principles established by the Declaration of Helsinki.

Statistical analysis

The data were analysed with the IBM SPSS Statistics for Windows, Version 26.0. Armonk, NY: IBM Corp. Descriptive statistics were used to describe the sociodemographic characteristics and baseline clinical profile of study respondents. Association between selected sociodemographic factors, anxiety, and depression with treatment adherence were analysed using Fisher's exact test or Pearson chi-square test of independence, depending on criteria fulfilment. An independent t-test was used to compare the score differences among different personality traits in relation to treatment adherence in normally distributed data, such

as for the Activity, Aggressiveness-Hostility, Impulsive Sensation Seeking and Neuroticism-Anxiety domain, whereas a Mann Whitney U test was used to compare the score differences in non-normally distributed data, such as for the Sociability domain of the personality trait. The association was considered significant at $p < 0.05$.

Multivariate analyses with simple and multiple logistic regressions were performed to identify predictive factors to ART treatment adherence. Simple logistic regression (SLR) was conducted to determine the odds of selected variables in ART treatment adherence independently, whereas multiple logistic regressions (MLR) were done to determine the best predictive model with a combination of selected variables that could positively predict treatment adherence among PLHIV. Variable selection for the simple logistic regression included all demographic, clinical and psychological variables potentially deemed to affect treatment adherence according to literature review and clinical observation. Additionally, the variable selection for multiple logistic regression included all variables with significance level of < 0.25 to determine the best predictive model for treatment adherence among PLHIV.

RESULTS

There was a total of 229 patients recruited in the study with no missing data. Majority, 171 (74.7%), were between 30 and 69 years old, males (71.6%), Malay descent (78.6%) and Muslims (80.30%). Most were single (48.9%) with education up to primary or secondary level, 144 (62.9%), with the monthly income of less than MYR1500. Majority (96.10%) reported good treatment adherence to ART but only 192 patients (87.3%) achieved adequate viral suppression of below 20 copies/ml. Older adults, aged between 30 and 69 years old were found to have comparably better adherence to treatment than younger adults between the ages of 18 to 29 [167 (75.9%) vs. 53 (24.1%)]. Table I describes the distribution of sociodemographic characteristics, clinical profile, and their associations with the treatment adherence.

Additionally, screening for the presence of anxiety and depression revealed that 62 (27.1%) patients had anxiety symptoms, and 100 (43.7%) were having depressive symptoms. There was no statistically significant association between the presence of anxiety ($p=0.738$) or depression ($p=0.463$) with treatment adherence (Table II).

With regards to personality trait, the overall highest score was observed in the 'Activity' domain, followed by the 'Sociability' domain (Table III). Additionally, the mean score for 'Activity' domain was significantly higher in those with reported good treatment adherence than those who did not ($p=0.014$). There was no significant difference with regards to other types of personality

Table I: Baseline socio-demographic characteristics and clinical profile among people living with HIV (PLHIV) receiving anti-retroviral therapy in the study centre (N=229)

Variables	Total n (%)	Adherence n (%)	Non-Adherence n (%)	p-value
Total	229 (100.0)	220 (96.1)	9 (3.9)	
Age group				0.033**
18-29 years	58 (25.3)	53 (24.1)	5 (55.6)	
30-69 years	171 (74.7)	167 (75.9)	4 (44.4)	
Gender				0.676*
Male	164 (71.6)	157 (71.4)	7 (77.8)	
Female	65 (28.4)	63 (28.6)	2 (22.2)	
Ethnicity				0.688 ^b
Malay	180 (78.6)	172 (78.2)	8 (88.9)	
Others	49 (21.4)	48 (21.8)	1 (11.1)	
Marital status				0.044 ^{b*}
Single	112 (48.9)	107 (48.6)	5 (55.6)	
Married	92 (40.2)	91 (41.4)	1 (11.1)	
Divorced	25 (10.9)	22 (10.0)	3 (33.3)	
Religion				1.000 ^b
Islam	184 (80.3)	176 (80.0)	8 (88.9)	
Others	45 (19.7)	44 (20.0)	1 (11.1)	
Education				0.243*
Primary or secondary	144 (62.9)	140 (63.6)	4 (44.4)	
Tertiary	85 (37.1)	80 (36.4)	5 (55.6)	
Availability of caretaker if ill				0.180 ^b
Yes	209 (91.3)	202 (91.8)	7 (77.8)	
No	20 (8.7)	18 (8.2)	2 (22.2)	
Presence of psychiatric treatment				0.366 ^b
Yes	32 (14.0)	30 (13.6)	2 (22.2)	
No	197 (86.0)	190 (86.4)	7 (77.8)	
Income				0.400*
<RM1500	148 (64.6)	141 (64.1)	7 (77.8)	
≥RM1500	81 (35.4)	79 (35.9)	2 (22.2)	
Employment status				0.678 ^b
Working	43 (18.8)	41 (18.6)	2 (22.2)	
Not working	186 (81.2)	179 (81.4)	7 (77.8)	
WHO clinical staging				0.504*
Stage 1 and 2	174 (76.0)	168 (76.4)	6 (66.7)	
Stage 3 and 4	55 (24.0)	52 (23.6)	3 (33.3)	
Viral load counts				0.641 ^b
<20 copies/ml	192 (83.8)	185 (84.1)	7 (77.8)	
≥20 copies/ml	37 (16.2)	35 (15.9)	2 (22.2)	

Note: *Pearson’s chi-square test; ^bFisher’s exact test. **Statistically significant

Table II. Association between anxiety and depression, with treatment adherence among PLHIV receiving ART.

Variable(s)	Total n (%)	Adherence n (%)	Non-adherence n (%)	p-value*
Total	229 (100.0)	220 (96.1)	9 (3.9)	
Anxiety				0.738
Normal	167 (72.9)	160 (72.7)	7 (77.8)	
Abnormal	62 (27.1)	60 (27.3)	2 (22.2)	
Depression				0.463
Normal	129 (56.3)	125 (56.8)	4 (44.4)	
Abnormal	100 (43.7)	95 (43.2)	5 (55.6)	

Note: *Pearson’s chi-square test.

Table III: Association between personality trait and treatment adherence.

Variable(s)	Total Mean (SD)	Adherence Mean (SD)	Non-adherence Mean (SD)	p-value
Activity	29 (5.9)	30 (5.8)	25 (6.7)	0.014 ^a
Sociability	24 (5.0)	24 (5.0)	21 (8.0)	0.320 ^b
Aggressiveness-Hostility	18 (6.3)	18 (6.3)	17 (5.9)	0.650*
Impulsive sensation seeking	18 (6.3)	18 (6.1)	17 (9.1)	0.688*
Neuroticism-Anxiety	18 (6.7)	18 (6.7)	17 (7.3)	0.623*

Note: ^aIndependent t-test, ^bMann-Whitney U test (presented as median and interquartile range).

domains and treatment adherence.

Multiple logistic regression found that ‘Activity’ domain of the personality trait emerged as the only factor significantly associated with good ART adherence after controlling for age, education level, and viral load, whereas an increase in one score of the ‘Activity’ domain of the personality trait has 1.14 higher odds of being adherent to therapy (95% CI: 1.02, 1.28). For example, those with a score of 25 had a 1.14 increased likelihood of being adherent as compared to those with a score of 24 (Table IV).

DISCUSSION

Patients with higher scores on the Active domain of the personality traits have greater odds of good adherence to HIV treatment. Other variables associated with good treatment adherence were older age group and being single. The rest of demographic parameters and clinical variables including gender, ethnicity, clinical staging, and viral load were not associated with HIV treatment adherence.

Our findings revealed the ‘Activity’ domain was found to be the only factor significantly associated with ART treatment adherence after controlling for age, education level, and viral load. Consistent with previous literature, HIV patients have also been reported to be sociable and extroverted (32). With regards to its relationship with treatment adherence, the ‘Activity’ domain was associated with ‘Conscientiousness’, according to a study evaluating the correlations between personality traits and adherence using the NEO-FFI-R and ZKPQ-50CC (33). Thus, this further supports the findings of a systematic review (32), which collated 17 studies of ‘Conscientiousness’ personality trait that were found to be associated with good treatment adherence in individuals with chronic diseases.

Conscientiousness is defined as “socially prescribed impulse control that facilitates task-and goal-directed behaviour” (34). As a result, those who score high on conscientiousness are frequently described as responsible, dependable, and structured. This propensity could explain why highly conscientious people follow

Table IV: Factors associated with good ART treatment adherence through simple and multiple logistic regression among adult outpatients with HIV

Variable(s)	Adherent <i>n</i> (%)	Non-adherent <i>n</i> (%)	Simple logistic regression Crude OR (95% CI)	<i>p</i> -value	Multiple logistic regression Adj. OR (95% CI)	<i>p</i> -value
Age group				0.136	-	-
10-29	53 (91.4)	5 (8.6)	1.00 (Ref.)			
30-49	110 (97.3)	4 (2.7)	3.46 (0.80, 15.02)			
50-69	57 (98.3)	1 (1.7)	5.38 (0.61, 47.54)			
Gender				0.677	-	-
Male	157 (95.7)	7 (4.3)	0.71 (0.14, 3.52)			
Female	63 (96.9)	2 (3.1)	1.00 (Ref.)			
Education level				0.253	-	-
Primary and secondary	140 (97.2)	4 (2.8)	2.18 (0.57, 8.38)			
Higher education	80 (94.1)	5 (5.9)	1.00 (Ref.)			
Viral load (copies/ml)				0.155	-	-
<50						
≥51	187 (96.9)	6 (3.1)	1.00 (Ref.)			
	33 (91.7)	3 (8.3)	2.83 (0.68, 11.89)			
Anxiety				0.739	-	-
Absent	160 (95.8)	7 (4.2)	1.00 (Ref.)			
Present	60 (96.8)	2 (3.2)	0.76 (0.15, 3.77)			
Depression				0.467	-	-
Absent	125 (96.9)	4 (3.1)	1.00 (Ref.)			
Present	95 (95.0)	5 (5.0)	1.65 (0.43, 6.29)			
Personality domain*						
Activity	29.6 (5.79)	24.7 (6.75)	1.14 (1.02, 1.28)	0.018*	1.14 (1.02, 1.28)	0.018*
Sociability	24.2 (4.65)	22.7 (4.74)	1.09 (0.93, 1.27)	0.298	-	-
Aggressiveness-hostility	18.0 (6.31)	17.0 (5.87)	1.03 (0.92, 1.15)	0.649	-	-
Impulsive sensation seeking	18.3 (6.13)	17.4 (9.13)	1.02 (0.92, 1.14)	0.687	-	-
Neuroticism-anxiety	18.0 (6.73)	16.9 (7.31)	1.03 (0.93, 1.14)	0.622	-	-

Note: *Presented in mean (SD). Other sociodemographic variables such as race, marital status and religion were excluded from analyses in view of the presence of cell size smaller than 2. Multiple logistic regression was performed with Forward LR method.

medical advice according to the drug regime, dosage, and timing of administration. Therefore, we suggest for routine personality trait assessment in the clinical setting to aid the identification of HIV patients who are at risk for poor treatment adherence. Preventive strategies may include behavioural modification therapy for the targeted individuals, particularly among those who scored low in the activity domain of personality trait.

We found that the prevalence of ART adherence among adults living with HIV in our study centres achieved the recommended global standard at 96.1% following the self-reporting measurement through TLFB, and at 94.6% according to the viral load suppression of below 20 copies/ml count (based on the latest viral load count in the recent 4-6 months). Apart from being a marker for ART adherence, viral load may also guide the clinicians on when to decide for switching to the second-line ART. However, caution needs to be practised when interpreting the results as not all people living with HIV (PLHIV) with high viral load and/or low viral suppression necessarily has poor treatment adherence, as the duration of ART and individual's immunological responses may interplay.

There was also a significant association between age group and treatment adherence. These results are consistent with related studies conducted in the Democratic Republic of Congo, Cameroon and Burundi where they demonstrated that older adults had 1.6 times increased in odds of being more adherent to ART

treatment (32). Older adults were regarded as more experienced and were comparably more knowledgeable to overcome the complex ART regimen (32). On the other hand, younger patients were particularly less adherent due to fear of social discrimination by peers, hence tend to delay treatment.

Apart from that, there was also a significant association between marital status and treatment adherence. Social and psychological support from the partner, family, friends, relatives, or peer volunteers positively impacted adherence to ART and is crucial in strengthening self-efficacy, hence adherence to treatment (32). Acceptance and adequate support from family members, which begins when they learn about their family member's HIV status, could help PLHIV to cope better with stress and reduce the risk of developing a psychological problem, both of which are critical for effective treatment adherence. These results are in keeping with the recommended intensive early adherence counselling at ART initiation to improve moral support towards therapy adherence. According to the paper, those who received adherence counselling were 29% less likely to have low adherence than those who did not. Furthermore, the beneficial effects of counselling on adherence were discovered shortly after the ART initiation and lasted for at least 18 months.

On the other hand, our findings revealed no association between the presence of anxiety and depression with treatment adherence. A comparatively similar study

among 101 ART users in South Africa also did not find any significant relationship between anxiety and adherence (35), and the authors speculated that it may be due to the idiosyncratic feature of the study and could be an area for further investigation. Several previous studies also found only a weak association between depression and ART adherence, with recent papers, demonstrated an unexpected optimal adherence among PLHIV with depression (36,37). Furthermore, we found that the prevalence of depression was more likely than anxiety disorder among our patients. This is in contrast to a previous report which found that the prevalence of anxiety was higher than depression at 45.1% and 36.9%, respectively among adults with HIV in the primary setting in northern peninsular Malaysia (38). The disparities may be due to the different study instruments used to measure anxiety and depression (i.e. Depression, Anxiety and Stress Scale 21 (DASS-21) vs. interviewer-guided HADS in our study).

Our study was limited in view of its methodological approach of purposive sampling, hence the present findings may not be generalisable to the population. Due to the non-probability sampling method, the results should be interpreted with caution. Besides that, given the cross-sectional design of the study, the causality between anxiety, depression, personality trait, and treatment adherence could not be established. Additionally, the lack of a significant association between anxiety and depression with treatment adherence may be associated with the use of different types of study instruments. Despite these limitations, our study did provide a preliminary overview of the current level of ART adherence and potential factors to be further explored with regards to treatment adherence among PLHIV in Malaysia.

CONCLUSION

We found that neither depression nor anxiety was associated with ART adherence among PLHIV. However, higher scores on the 'Active' domain of the personality trait significantly increased the likelihood of better treatment adherence among PLHIV. Therefore, the findings from the study may serve as the basis for future studies, assisting the clinicians in initiating interventional programs and policy changes to allocate resources to improve treatment adherence and reduce the number of patients who fail to respond to ART, thereby avoiding unintended costs for treatment and therapeutic options (39).

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