Effects of Cognitive and Behavioral Program on Drug Adherence, CD4 and AIDS Knowledge in Late Adolescent and Early Adult HIV/AIDS Patients

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ABSTRACT

Background: Regularity and continuity of medication is important in HIV/AIDS treatment. Late adolescents and early adults tend to have more problems of regularity and continuity of medication taking.

Methods: This quasi-experimental study has objectives to study outcomes of a Cognitive and Behavioral program in improving the regularity and continuity of medication taking and CD4 and AIDS knowledge in late adolescent and early adult HIV/AIDS patients. Sixteen study patients were specifically selected from Immunodeficiency and infectious diseases Clinic at Siriraj Hospital. Study equipment include Cognitive and Behavioral program, Drug Diary card, and questionnaire evaluating AIDS knowledge. The regularity and continuity of medication taking by patients was evaluated at enrollment and 3rd, 5th, 9th, 13th and 17th weeks after enrollment. Plasma HIV-RNA and CD4 were measured at enrollment and 17th weeks after enrollment. AIDS knowledge was evaluated at enrollment and at the 3rd weeks after enrollment. Data was analyzed by Wilcoxon Signed Rank Test and Friedman Test.

Results: The regularity and continuity of medication taking by patients was improved from 88.5% to 100% ($p < 0.001$) from the 3rd weeks after enrollment. The number of plasma HIV-RNA was decreased from 171, 369 to 2,439 copies/ml ($p = 0.022$) at the 17th weeks after enrollment. The number of CD4 was increased 328 to 366 cells/mm^3 ($p = 0.005$) at 17th weeks after enrollment. AIDS knowledge was increased significantly ($p < 0.001$) at the 3rd weeks after enrollment.

Conclusion: This study elaborated that Cognitive and Behavioral Program can significantly improve the regularity and continuity of medication taking by patients' AIDS knowledge leading to the ultimate outcome of controlling plasma HIV-RNA and CD4 elevation. This Cognitive and Behavioral Program can be applied to solve the problems of patients' irregularity and in-continuity of medication taking.

Keywords: HIV/AIDS, cognitive and behavioral program, drug adherence, CD4, AIDS knowledge

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INTRODUCTION

First HIV patients had been diagnosed in Thailand in 1984.[1] After that, HIV spread rapidly in Thailand.[2] The estimated number of accumulated HIV/AIDS patients since 1984 is more than one million cases.[3] Although the combination of antiretroviral drugs can suppress HIV viral load to undetectable level, there is no combination of antiretroviral drugs which can get rid of HIV virus from a human body. To get highest benefit from treatment, HIV/AIDS patients have to take antiretroviral drugs for life with nearly perfect drug adherence.[4] Otherwise HIV

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virus will develop drug resistance. Late adolescent and early adult HIV/AIDS patients tend to have problems of drug adherence leading to drug resistance.[5-9] To improve drug adherence may use short message reminder.[10] Directly Observed Therapy (DOT) may improve drug adherence, but it is time and labor intensive.[11-12] Safren et al, have developed a comprehensive cognitive and behavioral program named "Life-steps Program" to improve drug adherence in adult HIV patients.[13] This study was performed to test this cognitive and behavioral program in improving drug adherence, HIV virus suppression, increasing CD4 cell count and AIDS knowledge in late adolescent and early adult HIV/AIDS patients who have drug adherence problem. This study used a cognitive and behavioral program modified from the original "Life-steps Program" by Safren.[13] The reason to modify is to make the program feasible and appropriate for a Thai setting.

MATERIALS AND METHODS

This study was approved by the Institutional Review Board of the Faculty of Medicine Siriraj Hospital, Mahidol University. HIV patients who were 18-24 years old with history of drug adherence less than 95% at the Infectious Disease and Immunodeficiency Clinic, Siriraj Hospital were invited to join this study. Sample size was calculated by

$N = [(z_{\alpha/2}+z_{\beta})SD/\Delta]^2$, $\alpha = 0.05$, $1-\beta = 0.8$, SD = 25 (Safren SA)[14], $\Delta = 20$ (Safren SA)[14], n = 15

Sixteen patients were enrolled.

The difference of our cognitive and behavioral program and the original "Life-steps Program" have been shown in Table 1. Every patient attended an AIDS knowledge lecture and a VDO presentation including natural history of HIV/AIDS, antiretroviral drugs and side effects of antiretroviral drugs. Then every patient was individually interviewed by a trained nurse to find out what were the causes of poor drug adherence. At baseline every patient had blood test of HIV-RNA viral load and CD4 cell count. AIDS knowledge was evaluated by questionnaire. Patients were followed up at 3rd, 5th, 9th, 13th and 17th weeks after enrollment. AIDS knowledge was retested at 3rd weeks after enrollment. The percentage of drug adherence in every visit was evaluated by pill count and diary card recording drug taking by patients. HIV RNA viral load and CD4 cell count was retested at 17th weeks after enrollment (The end of study).

RESULTS

Sixteen late adolescent and early adult HIV/AIDS patients who had drug adherence less than 95% at the Infectious Disease and Immuno-

TABLE 1. Comparing the original "Life-steps Program" and the cognitive and behavioral program.

Original Life-Steps Program (Safren et al. 1999)	Modified Life-Steps Program
Psychoeducation and Introduction	Psychoeducation and Introduction
Getting to Appointment	Getting to Appointment
Communication with Physicians, Nurses, and Other Members of the Treatment Team	Communication with Physicians, Nurses, and Other Members of the Treatment Team
Coping with Side Effects	Coping with Side Effects
Obtaining Medications	Obtaining Medications
Concrete Daily Medication Schedule	Concrete Daily Medication Schedule
Storing of Medications	Storing of Medications
Cue-Control Strategies	Cue-Control Strategies
Guided Imagery	Problem Solving for Additional Barriers to Adherence
Handling Slips	Handling Slips
Review	Review

deficiency Clinic, Siriraj Hospital were enrolled. Demographic data has been shown in Table 2.

From Fig 1, the median of percentage of drug adherence at baseline in this study was 88.50. The median of percentage of drug adherence at 3rd and 5th weeks after participation in this study were increased to 98% and 98.9% respectively. The percentage of drug adherence was increased to 100% at 9th, 13th and 17th weeks after participation in this study. By Friedman Test, the percentage of drug adherence were statistically significantly increased after patients participated in this study. By Wilcoxon Signed Ranks Test, the percentage of drug adherence at the 3rd, 5th, 9th, 13th and 17th weeks were statistically significantly increased from baseline. In addition, the drug adherence at the 5th weeks was statistically significantly increased from the drug adherence at the 3rd weeks, and the drug adherence at the 9th weeks was statistically significantly increased from the drug adherence at the 5th weeks.

From Table 3, the median of HIV RNA viral load was statistically significantly decreased from 171,396.69 to 2,439.50 ($p = 0.022$). The median of log HIV-RNA viral load was statistically significant decreased from 3.19 to 2.11 ($p = 0.016$). The median of CD4 cells count was statistically significantly increased from 328.06 to 366.50 ($p = 0.005$).

From Table 4, AIDS knowledge, antiretroviral knowledge, side effects knowledge and total knowledge at 3rd weeks were statistically significantly increased from baseline ($p < 0.001$).

From Table 5, summary of problems and how to solve problems of each patient have been shown.

TABLE 2. Demographic data of patients.

Characters		n	%
Sex	Male	6	37.50
	Female	10	62.50
Mariatal status	Married	8	50.00
	Single	8	50.00
Education	Primary school	3	18.80
	Secondary school	3	18.80
	Vocational college	6	37.50
	Bachelor degree	4	25.00
Occupation	Student	4	25.00
	Laborer	10	62.60
	Civil Servant	1	6.20
	Other	1	6.20
Risk factor	Heterosexual	13	81.20
	Hemosexual	1	6.20
	Bisexuall	2	12.50
ARV	2NRTI+NNRTI	14	87.50
	2NRTI+PI	2	12.50

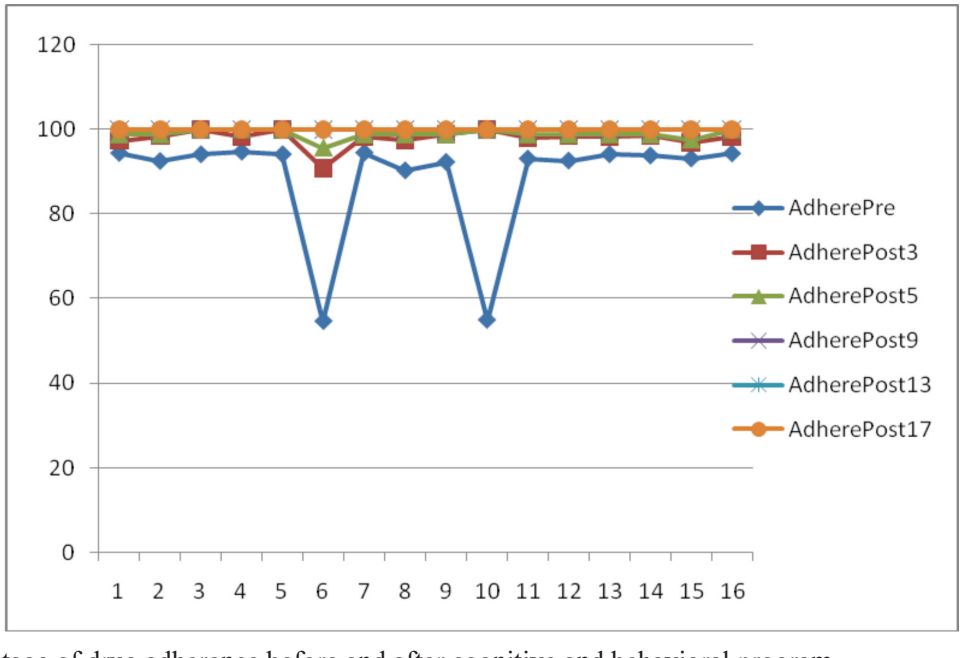

Fig 1. Percentage of drug adherence before and after cognitive and behavioral program.

TABLE 3. HIV- RNA viral load and CD4 cells count.

	Baseline			17 weeks after participation			p -value
	Min	Max	Median	Min	Max	Median	
HIV- RNA	40	2,694,508	171,396.69	40	33,303	2,439.50	0.022
Log HIV-RNA	1.60	6.43	3.19	1.60	4.52	2.11	0.016
CD4 (cells/mm^3)	41	528	328.06	90	573	366.50	0.005

TABLE 4. AIDS knowledge.

	Baseline			17 weeks after participation			p -value
	Min	Max	Median	Min	Max	Median	
AIDS knowledge	10	14	11.56	13	15	13.69	< 0.001
Antiretroviral knowledge	11	14	12.31	12	16	13.88	< 0.001
Side effects knowledge	5	8	6.44	7	10	8.19	< 0.001
Total	27	34	30.19	33	39	35.75	< 0.001

DISCUSSION

Drug adherence is the important factor of success in HIV treatment. Late adolescent and early adult HIV/AIDS patients are patients who tend to have more problems of drug adherence leading to treatment failure. This study identified late adolescent and early adult HIV/AIDS patients who had percentage of drug adherence less than 95%. A cognitive and behavioral program was used to identify cause of poor drug adherence in each patient and then individually designed corrective action for each patent. At the 17th weeks after participation in this study, the cognitive and behavioral program could improve adherence of all patients. The adherence at 17th weeks after enrollment was statistically increased ($p < 0.001$) from baseline. This finding corresponded with the study by Safren et al.[14] Shiu used a cognitive and behavioral program which could improve regularity of clinic visits.[15] In Shui's study HIV – RNA viral load was suppressed. This finding corresponded with the study of El-khalip et al[16] and Ti et al.[17] Finally CD4 cell count was statistically significantly increased from baseline. This finding corresponded with a study by Peterson.[18] Only, 2 patients had high HIV-RNA viral load in blood at 17th weeks after participation. These 2 patients had 100% drug adherence at the weeks 17th. The uncontrolled HIV- RNA viral load in these 2 patients was due to HIV drug resistance proved by HIV genotype assay after the study finished. These 2 patients probably had HIV drug resistant virus before participation in this study. Because of limitation of budget, HIV genotype assay was not done in every patient before enrollment.

The limitations of this study were: There was no genotypic assay of HIV virus in each patient before enrollment although some patients may have drug resistant HIV virus before enrollment. The follow up time was quite short.

This cognitive and behavioral program showed efficacy in late adolescent and early adult HIV/AIDS patients. In real life some adult patients also have drug adherence problems. This cognitive and behavioral program may be applied in adult patients too.

CONCLUSION

Our cognitive and behavioral program can improve drug adherence in late adolescent and early adult HIV/AIDS patients leading to HIV-RNA viral load suppression and elevation of CD4 cells count. Improved adherence on ARV

TABLE 5. Summary of problems and how to solve problems of each patient.

Case	Age	Sex	Problem	How to solve
1	24	F	Could not come home before medication time	Advise to carry one dose of medication with patient at all time
2	24	M	Frequently change address and inconvenience to pick up medication	Advise that patient can pick up medication at other location within the same health system
3	23	F	Patient had coincidence infection and misunderstand to stop ARV	Reassure that ARV have to be taken regularly and could be taken with other medications
4	20	M	Could not carry anything during work then miss dose of ARV	Advise to temporary leave the job and taking ARV on time
5	24	F	Health care personnel was her neighbor and patient concern of confidentiality leakage	Flexible date and time of her appointment to avoid facing her neighbor
6	21	M	Game addict and miss dose of ARV, intolerance of side effects of ARV	Adjust ARV and ask his grandmother to directly observed therapy
7	24	F	Inconvenience to pick up medication	Advise that patient can pick up medication at other location within the same health system
8	22	F	Busy schedule then miss dose of ARV	Advise to use alarm clock to remind medication time
9	19	F	Health care personnel was her neighbor and patient concern of confidentiality leakage	Flexible date and time of her appointment to avoid facing her neighbor
10	20	M	Misunderstand that HIV was incurable and ARV was not much benefit	Reassure that even HIV is incurable but ARV can improve general health and patient can have life expectancy nearly normal people
11	23	F	Depression due to loss of her daughter due to HIV infection	Psycho-support and Reassure ARV can improve general health and patient can have life expectancy nearly normal people
12	24	F	Busy schedule then miss dose of ARV	Advise to use alarm clock to remind medication time
13	19	M	Patient was student and concern that his friend may know his status if he take ARV	Adjust ARV to regimen that can be taken once a day and patient can take at home
14	24	F	Misunderstand that ARV taken before bedtime can be changed along with his working hour rotation	Advised that ARV should be taken nearly the same time of each day to avoid drug level fluctuation
15	22	F	Used to be in research which has one stop service, feeling inconvenience when have to use regular service then miss appointment	Explain detail point of service and have health care personnel accord
16	20	M	Multiple diseases with poor memory	Produce pill box which can carry ARV for seven days to help patient taking ARV accurately

would definitely benefit treatment outcome. Our cognitive and behavioral program may be applied to HIV/AIDS patients at other ages to improve drug adherence and improve ultimate outcome of HIV- RNA viral load suppression.

This important information would benefit others who read the article.

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