E-ISSN: 2378-654X

Recent Advances in Biology and Medicine

Original Research Article

Influence of Spirituality and Religion on Adherence to Highly Active Antiretroviral Therapy in Adult HIV/AIDS Patients in Calabar, Nigeria

HATASO, USA

Influence of Spirituality and Religion on Adherence to Highly Active Antiretroviral Therapy in Adult HIV/AIDS Patients in Calabar, Nigeria

Agam Ebaji Ayuk*, Ndifreke Udonwa, Abraham Gyuse
Family Medicine Department, Faculty of Medicine, University of Calabar, Calabar, Nigeria.

***Correspondence:** agamayuk@gmail.com

Received: Jun 19, 2017; Accepted: Jul 1, 2017

Abstract
The emergence of a chronic medical illness such as Human Immune Deficiency Virus and Acquired Immunodeficiency Syndrome (HIV/AIDS) may be the time when people turn to the Sacred through spirituality and religion. HIV is a chronic illness that requires strict adherence to medication regimens that may be influenced by spirituality/religion. This study was aimed at finding the association between spirituality/religion and adherence to highly active antiretroviral therapy (HAART) in adult HIV/AIDS patients. This is a cross-sectional descriptive study of 370 patients. Adherence was measured using an adapted adult AIDS clinical trial group (AACTG) and visual analogue scale (VAS) tools. Spirituality was assessed using Functional Assessment of Chronic Illness Therapy-Spirituality Expanded (FACIT-Sp-Ex) scale, religiosity with Duke University Religion index (DUREL), and religious coping with Brief Religious Coping (RCOPE) scale. Adherence rates were 86.2 and 43.8% using AACTG and VAS tools, respectively. Statistical significant correlation was found between spirituality and adherence to HAART ($r = 0.265$; $p = 0.00$). Also, significant correlation was found between positive religious coping and adherence ($r = 0.15$, $p = 0.003$). Odds ratio indicated that female respondents were 1.6 times more likely to be adherent, compared with males. Similarly, every unit rise in spirituality score yielded a 1.3 times increased likelihood of adherence to HAART on multiple logistic regression of adherence to HAART with relevant predictors. Both spirituality and positive religious coping have positive influence on optimal adherence. Therefore, the training of health care personnel to assess and provide spiritual care and involvement of chaplains/religious leaders is advocated for improved adherence.

Keywords: Spirituality; Adherence; Religious coping.

1. INTRODUCTION

Spirituality has long been linked with health and wellbeing and may be a central issue for patients at the end of life or those dealing with a chronic illness such as Human Immune Deficiency Virus and Acquired Immunodeficiency Syndrome (HIV/AIDS) [1, 2]. Spirituality, broadly defined as that which provides meaning and purpose to life, is a person's belief in a power apart from their own existence, while religion on the other hand pertains to the outward practice of a spiritual understanding and/or the framework for a system of beliefs, values, codes of conduct, and rituals. Both play crucial roles in guiding the decisions of people with HIV/AIDS about taking antiretroviral treatment [1-3]. Spirituality/religion is a complex construct that can incorporate the internal, personal, and emotional expression of the Sacred and the formal, institutional, and outward expression of the Sacred [4]. Illness disrupts the relationship inside the human organism, as well as disrupts the families and workplaces, destabilizes pre-existing patterns of coping, and raises questions about the Sacred [5]. According to the biopsychosocial-spiritual model of care, everyone has a spiritual history [5]. For many, this history may unfold within the context of a religious tradition; and for others as a set of philosophical principles or significant experiences. Moreover, when illness strikes, it affects the person in totality (biologic, psychological, social, and spiritual aspects).

Several studies have shown that spirituality is important to patients, and that it affects health care decision making and health care outcomes including the quality of life (QoL) [4, 6-8]. Spirituality and religious beliefs can create distress and increase the burden of illness, as well [1, 9-11]. Research indicates that people reflect on their spirituality after being diagnosed with HIV/AIDS by incorporating their understanding of God and previous religious and spiritual experiences as part of their coping repertoire [12]. Therefore, patients with HIV/AIDS use spirituality and religion as a coping strategy and to bring a sense of meaning and purpose to their lives in the face of a challenging illness [4]. Several studies elsewhere have demonstrated the benefits of various aspects of spirituality and religion on mental and physical health outcomes in patients with chronic disease conditions. There is paucity of data particularly in sub-Saharan Africa on the relationship between spirituality/religion and treatment decision making; only a few studies address spirituality and treatment adherence, and the results obtained have been inconsistent [13]. Furthermore, previous studies in Africa have been limited by a single item or a single measure for religion/spirituality and do not assess important spiritual and religious indicators such as the use of religious coping or the use of intrinsic religiosity. In addition, most studies on spirituality and religion are outside the African region, thus affecting the generalization of findings to African patients. Therefore, this study was aimed at having an in-depth assessment of spirituality and religion, and how they influence adherence to highly active antiretroviral therapy (HAART) in order to provide information to promote spiritual care aimed at improving adherence, promoting health, and improving QoL.

2. METHODS

The study was conducted over a 6 months period from September 2012 to February 2013 at a Tertiary institution. It was a cross-sectional descriptive study with a total of 370 consenting subjects. The sample size was calculated using the Leslie and Kish statistical formula for cross-sectional qualitative surveys [$n = Z^2 P(1\text{-}P)/d^2$] [14]. Consent was obtained from all study participants.

Adherence to HAART was measured using two self-reported instruments: Adapted adult AIDS clinical trial group (AACTG) and 30-day visual analogue scale (VAS) [15-17]. Both instruments have free access and both have been validated for resource limited settings. Using AACTG, adherence to antiretroviral therapy was calculated as the percentage of number of doses taken divided by the number of prescribed doses over the preceding 4 days. The VAS provided an overall adherence assessment for a longer time interval (30 days). Participants were asked to mark off on a horizontal, scale, which runs from 0 to 100%, the points that best described how well they had taken their pills over the previous 30 days. Adherence was dichotomized to ≥95% classified as "adherent" and <95% classified as "non-adherent" [18, 19].

Spirituality and religion were assessed using three instruments in an attempt to measure the four general domains of spirituality, which include religiosity, religious coping and support, and spiritual wellbeing and spiritual need. The Duke University Religion index (DUREL), a five-item scale, assessed the three major dimensions of religious involvement [20]: Organizational Religious Activity (ORA), Non-Organizational Religious activity (NORA), and Intrinsic Religiosity (IR) or subjective religiosity. The Brief Religious Coping (RCOPE) is a 14-item measure of religious coping with major life stressors such as HIV/AIDS [21]. This 14-item measure of religious coping methods comprised two subscales: positive religious coping (turning to God/religion for support) and negative religious coping (religious conflict and spiritual struggle). Moreover, the Functional Assessment of Chronic Illness Therapy-Spirituality Expanded (FACIT-Sp-Ex) version 4 is a 23-item measure of spirituality that assesses QoL and spiritual wellbeing, with subscale for meaning and peace (sense of meaning/peace/purpose in life), faith (comfort and strength in one's spiritual beliefs), and overall spirituality [4, 22]. License to use FACIT-Sp-Ex was granted by FACIT.org (Licensor).

Data from the study were analyzed using the statistical package for the social sciences (SPSS) software version 21.0 [23]. Data analysis was performed using descriptive statistics, inferential statistics, and multivariate/logistic regression analyses to determine correlates or predictors of adherence to HAART with the level of significance set at <0.05.

Ethical clearance was obtained from the Health Research Ethics Committee of the institution.

3. RESULTS

3.1. Demographic Characteristics of Subjects

Data were obtained from 370 consenting respondents, with a mean (SD) age of 37.4 (9.7) years, ranging from 20 to 75 years. The male-female ratio was 2:3, with the males being generally older, with a mean (SD) age of 41.2 (9.1) years compared to females with a mean (SD) age of 35.4 (9.4) years ($p = 0.00$). The modal age group was 30-39 years (145, 39.2%), with 228 (61.6%) of the respondents being less than 40 years old.

3.2. Religious and Spiritual Characteristics of Subjects

All respondents in the study indicated a specific religious preference. More than half of the subjects were of Pentecostal denomination (224, 60.5%), Roman Catholic (69, 18.7%), and Orthodox (44, 11.9%); other denominations consisted of mainly "white garment" (29, 7.8%) and Islam (4, 1.1%).

3.2.1. Spirituality Scores Using FACIT-Sp-Ex

Comparing the socio-demographic characteristics with the meaning/peace subscale scores, the respondents generally had high mean meaning/peace subscale scores (the lowest mean score was 24.6, and the highest mean score was 32.0). The minimum meaning/peace subscale score is 0, and the maximum score is 32. There was no significant difference in meaning/peace, faith, and spiritual wellbeing expanded (Sp-Ex) subscale scores by comparing age groups, marital status, level of education, and religion. However, compared with males, female subjects had significantly higher mean Sp-Ex scale (86.5 vs. 85.1, $p = 0.02$) scores. In addition, traders had higher mean meaning/peace subscale compared with other occupational groups ($p = 0.05$). Comparing spiritual wellbeing expanded scores with socio-demographic characteristics; the respondents generally had high mean scores (the lowest score was 83.5, and the highest score was 88.2). The score range for spiritual wellbeing expanded score is 0-92 (Table 1).

3.2.2. DUREL Religiosity Scores

Three hundred and five respondents (305, 82.4%) attended religious services more than once a week, forty-nine (49, 13.2%) once a week, twelve (12, 3.2%) a few times a month, two (2, 0.5%) a few times a year, one (1, 0.3%) once a year, and one (1, 0.3%) never. Regarding non-organized religious activities such as prayer and scripture study, most respondents (286, 77.3%) engaged themselves in NORA more than once a day. Regarding intrinsic religious activities such as experiencing the presence of the Divine and carrying one's religion into dealings in life, most respondents (206, 55.7%) carried their religion into dealings in life (Table 2).

3.2.3. BRIEF RCOPE Scores

Two hundred and ninety-eight respondents (298, 80.5%) used positive religious coping strategies "a great deal" compared with two hundred and fifty-two respondents (252, 68.1%) not using any form of negative religious coping strategy (Table 3).

3.3. Adherence to HAART

Three hundred and nineteen (86.2%) and one hundred and sixty-six (44.9%) of respondents had ≥95% adherence to HAART using AACTG and VAS instruments, respectively. Moreover, mean adherence was 95.7 ± 22.5 and 94.8 + 14.1 using AACTG and VAS instruments, respectively (Table 4).

Table 1: FACIT-Sp-Ex scores based on socio-demographic characteristics (*N* = 370).

Variable	Meaning/peace subscale Mean (SD)	Faith subscale Mean (SD)	Sp-Ex scale Mean (SD)
Age group			
20-29	27.2 (4.3)	15.7 (1.1)	86.1 (5.8)
30-39	27.5 (4.1)	15.6 (1.2)	86.2 (5.9)
40-49	26.7 (3.9)	15.9 (0.3)	85.6 (5.6)
50-59	27.3 (3.9)	15.7 (0.9)	86.3 (4.8)
60-69	27.2 (3.8)	16.0 (0.0)	87.0 (4.2)
***t*-test statistic (*p*-value)**	0.46 (0.78)	1.31 (0.27)	0.23 (0.92)
Sex			
Male	26.8 (4.3)	15.6 (1.3)	85.1 (6.6)
Female	27.4 (3.9)	15.8 (0.8)	86.5 (5.0)
***t*-test statistic (*p*-value)**	1.5 (0.13)	1.9 (0.06)	2.3 (0.02)
Marital status			
Single	27.3 (4.4)	15.6 (1.5)	85.7 (6.8)
Married	27.1 (4.0)	15.8 (0.7)	86.1 (5.3)
Separated	28.8 (3.6)	15.9 (0.3)	88.2 (3.6)
Cohabiting	27.8 (4.3)	15.3 (1.0)	86.0 (5.6)
Divorced	32.0 (0.0)	16.0 (0.0)	91.0 (0.0)
Widow	26.9 (3.3)	15.9 (0.5)	86.2 (4.2)
***F*-test statistic (*p*-value)**	0.81 (0.55)	1.36 (0.24)	0.63 (0.68)
Educational level			
No formal	28.6 (3.9)	16.0 (0.0)	86.7 (7.7)
Primary	27.3 (3.9)	15.6 (1.2)	86.1 (5.3)
Secondary	27.2 (4.0)	15.8 (0.8)	86.2 (5.5)
Tertiary	27.0 (4.2)	15.7 91.1)	85.9 (5.8)
***F*-test statistic (*p*-value)**	0.58 (0.63)	0.65 (0.58)	0.13 (0.94)
Religion			
Roman Catholic	27.3 (3.9)	15.5 (1.5)	86.0 (6.0)
Orthodox	26.3 (3.7)	15.9 (0.6)	85.3 (4.9)
Pentecostal	27.3 (4.2)	15.8 (0.9)	86.1 (5.7)
Other denominations	27.6 (3.3)	16.0 (0.2)	87.3 (3.3)
Islam	28.3 (3.9)	16.0 (0.0)	83.5 (12.6)
***F*-test statistic (*p*-value)**	0.7 (0.61)	1.6 (1.7)	0.8 (0.51)
Occupation			
Student	27.8 (4.3)	15.5 (1.9)	86.1 (5.6)
Trading	28.2 (4.0)	15.6 (1.1)	86.6 (5.4)
Farming	28.0 (3.9)	15.9 (0.3)	87.6 (4.1)
Civil Servant	26.7 (4.2)	15.8 (0.7)	85.6 (5.5)
Business	27.6 (4.0)	15.7 (1.1)	86.4 (5.9)
Unemployed	26.5 (3.4)	15.8 (0.9)	85.5 (5.0)
Others	24.6 (4.0)	16.0 (0.0)	83.5 (6.3)
***F*-test statistic (*p*-value)**	2.1 (0.05)	0.69 (0.66)	0.92 (0.48)

Table 2: DUREL religiosity scores (*N* = 370).

Score	Religious attendance (ORA) *n* (%)	Private religious activities (NORA) *n* (%)	Sum intrinsic religiosity (IR) *n* (%)
1	1 (0.3)	7 (1.9)	–
2	1 (0.3)	5 (1.4)	–
3	2 (0.5)	2 (0.5)	0 (0.0)
4	12 (3.2)	12 (3.2)	0 (0.0)
5	49 (13.2)	58 (15.7)	0 (0.0)
6	305 (82.4)	286 (77.3)	0 (0.0)
9	–	–	2 (0.5)
10	–	–	3 (0.8)
11	–	–	4 (1.1)
12	–	–	14 (3.8)
13	–	–	32 (8.6)
14	–	–	206 (55.7)
15	–	–	109 (29.5)
Total	**370 (100)**	**370 (100)**	**370 (100)**

Table 3: BRIEF RCOPE scores (*N* = 370).

Score	Sum positive religious coping *n* (%)	Sum negative religious coping *n* (%)
7	0 (0.0)	252 (68.1)
8	0 (0.0)	22 (5.9)
9	0 (0.0)	30 (8.1)
10	0 (0.0)	33 (8.9)
11	0 (0.0)	6 (1.6)
12	0 (0.0)	3 (0.8)
13	1 (0.3)	2 (0.5)
14	0 (0.0)	5 (1.4)
15	1 (0.3)	1 (0.3)
16	0 (0.0)	3 (0.8)
17	0 (0.0)	4 (1.1)
18	2 (0.5)	0 (0.0)
19	1 (0.3)	1 (0.3)
20	4 (1.1)	0 (0.0)
21	2 (0.5)	0 (0.0)
22	3 (0.8)	1 (0.3)
23	3 (0.8)	1 (0.3)
24	5 (1.4)	0 (0.0)
25	9 (2.4)	0 (0.0)
26	11 (3.0)	2 (0.5)
27	30 (8.1)	2 (0.5)
28	298 (80.5)	2 (0.5)
Total	**370 (100)**	**370 (100)**

Table 4: Adherence to HAART measured with AACTG and VAS instruments (*N* = 370).

Instrument	Freq. with >95% adherence level	Adherence rate (%)	Mean adherence level
AACTG	319	86.2	95.7 ± 22.5
VAS	166	44.9	94.8 + 14.1

 https://doi.org/10.18639/RABM.2017.03.456895

3.4. Comparison of Mean Religiosity and Level of Spirituality Scores among Adherent and Non-Adherent Respondents Using AACTG

Using the AACTG instrument and comparing with DUREL, BRIEF RCOPE, and FACIT-spiritual wellbeing expanded subscales, adherent and non-adherent respondents had similar scores. However, BRIEF RCOPE-sum of positive religious coping score was significantly higher among adherent respondents (27.8) when compared to non-adherent (27.4) respondents (Table 5).

3.5. Comparison of Mean Religiosity and Level of Spirituality Scores among Adherent and Non-Adherent Respondents Using VAS Instrument

Using the VAS instrument, the DUREL-private religious activities (5.73 vs. 5.52), FACIT-meaning and peace subscale (28.5 vs. 26.1), FACIT-spiritual wellbeing subscale (44.3 vs. 41.8), and FACIT-spiritual wellbeing expanded subscale (87.7 vs. 84.7) scores were found to be significantly different among adherent and non-adherent respondents, as shown in Table 6.

3.6. Multiple Logistic Regression of Adherence to HAART with Relevant Predictors

Logistic regression analysis was conducted for predicting adherence to HAART, using gender, and FACIT spirituality expanded scores as predictors, with control for other potential confounders. A test of the full model, against a constant only model was statistically significant, indicating that the predictors reliably distinguished adherence and non-adherence (chi square = 19.66, $p < 0.000$ with df = 2). Nagelkerke's R^2 of 0.68 indicated a fairly strong relationship between prediction and grouping. There was an overall prediction success of 82.5% (18.9% for non-adherent and 98.6% for adherent). The Wald criterion demonstrated that both gender and FACIT spirituality expanded scores that made significant contribution to prediction ($p = 0.025$ and $p < 0.00$, respectively). The odds ratio indicated that female respondents were 1.6 times more likely to be adherent, compared with males. In addition, every unit rise in FACIT spirituality expanded scores yielded a 1.3 times increased likelihood of adherence to HAART (Table 7).

Table 5: Comparison of mean religiosity and level of spirituality scores amongst adherent and non-adherent respondents using AACTG instrument (*N* = 370).

Variable	Adherent (*n* = 319) Mean (SD)	Non-adherent (*n* = 51) Mean (SD)	*t*-test	*p*-value
Religious Attendance (ORA)	5.8 ± 0.61	5.8 ± 0.56	0.22	0.83
Private Religious Activities (NORA)	5.7 ± 0.94	5.6 ± 0.94	0.76	0.45
Sum Intrinsic Religiosity (IR)	14.1 ± 0.94	13.9 ± 0.96	1.13	0.26
Sum Positive Religious Coping	27.8 ± 1.1	27.4 ± 1.68	2.2	0.03
Sum Negative Religious Coping	8.32 ± 3.3	8.6 ± 3.4	0.54	0.59
Meaning and Peace Subscale	27.8 ± 5.0	27.1 ± 3.9	1.21	0.23
Faith Subscale	15.8 ± 0.25	15.7 ± 1.2	0.42	0.59
Spiritual Wellbeing Subscale (SP-12)	43.5 ± 5.5	42.8 ± 4.0	1.11	0.27
Spiritual Wellbeing Expanded (SP-23)	86.4 ± 7.9	86.0 ± 5.2	0.41	0.69

Table 6: Comparison of mean religiosity and level of spirituality scores amongst adherent and non-adherent respondents using VAS instrument (*N* = 370).

Variable	Adherent (*n* = 166) Mean (SD)	Non-adherent (*n* = 204) Mean (SD)	*t*-test	*p*-value
Religious Attendance (ORA)	5.75 ± 0.62	5.77 ± 0.60	0.26	0.79
Private Religious Activities (NORA)	5.73 ± 0.65	5.52 ± 1.11	2.15	0.03
Sum Intrinsic Religiosity (IR)	14.1 ± 0.91	14.0 ± 0.98	0.58	0.56
Sum Positive Religious Coping	27.8 ± 1.4	27.5 ± 1.8	1.76	0.08
Sum Negative Religious Coping	8.3 ± 3.2	8.5 ± 3.3	0.7	0.47
Meaning and Peace Subscale	28.5 ± 3.9	26.1 ± 3.9	5.95	0.00
Faith Subscale	15.8 ± 0.9	15.7 ± 1.1	0.64	0.52
Spiritual Wellbeing Subscale (SP-12)	44.3 ± 4.0	41.8 ± 4.2	5.93	0.00
Spiritual Wellbeing Expanded (SP-23)	87.7 ± 4.8	84.7 ± 5.9	5.15	0.00

Table 7: Multiple regression of adherence to HAART with relevant predictors.

Model	Predictor variables	Odds ratio	*p*-value	Intercept	Model properties		
					N square*	HL test**	Overall model significance
1	Gender	1.6	0.025	0.517	0.68	0.214	Good
	FACIT-Spiritual Wellbeing Expanded score	1.3	0.000				
2	Gender	1.28	0.02	–0.016	0.32	0.63	poor***
	FACIT-Spiritual Wellbeing subscale score	0.87	0.11				
	FACIT-Spiritual Wellbeing Expanded score	1.33	0.046				
	Durel-Intrinsic Religiosity	1.04	0.082				

* = Nagelkerke's R^2; ** = Hosmer Lemeshow test; *** = considered poor owing to low *N* R^2.

4. DISCUSSION

This facility-based study among 370 adult respondents living with HIV/AIDS was aimed at assessing the possible relationship between Spirituality/Religion and adherence to HAART. The mean age of respondents was 37.4 years, and the modal age group was 30-39 years. This group is the socially and economically productive age group. This finding is in tune with the results of the Nigerian National Survey of 2010, which revealed that HIV prevalence was highest among adults less than 40 years of age [24]. A similar finding was observed in a cross-sectional study in Kumasi, Ghana, as well [25].

In this study, there was statistically significant higher proportion of female respondents (male-female ratio of 2:3) who were living with HIV ($p = 0.015$) and adherent to HAART ($p = 0.015$), using the AACTG instrument. This finding corroborates UNAIDS report on sub-Saharan Africa that revealed that there were more females than males living with HIV [26]. Similarly, Bello and colleagues, in their study in Ilorin, reported that women are two to three times more vulnerable to HIV transmission than men [27]. This may be due to biological vulnerability of the female genitalia with a larger surface area, the female being the recipient of semen and is prone to micro trauma during sexual activity, early exposure to sexual activity, lack of recognition of partner's risk, inequality in relationships, having sex with older men who are more likely to be infected with HIV and poverty [24, 26].

Gender disparity in access to HAART, as observed in this study, was also observed in a multicenter study in 13 low-income countries, where a male-female ratio of 2:3 was found [28]. In addition, Bello *et al*. reported that the proportion of females on HAART was twofold than that of males in Ilorin, Nigeria [27]. This disparity in access to HAART may be attributed to better health seeking behavior of females [28]. In many cultures, including Nigeria, men are allowed to have many sexual relationships thereby putting more women at risk of HIV infection. In addition, gender inequality impacts on women HIV risk more directly through their exposure to gender-based violence and the cultural barriers that prevent them from taking precautions against infections such as HIV [29]. There was no statistically significant difference in religious affiliation, comparing male and female respondents and adherent and non-adherent respondents.

All respondents in this study belonged to an organized religion. The female respondents had higher and statistically significant levels of the use of organized religious activity such as attending church compared to male respondents ($p < 0.05$). This finding of greater religious commitment among women has been reported by other researchers [4, 30, 31]. This may be because women tend to be more open about sharing personal problems and are more relational than men and thus will turn to religion more in difficult times [31]. Also, mothers tend to spend more time raising children, which often indicates overseeing their involvement in church and other religious activities. Furthermore, though two-income households are more common today, women often have more flexible schedules, permitting more church/religious involvement during the week. However, a study by Cotton and colleagues did not find significant difference in religiousness attributable to HIV/AIDS by gender [32]. This was probably because 87% of the study participants were male.

Using the AACTG instrument, three hundred and nineteen (319) subjects reported ≥95% adherence to HAART, yielding an adherence rate of 86.2%, with a mean adherence of 95.7 ± 22.5. With the use of VAS, one hundred and sixty-six (166) subjects reported ≥95% adherence to HAART, yielding an adherence rate of 44.9%, with a mean adherence of 94.8 ± 14.1. The AACTG instrument identified more adherent respondents when compared to the VAS instrument. The variation in adherence rate between AACTG and VAS calls for concern of the possibility of misunderstanding or individual differences in interpreting the two adherence measures. The determination of sensitivity and specificity for the VAS and AACTG instruments in this study was not performed because it did not use a "gold standard" such as medication event monitoring system (MEMS) caps, which are used in many studies to assess adherence and make comparisons with self-report measures. However, a study has reported

higher sensitivity and lower specificity with VAS compared to a structured self-report questionnaire such as AACTG [33]. Studies in various settings have reported higher adherence rate with AACTG compared with VAS, similar to findings in this study [34-36]. Generally, research suggests that individuals report adherence behavior more accurately in brief than for longer assessment interval [37, 38]. Therefore, in this study, the AACTG instrument that assessed adherence over a 4-day period may be said to be more representative compared to VAS instrument that assessed adherence over a 1-month period in the cohort. Furthermore, it has been found that reporting adherence in percent response format was less accurate as was performed with the VAS instrument [37].

Proportionally, more females were found to be adherent to HAART compared to males with statistical significance ($p = 0.015$). This finding is similar to that reported by Braitstein and colleagues, following a review of ART in low-income countries in Africa, Latin America, and Asia that found more women assessing and adherent to HAART and less likely to have advanced HIV [28]. A South African study reported similar finding [39]. In addition, similar finding was reported in a multicenter study across Nigeria where female gender was reported to have lesser risk to loss to follow-up [40]. In this study, the odds ratio indicated that female respondents were 1.6 times more likely to be adherent, compared with males when multiple logistic regression of adherence to HAART with relevant predictors was conducted. This finding in this study may be attributed to better health seeking behavior of females [28]. Other socio-demographic factors were not found to significantly influence the adherence status.

Religiosity using DURELL was high among all subscale scores. For ORA, scores across all age groups was high with 5.7 and 5.8 being the lowest and highest mean scores, respectively (ORA score range, 1-6). This indicated that most respondents attended religious services at least once a week or more. The mean score was higher than that reported among HIV/AIDS patients by Cotton and colleagues using DUREL, with 23% of patients attending religious services once a week or more [4]. Regarding NORA, the mean scores were high: the lowest was 5.6, and the highest was 5.8 (score range 1-6), with most respondents spending time in private religious activities at least daily or more. This rate is higher than that reported by Cotton *et al*. with 32% of patients engaged in NORA at least daily or more [4]. The mean scores for IR was also high with 14 and 14.5 being the lowest and highest mean scores across all age groups (range 3-15). The high DUREL subscale scores in this study support the observation of high religiosity/spirituality in the environment and among Nigerians [41]. In addition, studies have reported increased religiosity with the diagnosis of HIV [6, 42].

Participants in this study used positive religious coping strategies more often than they used negative religious coping strategies with females having statistical significance ($p < 0.03$). The mean scores ranged from 27.1 to 28, higher than that reported in studies reviewed where mean scores ranged from 17 to 21 for positive religious coping [21]. A study by Cotton *et al*. reported a mean score of 17.7 for positive religious coping, which was lower than that found in this study [4]. There were no studies in similar settings that used Brief RCOPE to assess religious coping to make comparisons. The high positive religious coping scores may have been the reason for better coping with problems of side effects of medication by adherent respondents in this study [43]. Medication side effect was found to be the most common reason for missed medication among adherent and non-adherent respondents in this study. In addition, a higher positive coping may possibly indicate better coping with issues of stigma and discrimination, less worry and stress, and positive mental attitude that positively influenced adherence and less use of negative coping strategies such as feeling abandoned by God or members of a religious community, which have been associated with poor adherence.

On the FACIT-Sp-Ex scale, mean scores were high with statistical significance found with female respondents ($p < 0.02$). High FACIT-Sp-Ex scores have been associated with increased meaning and purpose in life that could improve overall health-related QoL and adherence or overall life satisfaction in people with chronic illness such as HIV/AIDS [4]. In this study, compared with non-adherent respondents, adherent respondents generally had higher mean spirituality scores. This difference was more appreciable with respondents that were adherent with the VAS tool with statistical significance ($p < 0.05$). The FACIT spiritual wellbeing expanded scale scores were significantly correlated with adherence ($p < 0.05$). Multiple logistic regression of adherence to HAART with relevant predictors revealed that, for every unit rise in spirituality score, there is a 1.3 times increased likelihood of adherence to HAART. Similar findings have been obtained in similar studies among adults receiving HAART [1, 6, 29, 43]. Similar finding was reported by Cotton and colleagues where patients with higher FACIT-Sp-Ex scores had fewer HIV symptoms and better overall functioning [4]. Vyas *et al*. in a prospective longitudinal study in California, USA, reported adherence to be significantly higher among subjects with higher levels of spirituality and positive religious coping scores ($p < 0.05$) [9]. These findings may have been due to the social support acquired through religious institutions. Similarly, Tumwine *et al*. in a study in Kampala, Uganda, also reported high adherence among highly religious subjects [1]. Similarly, in a study of perinatally HIV-infected youths, subjects who had excellent adherence had significantly higher spirituality scores than those who had poor adherence [29].

In Nigeria, studies have reported better QoL in the spiritual domain with better adherence [7, 44]. The reasons for better adherence in subjects with high spiritual and religious scores in this study could be due to better support and teachings from religious institutions and a positive psychological impact of private religious activities such as prayers and scripture reading. Findings in the study revealed that 82.4% of subjects attended ORA more than once per week and 77.3% were engaged in NORA such as prayer and bible reading. In addition, the increased faith in their religious beliefs with less worries and finding meaning and peace in their life through their beliefs in the face of a life-threatening illness may have provided them a reason to be adherent and stay alive since most of them were married (194, 52%) and had children. Better health behaviors such as

less alcohol use and less risky sexual behaviors attributed to their spirituality could be contributing factors to better adherence. The engagement in personal and or community protective behaviors owing to spirituality may have also been contributing factors to high adherence [45]. It is also possible that higher levels of spirituality yielded more self-discipline, which would in turn improve adherence rates. This position is being considered, owing to the cause-effect relationship between spirituality and self-discipline. In other words, spirituality may enable attainment of self-discipline, while self-discipline may be essential for attainment of spiritual growth or higher levels of spirituality. This interactive influence of spirituality on self-discipline may be modified by the presence or absence of health education-related messages or interventions being provided with the religious institutions as platforms.

However, findings in this study were at variance with a similar study in California, USA, which reported that those who believed that "God will not turn his back on me no matter what I do," attended religious services regularly and participated in religious rituals that were less likely to be adherent [9]. These patients, falling into religious fatalism (belief that events are determined by fate) feel that God will protect them and that they do not need medication. Similarly, low adherence has been reported among highly religious subjects with certain religious beliefs negatively associated with adherence [1, 8]. The reason for discontinuation was due to teachings and prophecies from religious leaders, supported with biblical scriptures, which led patients to feel that God and their faith only would heal them, not medicines. Finocchario-Kessler *et al.*, in their randomized trial in USA, found that HIV patients who strongly believed in God's control of their health were significantly less adherent to HAART [46]. This was attributed to religious fatalism.

In this study, positive religious coping (looking for a stronger connection with God, seeking for God's love and care, focusing on religion to stop worrying about problems) was significantly associated with better adherence ($p < 0.03$). Similarly, Trevino *et al*. in a cross-sectional longitudinal study in Cincinnati, USA, reported that positive religious coping was associated with positive outcomes such as better QoL, improved clinical outcome, and adherence [47]. This findings in this study may have been due to the possible role of positive religious coping in helping patients maintain a positive attitude to life, promote active coping with health problems, fostering emotional wellbeing, establishing and maintaining social support, facilitating meaning making, and improved self-efficacy [48]. This is in tune with other studies in diverse settings, which reported positive association between the level of positive spiritual coping and the physical as well as mental health [4, 49, 50].

Adherent respondents had higher and statistically significant mean scores of private religious activities such as prayers, meditation, and scripture study compared with non-adherent respondents ($p < 0.03$). This could be attributed to the influence of spirituality on improving healthy behaviors such as taking medications and reducing alcohol abuse. This finding is in tune with studies that report prayer and scripture reading as predictive of better health behaviors and outcome [51-53]. Prayer has been reported to help interrupt negative rumination and thus lead to improved health outcome [41]. On the contrary, Vyas *et al*. reported that patients who prayed or meditated to get in touch with God and attended religious services regularly were highly predictive of poorer adherence [9]. This may have been due to HIV-associated stigma from religious institutions and negative beliefs about illness including HIV/AIDS.

5. CONCLUSION

The level of spirituality, religious involvement, and coping especially among female HIV/AIDS patients significantly influenced optimal adherence to HAART. Although this relationship may not be directly causal owing to the roles of many other determinant factors, it provides better understanding of how assessment of spirituality may be useful for the improvement of HAART adherence. Inclusion of spirituality in routine client assessment is hereby recommended, as a complement to existing best practice of health education and distribution of pill organizers.

5.1. Limitation of Study

The use of self-reported adherence as the only instrument to measure adherence in this study may have led to overestimation or underestimation of adherence. The subjective nature of instruments used in measuring spirituality and religion was a limitation in interpreting results of the study, as some patients may give answers that are socially acceptable. DUREL was not an in-depth measure of religiosity in terms of religious practices; therefore, it could not be used as a sole instrument to measure religious beliefs. Brief-RCOPE instrument focused only on divine types of religious struggle leaving out other types such as intrapsychic and interpersonal religious struggle. The absence of focused group discussions and interviews for qualitative data in the study did not provide the opportunity of eliciting personal, cultural spiritual beliefs, and other determinant factors among study participants that may have strongly influenced adherence.

Acknowledgments

We acknowledge contributions of the staff of Special Treatment Clinic, University of Calabar Teaching Hospital, Calabar; Philia Agam Ayuk for type setting, and Omoronyia Ogban for data analysis.

Manuscript was presented as part of a conference: Abstract presentation at the 21st WONCA World Conference of Family Doctors, Rio de Janeiro, November 6, 2016.

Author Contributions
Conceptualization of study, literature search/review, data collection, and manuscript writing: AE Ayuk; conceptualization of study, review of initial draft and manuscript preparation: NE Udonwa; conceptualization of study, review of initial draft and manuscript preparation: AN Gyuse.

Source of Funding
The research was funded by the authors.

Conflict of Interest
The authors have no conflict of interest to declare.

References

1. Tumwine C, Neema S, Wagner G. Reasons why high religiosity can co-exist with and precipitate discontinuation of anti-retroviral therapy among different HIV clients in Uganda: an exploratory study. Religions (Basel). 2012; 3:817-32.
2. Ironson G, Kremer H, Ironson D. Spirituality, spiritual experiences, and spiritual transformations in the face of HIV. In "Spiritual Transformation and Healing: Anthropological, Theological, Neuroscientific, and Clinical Perspectives." Editors - Koss JD, Hefner P; Lanham, MD: AltaMira Press (2006), pp: 241-62.
3. Kremer H, Ironson G, Schneiderman N, Hautzinger M. To take or not to take: decision-making about antiretroviral treatment in people living with HIV/AIDS. AIDS Patient Care STDS. 2006; 20(5):335-49.
4. Cotton S, Puchalski CM, Sherman SN, Mrus JM, Peterman AH, *et al*. Spirituality and religion in patients with HIV/AIDS. J Gen Intern Med. 2006; 21(S5):S5-S13.
5. Puchalski CM, Ferrell B, Virani R, Otis-Green S, Baird P, *et al*. Improving the quality of spiritual care as a dimension of palliative care: the report of the consensus conference. J Palliat Med. 2009; 12(10): 885-904.
6. Kisenyi RN, Muliira JK, Ayebare E. Religiosity and adherence to antiretroviral therapy among patients attending a public hospital-based HIV/AIDS clinic in Uganda. J Relig Health. 2013 Mar; 52(1):307-17.
7. Fatiregun A, Mofolorunsho K, Osagbemi K. Quality of life of people living with HIV/AIDS in Kogi State, Nigeria. Benin J Postgrad Med. 2009; 11(1):21-27.
8. Parsons SK, Cruise PL, Davenport WM, Jones V. Religious beliefs, practices and treatment adherence among individuals with HIV in the southern United States. AIDS Patient Care STDS. 2006; 20(2):97-111.
9. Vyas KJ, Limneos J, Qin H, Mathews WC. Assessing baseline religious practices and beliefs to predict adherence to highly active antiretroviral therapy among HIV-infected persons. AIDS Care. 2014; 26(8):983-87.
10. Daniel O, Oladapo O, Ogundahunsi O, Ogundahunsi S, Ogun S, *et al*. Default from anti-retroviral treatment programme in Sagamu, Nigeria. Afr J Biomed Res. 2008; 11(2):221-24.
11. Lyon ME, Garvie PA, Kao E, Briggs L, He J, *et al*. Spirituality in HIV-infected adolescents and their families: FAmily CEntered (FACE) advance care planning and medication adherence. J Adolesc Health. 2011 Jun; 48(6):633-36.
12. Utley JL, Wachholtz AB. Spirituality in HIV+ Patient Care. Psychiatry Inf Brief. 2011; 8(3):1.
13. Kremer H, Ironson G. Spirituality and HIV. In "Spirit, Science and Health: How the Spiritual Mind Fuels Physical Wellness." 1st ed. Editors - Plante TG, Thoresen C; West Port, CT: Greenwood Publishing Group (2007), pp: 176-91.
14. Charan J, Biswas T. How to calculate sample size for different study designs in medical research? Indian J Psychol Med [Internet]. 2013; 35(2):121-26. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3775042&tool=pmcentrez&rendertype=abstract
15. Chesney MA, Ickovics JR, Chambers DB, Gifford AL, Neidig J, *et al*. Self-reported adherence to antiretroviral medications among participants in HIV clinical trials: the AACTG adherence instruments. Patient Care Committee & Adherence Working Group of the Outcomes Committee of the Adult AIDS Clinical Trials Group (AACTG). AIDS Care. 2000 Jun;12(3):255-66.
16. Reynolds NR, Sun J, Nagaraja HN, Gifford AL, Wu AW, *et al*. Optimizing measurement of self-reported adherence with the ACTG adherence questionnaire: a cross-protocol analysis. J Acquir Immune Defic Syndr. 2007; 46(4):402-9.
17. Giordano TP, Guzman D, Clark R, Charlebois ED, Bangsberg DR. Measuring adherence to antiretroviral therapy in a diverse population using a visual analogue scale. HIV Clin Trials. 2004; 5(2):74-79.
18. Ministry of Health, Kenya. Adherence to Antiretroviral Therapy in Adults: A Guide for Trainers. Ministry of Health, Mombasa, Kenya (2004), p: xi. Available at: http://www.popcouncil.org/pdf. Accessed October 21, 2011.
19. World Health Organisation. Case Definitions of HIV for Surveillance and Revised Clinical Staging and Immunological Classification of HIV Related Disease in Adults and Children. WHO, Geneva, Switzerland (2006), p: 13.
20. Koenig HG, Büssing A. The duke university religion index (DUREL): a five-item measure for use in epidemological studies. Religions. 2010; 1(1):78-85.
21. Pargament K, Feuille M, Burdzy D. The Brief RCOPE: current psychometric status of a short measure of religious coping. Religions. 2011; 2(1):51-76.
22. Frick E, Riedner C, Fegg M, Hauf S, Borasio G. A clinical interview assessing cancer patients' spiritual needs and preferences. Eur J Cancer Care. 2006; 15(3):238-43.

23. Arbuckle JL. IBM® SPSS® Amos™ 22 User's Guide. IBM, Chicago, IL (2013).
24. National Agency for the Control of AIDS. Fact sheet 2011: update on the HIV epidemic and response in Nigeria. NACA, Nigeria (2011), pp: 7-8. Available at: http://www.naca.gov.ng. Accessed November 27, 2011.
25. Ohene S, Forson E. Care of patients on anti-retroviral therapy in kumasi metropolis. Ghana Med J. 2009 Dec; 43(4):144-49.
26. Joint United Nations Programme on HIV/AIDS. UNAIDS 2014 Report. UNAIDS, Geneva, Switzerland (2014), p: 1-2. Accessed January 20, 2015.
27. Bello S. HIV/AIDS patients' adherence to antiretroviral therapy in Sobi specialist hospital, Ilorin, Nigeria. Global J Med Res. 2011; 11(2):123-34.
28. Braitstein P, Boulle A, Nash D, Brinkohf MW, Dabis F, *et al*. Gender and the use of antiretroviral treatment in resource-constrained settings: findings from a multicentre collaboration. J Womens Health. 2008; 17(1):47-55.
29. Park J, Nachman S. The link between religion and HAART adherence in pediatric HIV patients. AIDS Care. 2010; 22(5):556-61.
30. Bryant AN. Gender differences in spiritual development during the college years. Sex Roles. 2007; 56(11-12):835-46.
31. Chandra PS, Satyanarayana VA, Satishchandra P, Satish K, Kumar M. Do men and women with HIV differ in their quality of life? A study from South India. AIDS Behav. 2009; 13(1):110-17.
32. Cotton S, Tsevat J, Szaflarski M, Kudel I, Sherman SN, *et al*. Changes in religiousness and spirituality attributed to HIV/AIDS: are there sex and race differences? J Gen Intern Med. 2006; 21(S5):S14-S20.
33. Deschamps AE, De Geest S, Vandamme A-M, Bobbaers H, Peetermans WE, *et al*. Diagnostic value of different adherence measures using electronic monitoring and virologic failure as reference standards. AIDS Patient Care STDS. 2008; 22(9):735-43.
34. Chkhartishvili N, Rukhadze N, Svanidze M, Sharvadze L, Dehovitz JA, *et al*. Evaluation of multiple measures of antiretroviral adherence in the Eastern European country of Georgia. J Int AIDS Soc. 2014; 17(1):18885.
35. Kleinman NJ, Manhart LE, Mohanraj R, Kumar S, Jeyaseelan L, *et al*. Antiretroviral therapy adherence measurement in non-clinical settings in South India. AIDS Care. 2015; 27(2):248-54.
36. Fisher JD, Amico KR, Fisher WA, Cornman DH, Shuper PA, *et al*. Computer-based intervention in HIV clinical care setting improves antiretroviral adherence: the LifeWindows Project. AIDS Behav. 2011; 15(8):1635-46.
37. Lu M, Safren SA, Skolnik PR, Rogers WH, Coady W, *et al*. Optimal recall period and response task for self-reported HIV medication adherence. AIDS Behav. 2008; 12(1):86-94.
38. Pearson CR, Simoni JM, Hoff P, Kurth AE, Martin DP. Assessing antiretroviral adherence via electronic drug monitoring and self-report: an examination of key methodological issues. AIDS Behav. 2007; 11(2):161-73.
39. Achalu DI. Gender differences in HIV and AIDS in Africa: the role of social and cultural practices. J Res Educ Soc. 2011; 2(1):1-4.
40. Charurat M, Oyegunle M, Benjamin R, Habib A, Eze E, *et al*. Patient retention and adherence to antiretrovirals in a large antiretroviral therapy program in Nigeria: a longitudinal analysis for risk factors. PLoS One. 2010; 5(5):e10584.
41. Ridge D, Williams I, Anderson J, Elford J. Like a prayer: the role of spirituality and religion for people living with HIV in the UK. Sociol Health Illn. 2008; 30(3):413-28.
42. Ironson G, Stuetzle R, Fletcher MA. An increase in religiousness/spirituality occurs after HIV diagnosis and predicts slower disease progression over 4 years in people with HIV. J Gen Intern Med. 2006 Dec; (21 Suppl 5):S62-68.
43. Kremer H, Ironson G, Porr M. Spiritual and mind–body beliefs as barriers and motivators to HIV-treatment decision-making and medication adherence? A qualitative study. AIDS Patient Care STDS. 2009; 23(2):127-34.
44. Akinboro AO, Akinyemi SO, Olaitan PB, Raji AA, Popoola AA, *et al*. Quality of life of Nigerians living with human immunodeficiency virus. Pan Afr Med J. 2014; 18:234.
45. Ekanem S, Asira A. Religion and medicine in the 21st century Nigeria. Sophia Afr J Philos. 2007; 9(1):56-61.
46. Finocchario-Kessler S, Catley D, Berkley-Patton J, Gerkovich M, Williams K, *et al*. Baseline predictors of ninety percent or higher antiretroviral therapy adherence in a diverse urban sample: the role of patient autonomy and fatalistic religious beliefs. AIDS Patient Care STDS. 2011 Feb; 25(2):103-11.
47. Trevino KM, Pargament KI, Cotton S, Leonard AC, Hahn J, *et al*. Religious coping and physiological, psychological, social, and spiritual outcomes in patients with HIV/AIDS: cross-sectional and longitudinal findings. AIDS Behav. 2010; 14(2):379-89.
48. Dilorio C, McCarty F, DePadilla L, Resnicow K, Holstad MM, *et al*. Adherence to antiretroviral medication regimens: a test of a psychosocial model. AIDS Behav. 2009; 13(1):10-22.
49. Williams DR, Sternthal MJ. Spirituality, religion and health: evidence and research directions. Med J Aust. 2007 May 21; 186(10 Suppl):S47-50.
50. Sax PE, Tierney C, Collier AC, Daar ES, Mollan K, *et al*. Abacavir/lamivudine versus tenofovir DF/emtricitabine as part of combination regimens for initial treatment of HIV: final results. J Infect Dis. 2011 Oct 15; 204(8):1191-201.
51. Hill DL. Sense of belonging as connectedness, American Indian worldview, and mental health. Arch Psychiatr Nurs. 2006 Oct; 20(5):210-16.
52. Miller RL, Jr. An appointment with god: AIDS, place, and spirituality. J Sex Res. 2005 Feb; 42(1):35-45.
53. Puchalski CM. Honoring the sacred in medicine: spirituality as an essential element of patient-centered care. J Med Person. 2008; 6:113-17.

Citation: Ayuk AE, Udonwa N, Gyuse A. Influence of spirituality and religion on adherence to highly active antiretroviral therapy in adult HIV/AIDS patients in Calabar, Nigeria. Recent Adv Biol Med. 2017; 3:48-57.