



ACCEPTABILITY OF A SMARTPHONE APP FOR PROMOTING ADHERENCE TO ANTIRETROVIRAL THERAPY AMONG HIV INFECTED INDIVIDUALS

Clinical Research

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ABSTRACT

BACKGROUND: Maintaining high adherence is important to retain long term efficacy of antiretroviral therapy. With easy affordability and improved connectivity of mobile phones, a smartphone based application (app) can be a cost-effective tool for adherence promotion. The aim of this study was to ascertain acceptability of an indigenously developed HIV and AIDS self-care app "SATHI" among HIV infected individuals.

METHODS: In this pilot study consecutive HIV sero-positive adults reporting for routine follow-up were offered app free of cost and feedback was obtained on its acceptability eight weeks post usage by a structured questionnaire.

RESULTS: Of the 40 participants, 36 completed the post usage questionnaire and provided a score of 3.42 rating out of maximum 5. A total of 91.6% of individuals agreed that the app was helpful in enhancing the adherence

CONCLUSION: This pilot study indicated considerable interest and acceptability of an ART reminder app among HIV infected individuals.

KEYWORDS

Health care app, mobile phone, antiretroviral therapy, HIV

INTRODUCTION: The recent estimates from India indicates stable HIV epidemic with 2.1 million people living with HIV and AIDS (PLHA)(1). HIV in India exhibit a concentrated epidemic with high prevalence in female sex workers, men who have sex with men (MSM) and IV drug users. Prior studies have shown that migrating male population from rural area is an important factor for bridging HIV infection from high risk group to general population (2). Till an absolute cure or vaccine is available, the best way to stop the spread of HIV is treating the infected one and educating the rest about prevention. There is lack of awareness among rural youth in India (3). Thus, there is a need for discrete and acceptable individual level health education tool for young vulnerable individuals who have easy access to information technology.

Although active antiretroviral therapy (ART) has transformed HIV infection in to a chronic manageable disease, an adherence level of over 95% is important to achieve HIV viral load suppression (4). Suboptimal pill taking behaviour is influenced by adverse effects of anti-retrovirals, forgetfulness, lack of care givers at home or work place, inadequate counselling and poor knowledge about disease (5). With improved affordability and connectivity of mobile phones, a smartphone based application (app) can be a cost-effective tool for health education of troops and promoting adherence to ART. Mobile App based intervention can also reach soldiers posted to remote locality. However, no such customized app in Indian setting is available. The aim of this study is to ascertain acceptability of an indigenously developed HIV and AIDS self-care app "SATHI" for promoting adherence to ART.

METHODS: We conceptualized and developed an Android OS based HIV self-care app called "SATHI", which is freely available in google play store currently. This tailor-made app was equipped with ART reminder tool, which could be customized by user to prompt timely uptake of prescribed antiviral drugs (6). Other useful features were track your investigations, creatinine clearance calculator and reminder for next visit to ART clinic. HIV awareness module containing frequently asked questions and other useful information on HIV/AIDS was also added (6).

This pilot study was carried out at tertiary care hospital, wherein, HIV sero-positive adults reporting for routine follow-up for CD4 cell count at venerology clinic were recruited after obtaining written informed

consent. Consenting individuals in possession of smartphone were offered HIV self-care mobile app free of cost. Critically ill patients, female patient and those on ART for less than six months were excluded. Eight weeks post usage of mobile app, assessment of its acceptability and utility was performed by a structured questionnaire.

Ethical consideration. The HIV self-care app was provided free of cost to all participants by sending an internet link by the investigator. Once downloaded to a smart phone the app does not requires an active internet connection. Information once entered, is protected by pass word, and not assessed by any internet server. All participants were recruited voluntarily and the study was approved by institutional ethics committee.

RESULTS: A total of 40 individuals participated in the study between Mar to Dec 2017. All participants have completed there secondary schooling with 4 of them have attained graduation. A total of 35% of study participants were unmarried or separated or divorced. Pre-app usage questionnaire reflected need for selfcare app in PLHA as caregiver or family support was missing in 30% of them (**Table-1**). A total of 37 participants in possession of smartphone were provided with customized HIV self-care app for installation. Of these 36 completed the post usage questionnaire at 4 weeks of App trial.

TABLE 1. Baseline assessment of study participants by a questionnaire

Parameter	n=40 (100%)
Duration of ART in years, median (IQR)	3.2 (1.2-5.6)
Age in years, median (IQR)	36.5 (32-44.5)
Missed pills in past 1 month	
Never	30(75)
once or twice	5(12.5)
less than five	4(10)
more than five	1(2.5)
Reason for missed pill	
Forgetfulness	35(87.5)
busy with work	3(7.5)
outstation visit	2(5)
no reason/others	1(2.5)
Care giver at home	28(70)

Awareness about last CD4 count	26(65)
Usage of internet on mobile	35(87.5)
Familiarity with mobile apps	35(87.5)
Sharing of mobile phone at home	33(82.5)
Need for HIV related app	38(95)
Willingness to pay for HIV app	30(75)

A total of 91.6% of individuals agreed that the app was helpful in enhancing the adherence. A total of 90% individual never missed a pill in past one month following app usage as compared to 75% prior to availability of app. Investigation tracking feature improved awareness about recent CD4 cell count from 65% to 87.5%. The average rating received by the App was 3.42 out of 5, and all users recommended it for fellow patients (Table-2). Although 87.5% of participants considered HIV awareness module in English language useful, it was read and understood completely by 55.6% of them. Need of App information in Hindi and other regional language was the commonest requirement perceived from the user. From physician's perspective, monthly adherence report, creatinine clearance calculator was most appreciated App feature. Also 5% of users expressed privacy concerns as the mobile was shared with other members of family.

TABLE 2. Result of post HIV self-care app usage questionnaire

Parameter	n=40(100%)
Missed pills in past 1 month	
Never	36(90)
once or twice	2(5)
less than five	1(2.5)
more than five	1(2.5)
Appearance of HIV self-care app	
Needs improvement	2(5)
Satisfactory	5(7.5)
Good	31(77.5)
Excellent	2(5)
Did ART reminder function well (Yes)	40(100)
ART reminder function was useful (Yes)	40(100)
Overall rating of mobile app	
1 star – bad	Nil
2 stars – Satisfactory	2(5)
3 stars – good	25(85)
4 stars - very good	7(5)
5 stars – excellent	6(5)
Awareness about last CD4 count	35(87.5)
HIV knowledge tool was useful (Yes)	35(87.5)
Does this app interfere with privacy (No)	38(95)
Will you recommend the app to peers (Yes)	38(95)
Clinic reminder function was useful (Yes)	30(75)

DISCUSSION

In a resource limited country protecting therapeutic options by promoting optimal adherence to ART is crucial. In this study we explored the acceptability of a mobile application (app) that could serve as dual purpose of promoting adherence to ART and awareness towards HIV prevention.

With increased availability and affordability of smart phones, mobile phone based health care intervention (mHealth) can reach geographically remote, economically backward and culturally diverse group of population. Prior studies on text message (SMS) based reminders were promising but SMS does have content barrier and are managed by health care provider (7). Repeated untimely SMSs are disturbing and often ignored. Hence, we conceptualized a user friendly, patient controlled ART reminder mobile app “SATHI” that could also be helpful in creating awareness about modes of transmission, prevention and treatment strategies. Prior study from New York of a complex internet based app for reporting substance abuse and ART adherence has shown promising results (8). Acceptability of such apps in people living with HIV and AIDS was explored for the first time with encouraging results. The popularity of this android app is increasing and need to be made available in other regional languages.

Adherence or compliance is defined as extent to which a patient follows a prescription of a health care provider in terms of quantity and timing of drug intake. The National AIDS Control Programme aims for over 95% adherence to antiretroviral therapy to maintain virological

suppression (9). Suboptimal adherence in PLHA leads to rebound increase in HIV viral-load and increases the risk of transmission. It also results in emergence of resistance to first-line drugs and overall deterioration of health due to subsequent immunological failure and opportunistic infections. In the present digital era, smartphone based health care app play vital role in health education, self-care of chronic diseases and remote monitoring of patients (10).

Affordability of smartphone, internet availability and working knowledge of operating apps remains major hurdles towards large scale implementation of such app in country. The app technology evolves based on user feedback and the app needs to be translated in various Indian languages for improving its acceptability. The study results do have certain limitations. The limited sample size, better educational background and absence of active co-infection or comorbidity can influence individual decision. Although the app info is password protected, few users did expressed privacy concerns. Wider usage of app as a health education tool will eliminate the stigma associated with having such app. Mobile app can be a convenient medium for educating troops in a discrete manner. Funding for further customization is needed for large scale implementation of HIV self-care app.

To conclude, this pilot study indicated increased interest and acceptability of free to use ART reminder mobile App in HIV infected troops. Multilingual availability of app will further increase the scope of large scale implementation among diverse kind of population not having regular access to a HIV treating physician. Manifold features of this mobile App also have a potential of being promoted as a health education tool for HIV prevention.

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