Relationship between Demographic Factors, Stage of Disease and Adherence among HIV/AIDS Patients Receiving Highly Active Antiretroviral Therapy

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Introduction

Global summary of the AIDS epidemic reported number of people living with HIV total 33.3 million and newly infected with HIV total 2.6 million in 2009.[1] In Thailand, estimated number of people living with HIV around 530,000 persons in 2009.[2] There are more people living with HIV than ever before as people are living longer due to the beneficial effects of antiretroviral therapy. Though antiretroviral drugs are effective treatment of HIV/AIDS and long term survival, but patients may meet with complication of antiretroviral drugs, quality of life and socioeconomic changes. Poor adherence to highly active antiretroviral therapy (HAART) may result in drugs resistance, treatment failure and death. Many factors correspond to adherence such as long-term toxic effects of HAART, co-morbidity conditions, understanding of HIV illness, importance of adherence, health insurance or prescription drug coverage, family and social support, mental illness, poverty, employment constraints, institution, political, health care facilities and culture etc.[3-4] Demographic factors have been argued that prediction of adherence depend on context in each country for instance age, gender, ethnicity, and socioeconomic status. Some studies showed that the patient characteristics associated with a more rapid progression to death after initiation of HAART were male gender, age less than 30 years old, and unemployment or unknown occupation status.[5] Many studies in Thailand found that approximately 20% of HIV/AIDS patients were poor adherences. Adherence more than 95% tends to reduce morbidity and mortality rate.[6] Risk factors of adherence were age, income, education, occupation, and family and social support.[7-8] Reasons for missing doses were forgetful, busy, and late to take medicine.[9] This study was examined demographic factors and stage of disease associated with adherence among HIV/AIDS patients receiving HAART in Thailand.

Methodology

This retrospective study included 3,442 HIV/AIDS patients of 18 years old and over on their first visits at 3 hospitals (Bamrasnaradura Infectious Diseases Institute, Lop Buri hospital, and San Pa Tong hospital) in 2007. Data were collected from medical records and self-reported questionnaire of individual characteristics and adherences. Data consist of demographic characteristics, body mass index, smoking history, stage of disease, CD4 level, HIV RNA and adherence score variables. Adherence scores in this study were measured by using the Center for Adherence Support Evaluation (CASE) adherence index[10]. This index evaluates self-reported antiretroviral therapy (ARV) adherence with three questions and a simple composite score ranged from 3 to 16 score. Adherence score are divided two categories; total scores of good adherence >10 and poor adherence ≤ 10. Dependent variable was adherence of HIV/AIDS patients receiving HAART (good adherence =1, poor adherence =0). Independent variables such as hospital, gender, age at HIV positive, marital status, education, occupation, income, body mass index, smoking history, stage of disease, CD4 level, and HIV RNA were entered into the model analysis. Multivariate analysis was used Multiple Logistic Regression and backward stepwise method.

Definition
HIV/AIDS patients were defined as patients who had evidence of HIV positive by using ELISA and HIV RNA PCR techniques.

The CASE adherence index measures of self-reported antiretroviral therapy (ART) with three questions.[10] The first question, how often do you feel that you have difficulty taking your HIV medications on time? By "on time" we mean no more than 2 hours before or 2 hours after the time your doctor told you to take it. (1= All of the time, 2 = Most of the time, 3 = Rarely, 4 = Never). The second question, average number of days per week at least one dose of HIV medications was missed? (1 = Everyday, 2 = 4-6 days per week, 3 = 2-3 days per week, 4 = Once a week, 5 = Less than once a week, 6 = Never) The third question, when was the last time you missed at least one dose of your HIV medications? (1 = Within the past week, 2 = 1-2 weeks ago, 3 = 3-4 weeks ago, 4 = Between 1 and 3 months ago, 5 = More than 3 months ago, 6 = Never)

Results
3,442 Patients were included in this study from 3 hospitals; Bamrasnaradura Infectious Diseases Institute (76.6%), San Pa Tong hospital (18.5%), and Lop Buri hospital (4.9%). Patients were age at HIV positive 25-34 years old (41.5%), 35-44 years old (30%), > 45 years old (20%), and 18-24 years old (8.5%), respectively. Males were higher than females. Majority of patients were married, bachelor degree and over education, wage earner occupation, income 5,000-14,999 Baht/month (Thai), and ever smoked cigarettes. Mostly, patients were AIDS (63.3%), asymptomatic (22.7%), and symptomatic (14%), respectively. 59.3% of patients were CD4 level less than 100 cell/mm^3. 84.7% of patients were HIV RNA more than 400 copies/ml. 91.3% of patients were good adherences (total score >10). (Table 1)

TABLE 1 Percentage of demographic factors, stage of disease and adherence

Variables	Number	Percent
Hospital		
Bamrasnaradura Infectious Diseases Institute	2,637	76.6
San Pa Tong hospital	635	18.5
Lop Buri hospital	170	4.9
Age at HIV positive (year)		
18-24	293	8.5
25-34	1,427	41.5
35-44	1,032	30.0
≥ 45	690	20.0
Gender		
Male	2,003	58.2
Female	1,439	41.8
Body mass index (BMI)		
Min =12.95 Max = 76.63 Mean (SD) = 22.18 (3.89) Median =21.78		

Variables	Number	Percent
Marital status		
Single	913	26.5
Married	1,849	53.7
Widowed, divorced, separated	680	19.8
Education		
Primary school and lower	871	25.3
Secondary and high school	1,203	35.0
Bachelor and over	1,368	39.7
Occupation		
Unemployed	392	11.4
Wage earner	1,332	38.7
Self-employed	619	18.0
Government	599	17.4
Private or Individual company	500	14.5
Income (Baht/month)		
< 5,000	1,044	30.3
5,000-14,999	1,527	44.4
$\geq$ 15,000	871	25.3
Ever smoked cigarettes		
Yes	2,062	59.9
No	1,380	40.1
Stage of disease		
Asymptomatic	780	22.7
Symptomatic	484	14.0
AIDS	2,178	63.3
CD4 level (cell/mm^3)		
< 100	2,040	59.3
100-199	608	17.7
$\geq$ 200	794	23.0
HIV RNA (copies/ml)		
$\leq$ 400	526	15.3
> 400	2,916	84.7
Adherence (Total Score)		
$\leq$ 10	299	8.7
> 10	3,143	91.3

Multivariate analysis was used Multiple Logistic Regression and included all variables into the model such as hospital, gender, age at HIV positive, marital status, education, occupation, income, body mass index, smoking history, stage of disease, CD4 level, and HIV RNA variables. Results found that only hospital, age at HIV positive, marital status, education, stage of disease, and CD4 level variables were statistically significant. Patients who received ARV drugs at San Pa Tong hospital were more likely to have good adherence than patients who received ARV drugs at

Bamrasnaradura Infectious Diseases Institute (OR=29.55, 95% CI: 7.25, 120.40). Patients age 25-34 years old and 35-44 years old were more likely to have good adherence than age 18-24 years old (OR=1.625, 95% CI: 1.09, 2.41; OR=1.606, 95% CI: 1.05, 2.44), respectively. Married patients were more likely to have good adherence than single patients (OR=1.426, 95% CI: 1.07, 1.89). Patients who had bachelor degree and over education were less likely to have good adherence than patients who had primary school and lower education (OR=0.672, 95% CI: 0.46, 0.96). AIDS patients were less likely to have good adherences than asymptomatic patients (OR=0.661, 95% CI: 0.45, 0.96). Patients who had CD4 level $\geq$100 cell/mm^3 were less likely to have good adherences than patients who had CD4 level < 100 cell/mm^3. (Table 2)

TABLE 2 Demographic factors and stage of disease associated with adherence among HIV/AIDS patients

Variables	OR	95%CI	*p-value*
Hospital			
Bamrasnaradura Infectious Diseases Institute	1	(ref.)	.000
San Pa Tong hospital	29.551	7.253-120.403	.000
Lop Buri hospital	0.861	0.493-1.505	.600
Age at HIV positive (year)			
18-24	1	(ref.)	.068
25-34	1.625	1.097-2.408	.016
35-44	1.606	1.055-2.443	.027
$\geq$ 45	1.309	0.842-2.032	.231
Marital status			
Single	1	(ref.)	.004
Married	1.426	1.075-1.891	.014
Widowed, divorced, separated	0.874	0.619-1.235	.447
Education			
Primary school and lower	1	(ref.)	.038
Secondary and high school	0.889	0.612-1.292	.538
Bachelor and over	0.672	0.467-0.965	.031
Stage of disease			
Asymptomatic	1	(ref.)	.093
Symptomatic	0.699	0.437-1.117	.134
AIDS	0.661	0.455-0.959	.029
CD4 level (cell/mm^3)			
<100	1	(ref.)	.008
100-199	0.677	0.494-0.929	.016
$\geq$ 200	0.670	0.500-0.899	.008

Conclusion

Multivariate analysis found that hospital, age at HIV positive, marital status, education, stage of disease, and CD4 level variables were statistically significant. Results showed that patients who received ARV drugs at San Pa Tong hospital were more likely to have good adherence than patients who received ARV drugs at Bamrasnaradura Infectious Diseases Institute. Data showed that patients who received ARV drugs at San Pa Tong hospital were the highest asymptomatic but patients who received ARV drugs at Bamrasnaradura Infectious Diseases Institute were the highest AIDS. Mostly, asymptomatic patients were good adherence and AIDS patients were poor adherence. One reason, San Pa Tong hospital is district hospital in small district compared with Bamrasnaradura Infectious Diseases Institute located in big city and near capital in Thailand. Uncomfortable transportation, traffic jam, hurry life style in capital or big city barrier good adherence of patients who received antiretroviral therapy.[11-12] Patients may often forget and late to take medicine. Patients age 18-24 years old were less likely to have good adherence than other groups because of acceptance and perception of disease in difference age groups. In addition, married patients were more likely to have good adherences compared with single patients. Reasons, married patients have good health care, family and mental supports.[13] Patients who had bachelor degree and over education were less likely to have good adherences than patients who had primary school and lower education. High education patients may have some problems about institution, social and family acceptation for receiving antiretroviral drugs and continuous taking medicine. Besides, AIDS patients were less likely to have good adherences than asymptomatic patients. Initial treatment in asymptomatic patients may not have severe side effects, complications to stop drug and adherence problems.[3] Patients who had CD4 level $<$ 100 cell/mm^3 were more likely to have good adherences than patients who had CD4 level $\geq$ 100 cell/mm^3. We can explain in terms of individual perception and concern of disease severity. CD4 level, clinical signs and symptoms indicate the starting antiretroviral drugs therapy. Half of all people who have AIDS symptoms or a CD4 level $\leq$ 350 cell/mm^3 (new guideline, 2011) begin antiretroviral treatment in Thailand. Since 2001, the government committed to providing antiretroviral drugs free of charge to people living with HIV under the National Access to Antiretroviral treatment Program for people living with HIV/AIDS. In this study, the CASE adherence index measures of self-reported antiretroviral therapy with three questions and one time answers so the total scores may be over estimate. However, results clearly demonstrated that demographic factors and stage of disease associated with adherence among HIV/AIDS patients receiving highly active antiretroviral therapy. The outcomes of this study suggest that we should emphasize on adherence of patients receiving HAART not only demographic factors but also AIDS patients and CD4 level. We may study other variables associated with adherence of HIV/AIDS patients such as ARV drugs, timing of ARV therapy, co-morbidity conditions, etc. In addition, we should design methods both qualitative and quantitative studies to explain clearly and completely results in the future.

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