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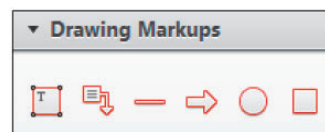
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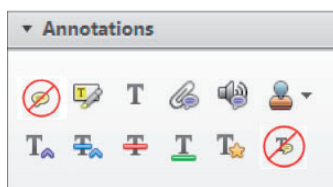
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The use of mobile phones to deliver acceptance and commitment therapy in the prevention of mother–child HIV transmission in Nigeria

AG Ishola[1,3] and J Chipps[1,2]

Abstract

The objective of this study was to determine if introducing acceptance and commitment therapy in the prevention of mother to child HIV transmission (PMTCT) programme using weekly mobile phone messages would result in improved mental health status of HIV-positive, pregnant women in Nigeria. We used a Solomon four-group (two intervention and two control groups) randomised design. The study population was 144 randomly selected, HIV-positive pregnant women attending four randomly selected PMTCT centres in Nigeria. The intervention groups were exposed to one session of acceptance and commitment therapy with weekly value-based health messages sent by mobile phone for three months during pregnancy. The control groups received only post-HIV test counselling. A total of 132 participants (33 per site) were enrolled in the study from the two intervention and two control sites. In the pre-tests, the intervention and control groups did not differ significantly with regard to demographics. Evaluation of the pre- and post-tests of the intervention group indicated significantly higher Action and Acceptance Questionnaire (AAQ-II) scores. The introduction of a mobile phone acceptance and commitment therapy programme may result in greater psychological flexibility in women diagnosed with HIV.

Keywords

Acceptance and commitment therapy, mobile phone, mother–child HIV transmission, pregnancy

Introduction

The HIV and AIDS pandemic is a major public health problem in sub-Saharan Africa, where more than 70% of all people living with HIV and AIDS reside.[1] In Nigeria, the first case of HIV and AIDS was identified in 1985,[2] but 30 years later the epidemic continues, despite moderate successes in decreasing individual-level risk and international efforts to address this pandemic [3,4]

HIV prevalence is much lower in Nigeria than in other African countries such as South Africa and Zambia. However, about 5 million Nigerians were receiving antiretroviral therapy (ART) in 2010 with about 400,000 of these being children less than 14 years old.[5] In 2011, the number of HIV-positive, pregnant women was estimated to be 221,129 with about 17% (37,868) of them receiving ART to reduce mother to child transmission.[5] It is estimated that around 27% (58,495) of HIV infected pregnancies led to child infections.[5]

The 2010 World Health Organization guidelines recommended that all infants born to HIV-positive mothers should receive ART prophylaxis.[6] In 2010, the coverage of ART prophylaxis among infants was still less than the coverage among mothers.[1] The gap between infants' and mothers' uptake of ARTs is still substantial, suggesting problems with providing the postpartum prophylaxis to infants.[1] With growing political will by the World Health Assembly to eliminate new HIV infections among children by 2015 and keep their mothers alive, Nigeria identified the need to develop strategies for increasing ART uptake in pregnant mothers.

Coping with HIV infection is complex, involving multiple interacting stressors ranging from disclosure of HIV infection, social ostracism, fear of death, access to adequate healthcare services, medication, repeated hospitalisations and family conflict following disclosure.[7] The diverse stresses and contexts of HIV have given rise to multiple modes of adaptation and coping.[7] The challenge is therefore to find ways to increase adaptation and coping

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with HIV, thereby increasing PMTCT uptake in HIV pregnant women. Acceptance and commitment therapy (ACT), a behavioural therapy based on the achievement of value guided action through personal commitment, has been identified as a possible strategy to strengthen the mental health status of pregnant women living with HIV. ACT has been found to be useful in improving anxiety states, depression and other mood disturbances.[8,9] A study to develop, implement and evaluate ACT in prevention of mother to child HIV transmission (PMTCT) programmes in Nigeria using weekly mobile phone messages was designed with the aim of increasing psychological flexibility of HIV-positive pregnant women in Nigeria.

Methods

Design

We performed a randomised controlled trial using a Solomon four-group design among pregnant women in south-western Nigeria.[10] This design involves four randomly assigned groups (two control and two intervention groups) and all groups being involved in before and after measures. This design has the advantage of allowing for control of testing effects.[11] The intervention groups received post-HIV test counselling and were exposed to one session of ACT followed by weekly value-based health messages sent by mobile phone for a period of three months. The control groups only received the post-HIV test counselling.

Population and sampling

Our study population came from HIV-positive pregnant women attending four PMTCT centres in south-western Nigeria. The centres were randomly selected from seven such centres. A total of 3291 new pregnant women were registered for ART in the last five years (2007–2011). On average, each of the PMTCT centres registered 150 new pregnant women yearly into ART.

Sample size calculations suggested 33 participants were required for each group in the study. A sample of 144 pregnant women was randomly selected (33 participants per site) forming the four groups. Random selection of participants was done by an independent person blinded to the aims of the study.

Intervention

ACT aims to increase psychological flexibility which is the ability to be present and to accept and do what matters.[12] Psychological flexibility is established through six core ACT processes. Each of these areas is conceptualised as a positive psychological skill, not merely a method of avoiding psychopathology.[12] The six core areas of acceptance, cognitive defusion, being present, self as context, values and committed action are introduced and developed experientially over the course of treatment using the value-based mobile messages.[12]

The intervention groups received post HIV test counselling and were exposed to three sessions of ACT followed by weekly value-based health messages. These messages were established on the core areas of ACT interventions. Messages were sent by mobile phone for a period of three months using a MHealth software application. This software sends text messages to the HIV-positive pregnant women at the clients' preferred time of the day. It also captures the delivery status of the messages sent. An example of a mobile message was:

> . . . Accept yourself: acceptance is the voluntary adoption of an intentionally open, receptive, flexible and nonjudgmental posture with respect to moment to movement experience. It is supported with a willingness to make contact with distressing private experience situations event or interactions that will likely trigger them accept your status.

The control groups only received the post-HIV test counselling (which is considered the gold standard in PMTCT management). The control groups completed the data collection questionnaires and were monitored until delivery.

Instrument

The data collection instrument was a questionnaire which included a number of mental health outcome measures. These included the revised Action and Acceptance Questionnaire (AAQ-II), a depression anxiety scale and a HIV stigma scale. The AAQ-II was specifically used to measure the experiential avoidance and psychological flexibility of mothers diagnosed with HIV. The AAQ-II has been reported to have a satisfactory structure, good reliability and validity.[13] Additional demographic and outcome measures such as CD4 counts were also collected. Data were collected by the study's research assistants (nurses and mentored mothers who monitored the pregnant women).

Data collection and analysis

The Solomon four-group design includes an evaluation of the effects of the intervention using pre-and post-test scores, and an assessment of pre-test sensitisation through the analysis of post-test scores. Psychological flexibility was measured using participants' scores on the AAQ-II with higher scores indicating more acceptance and flexibility. To test for pre-test sensitisation between a group, analysis of variance (ANOVA) was conducted on the post-tests using intervention and pre-test as fixed factors.[10] To test for the intervention effect, paired and independent t-tests were conducted for the main intervention effect. Significance was tested at a 5% level.

Results

Participant demographics

There were 132 participants in the study (33 participants per group). Five participants were lost to follow up resulting in 128 participants completing the study. The average age of the participants was 31.6 years (SD 4.5, range 10–41) with most participants being married ($n = 121$, 92%) and having at least a secondary education ($n = 91$, 69%) (Table 1). There were no significant differences between the groups in terms of demographics, though there were significant differences in the average number of *years since diagnosis*, with both Group 1 (4.7 years) and Group 4 (5.2 years) having a longer time of knowing their HIV status ($p = 0.005$) (Table 1).

Acceptance and commitment outcome measures

There was a significant increase in pre- and post-test AAQ-II scores within Group 1 (intervention group) and by contrast, a significant decrease within Group 2 (control group) (Table 2).

An independent samples t-test was used to compare the pre- and post-test score differences between Group 1 (mean (M) = 3.6, standard deviation (SD) = 8.9) and Group 2 (M = −4.9, SD = 11.1). There was a significant psychological flexibility improvement in participants following ACT intervention ($t = 3.4$, $p = 0.001$).

The ANOVA ($F(1,33) = 19.2$, $p < 0.001$) found a significant interaction between the intervention and pre-test factors suggesting pre-test sensitisation being present.

When Group 4 was removed from the analysis the interaction disappears.

Discussion

Since 2002, PMTCT has been at the forefront of HIV prevention activities in Nigeria as pregnancy is a crucial period to identify and treat HIV-positive women.[14] Despite the rapid expansion of ART programmes, uptake of ART in pregnancy remains suboptimal, particularly in sub-Saharan African. A study in South Africa identified the key challenges to ART initiation as: late first presentation, denial of HIV diagnosis, fear of disclosure, treatment side-effects and difficulties in accepting a lifelong commitment to treatment.[15] The study suggested that a specific barrier to swift initiation of ART in pregnancy is the capacity to accept an HIV diagnosis and the need to start lifelong treatment at the time of accessing antenatal care.[15]

There has been a substantial increase in the use of mobile phone messaging to improve adherence to ART. There is high-quality evidence to support the effectiveness of mobile telephone text messages (of any length sent at weekly intervals) n enhancing adherence to ART and improving HIV viral load suppression.[16] In contrast, there is a dearth of literature on the application of ACT in PMTCT to improve ART adherence and mother and child outcomes. Our study is one of the first evaluations of the effectiveness of a mobile phone intervention based on the theory of psychological flexibility. The study aimed to improve women's ability to accept a HIV diagnosis and thereby improve mental health outcomes.

Table 1. Demographic characteristics of the intervention and control groups.

| | Control groups | | Intervention groups | | | |
	Group 2	Group 4	Group 1	Group 3	Test	*p*-value
Age, years (SD)	31.3 (4.5)	31.4 (4.6)	31.9 (4.42)	32.1 (4.5)	$K = 0.4$	0.934
Secondary education and above (%)	20 (76.9%)	29 (87.9%)	20 (64.5%)	22 (66.7%)	$X^2 = 5.8$	0.127
Married (%)	26 (100%)	30 (90.9%)	33 (100%)	32 (97%)	$X^2 = 3.9$	0.249
Years since diagnosed (SD)	2.7 (1.3)	5.2 (3.6)	4.7 (2.8)	3.6 (2.3)	$K = 13.3$	0.005

Independent samples: Kruskall–Wallis test (K) and Fisher exact chi-square tests (X^2).

Table 2. Mean pre- and post-test AAQ-II scores.

Group	Pre-test AAQ-II score (SD)	Post-test AAQ-II score (SD)	Difference [95% CI]	t-test	*p*-value
Group 1 ($n = 33$)[a]	44.4 (7.5)	48.1 (6.8)	3.7 [0.5 to 6.9]	$t = 2.4$	0.023
Group 2 ($n = 28$)	46.0 (9.4)	41.1 (6.1)	−4.9 [−0.6 to −9.2]	$t = 2.2$	0.027
Group 3 ($n = 33$)[a]		46.7 (5.7)			
Group 4 ($n = 33$)		50.7 (8.8)			

[a]Intervention groups.

HIV-positive women in our study had similar (though marginally higher) AAQ-II pre-test scores to HIV-positive women in other studies.[13] The key finding from this study, was the significant increase in psychological flexibility following the ACT training and mobile messaging. This effect was however influenced by a significant interaction between the pre-tests and the intervention. This interaction effect could be explained by the high post-test AAQ-II scores of Group 4. This group did not receive the intervention but belonged to a service attached to the Nigeria Research Medical Centre. This centre is not a typical hospital setting and may have exposed the participants to other interventions. Further, this group also had the longest average time of knowing their HIV status and thereby had the longest period of time to accept this diagnosis.

There are a number of limitations in the study. Firstly, the study was restricted to the four major PMTCT centres in south-western states of Nigeria and generalisations should be done with caution. Secondly, the inclusion of Group 4 could have significantly affected the findings due to possible additional interventions associated with a research service. A final limitation is the use of the AAQ-II. Despite its wide use in clinical research, some studies have questioned the appropriateness of the AAQ-II as a measure of psychological flexibility due to its strong association with measures of psychological wellbeing.[17]

Conclusions

The introduction of mobile phone based ACT may result in greater psychological flexibility in women diagnosed with HIV. Further research should be done to examine the mechanisms by which mobile phone message interactions are effective when used in interventions.

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