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RESEARCH ARTICLE

The Influence of Peer-Led Health Education Intervention on Medication Adherence Practices Among Youths Living with HIV In Nigeria

Olugbenga Asaolu, PhD[1]*, Gbadegesin O. Alawode, MPH[2], Saratu Ajike, PhD[1], Ololade O. Ogunsami, PhD[1], Mustapha Bello, MD, MPH[3], John O. Ibitoye, PhD[4], Adebusola Oyeyemi, PhD[1], Adeniyi Adeniran, MD, PhD[1], Chisom Emeka, PhD[1], Oluwagbemiga Obembe, MPH[5], Olubunmi Ojelade, PhD[1], Olutayo Asaolu, MBA[1], Adaeze Ugwu, MD, MPH[6], Christopher Obanubi, MD, MHE, MDS, MPPA[7], Abdulmalik Abubakar, MPH[6], Adekemi Asaolu, MBA[8], Olubayode Asaolu, MSc[9], Nannim Nalda, MPH[10], Adebayo O. Amao, MPH[11], Oladimeji Folorunso-Ako, PhD[1], Ishaq K. Salako, MD, MPH[1], Catherine Agbede, PhD[1]

[1] Babcock University, Ilishan-Remo, Ogun State, Nigeria
[2] Association for Reproductive and Family Health, Lagos, Nigeria.
[3] Formerly of University of Leeds, Leeds, UK.
[4] Catholic Relief Services, Abuja, Nigeria
[5]Texila American University, Georgetown, Guyana
[6]Liverpool John Moores University, Liverpool, UK
[7]Bayero University Kano, Kano State, Nigeria.
[8] University of Ibadan School of Business, University of Ibadan, Oyo State, Nigeria.
[9]University of Ilorin, Kwara State, Nigeria.
[10]Staffordshire University, Stoke-on-Trent, UK
[11]Lagos State, University College of Medicine, Lagos State, Nigeria

***Corresponding author:** gbengasaolu@gmail.com

ABSTRACT

Medication adherence and antiretroviral therapy retention are required for successful durable, virologic suppression and treatment outcomes among youths. The use of peer-led health education in increasing medication adherence and antiretroviral therapy retention has been advocated. Therefore, this study investigated the effect of peer education on medication adherence and antiretroviral-therapy retention practices among Youth Living with HIV in Niger state, Nigeria. The study was a quasi-experimental design in two selected hospitals. One hospital was assigned to a one-hour peer-led health education session for six weeks, and the 2nd served as the control group. Data were collected at baseline, immediate post-intervention, and at the sixth-week follow-up. Data were analyzed using descriptive and inferential statistics at a 0.05 level of significance.

Majority of respondents practice Islam and are within the ages of 20-24 years (control: 100%, 89%; intervention: 83%, 73%), from the Hausa Ethnic group (control: 62%; intervention: 56%). Majority of respondents in the control group have Islamic education (50%) and Secondary education (50%), while the majority of those in the intervention group have primary education (35%), secondary (29%), tertiary (19%) and Islamic (17%) respectively. Medication adherence and ART retention was higher in the intervention group (27%, 16%) compared with the control (17%, 9%). A significant association between knowledge and perception due to peer education on medication adherence was found (24%, 80%) in the intervention group and (11%, 36%) in the control group. Subsequently, the 6th week follow-up sustained findings from the intervention period on medication adherence and ART retention (27%, 16%) in the intervention group compared with control group (17%, 9%). Similarly, knowledge and perception follow-up post intervention was sustained (24%, 80%) in the intervention group and (11%, 36%) in the control group.

Interventions leveraging peer-led health education enhanced HIV medication adherence and antiretroviral therapy retention practices among youths. Thus, we recommend scale-up of the structured peer-led curriculum and integration into the health systems to improve health outcomes among HIV positive youths, achieve epidemic control and accelerate progress for the UNAIDS 95:95:95 goals.

Keywords: HIV, Peer Education, Treatment Adherence, Youths

Introduction

Human Immunodeficiency Virus (HIV) is an infectious agent which causes Acquired Immunodeficiency Syndrome (AIDS). Routine Antiretroviral Therapy (ART) uptake, especially current daily regimens, is overwhelming to some young people while others find it stigmatizing when known to people, hence fundamentally becoming an impediment to their normal lives. For this segment of the population, consistency in treatment and maintenance in active medication often involves more than a simple time track for medication and hospital-driven follow-up checks. It requires sustained motivation and additional effort to surmount the various factors that affect adherence to medications[1, 2].

Peer education is one of the effective ways to educate youths about sexual and reproductive health-related issues[3]. Peer education is a reliable method for preventing HIV and other sexually transmitted infections (STIs) across the globe[4]. Individuals who share demographic traits (for example, age or gender) or risk behaviors (for example, female sex workers and people who inject drugs) with a target group are identified and trained to raise awareness, convey information, and advocate behavior change among members of that group. Peer education may take place in a formal context (such as a classroom) or informally during ordinary encounters. Peer education creates a sense of solidarity and collective action among peers in addition to being more cost-effective when compared with interventions that rely on highly trained professional staff [5, 6, 7]

Peer education has its origins in Joseph Lancaster's "monitorial system," which was set up in London, England, in the early 1800s to minimize teacher responsibilities[8]. Lessons were given to a limited selection of student "monitors," who subsequently passed them on to their peers. The influenza epidemic at the University of Nebraska in the United States, was one of the first applications of peer educators in the health domain, with educated students delivering preventative and care information to other students[9]. Peer education was one of the most extensively employed intervention in HIV prevention campaigns aimed at teenagers by the 1990s [10, 11]

Peer education is now a feature of several large-scale projects aimed at reducing HIV transmission including a 100-million-pound initiative in Nigeria supported by the UK Department for International Development and South Africa's National HIV Prevention Program for Youth, Love Life. Other global areas have developed national and international organizations based on the EUROPEER concept, which connected peer educators across 14 nations in the European Union. NOPE (National Organization of Peer Educators; www.nope.or.ke) is a Kenyan organization that mobilizes peer-led community initiatives which teaches and networks peer educators. With chapters in 27 countries spanning Eastern Europe, Central Asia, the Arab States, and Africa, YPEER (Youth Peer Education Network; website www.youthpeer.net) connects and develops peer educators while expanding peer-led programming within and beyond regions[12].

In developing countries, peer education interventions have been used with a variety of target populations, including youth[13,14,15], commercial sex workers [16,17,18], and injection drug users[18, 19]. Peer education has been employed in a variety of public health intervention areas, such as nutrition education, family planning, drug abuse prevention, and violence prevention. However, due to the large number of cases of HIV/AIDS peer education in contemporary international public health literature, it stands out. As a result of its scale, there has been an increase in worldwide efforts to better understand and enhance the process and effect of peer education in the areas of HIV/AIDS prevention, care, and support.

Young people must understand how to protect themselves against HIV infection and have the resources to do so. Access to HIV preventive treatments such as voluntary medical male circumcision, condoms, and pre-exposure prophylaxis, improved HIV testing and counseling, and enhanced connections to HIV treatment facilities for individuals who test HIV positive are all part of the spectrum. With the growth of peer education, including the formation of national and worldwide organizations to promote peer education, it is becoming more vital to synthesize data from current programs to better guide decision-making and program design.

The strategies used in peer education are somewhat diverse. Some kinds of peer education, such as whole-class instruction in schools or group discussion in youth centers, use approaches similar to formal tutoring. Other techniques include unstructured informal instruction, one-on-one dialogues, and counseling. Peer educators have done theater, stalls, and displays in various situations. The techniques used are influenced by the project's targeted results, whether they be information dissemination, behavior modification, skill development, or community development. Methods are selected based on compatibility with the target

group's setting or culture. Some projects use a mix of techniques, while others may adopt to one only. Peer education is a prevalent technique for preventing HIV and boosting health across the globe, and it usually entails enlisting members of a particular at-risk population to persuade them to modify dangerous sexual practices and preserve healthy ones. Peer education differs from mass media education, the former involves greater interpersonal connection in both directions [20]. Peers are considerably more likely to influence fellow group members' conduct since they are thought to be able to achieve a degree of confidence, allowing for more open conversations on sensitive themes [21]. They also have greater access to underserved groups who may not have been exposed to conventional health initiatives [22]. Finally, in comparison to conventional healthcare providers, peer education is less expensive [23, 24].

In order to explore the possibilities of the impact of peer influence in HIV programming among youth, this study investigated the effect of Peer Education intervention on knowledge, perception, medication adherence practice, and ART retention among youths living with HIV in Niger State, Nigeria.

Methods

STUDY DESIGN, POPULATION

The study utilized a quasi-experimental in design involving patients receiving HIV care and treatment in two selected general hospitals and groups (intervention and control) accessed at baseline and end line in Niger State. Multistage sampling technique was employed in the selection of participating health facilities. One of the three senatorial districts (Niger East) in Niger State was purposively selected for this study. The two hub facilities providing free comprehensive HIV care and treatment were purposively selected- Rafi LGA (Control) and Tafa LGA (Intervention). Fifty-two (52) young people living with HIV from the two selected health facilities that met inclusion criteria and consented to participate in the study were enrolled in the intervention group. To be eligible, patients had to be at least 18 years old, enrolled on ART for at least 6 months, resident in Niger State for the next 3 months and receive HIV care from the same facility during the period of the study. Exclusion criteria were previous assessment for ART eligibility, previous or current exposure to ART, and pregnancy. The study was conducted between December 2021 and March 2022. Ethical approval for the study was obtained from the Babcock University Health Research Ethical Committee (BUHREC) and the Niger State Ministry of Health Ethical Review Committee (NSMOH ERC). Signed consent forms were obtained from the respondents. Respondents on the intervention group received peer-education sessions of one-hour weekly for six weeks from the Intervention curriculum designed by the researcher.

The control group received the standard of care provided by the facilities but excluded peer education during the twelve weeks of intervention and post-intervention. The study outcomes were knowledge, perception, medication adherence practice, and ART retention practice scores from each construct of the validated questionnaire administered at baseline, immediately post intervention, and six-week follow-up period.

SAMPLE SIZE DETERMINATION

Previous studies documented that approximately 60% of participants would maintain >= 95% adherence without any intervention, while 85% of participants would maintain >=95% adherence with the intervention[7]. Hence, the mean difference between the treatment and control group (D2) was set at 0.3. Furthermore, the significance level (p-value) and Power of the study was set at 5 and 80%, respectively. Hence, the Standard normal deviation (z score) Zα and Zβ were 1.96 and 0.84, respectively, at a Confidence Interval of 95%. The sample size was computed using the sample size for intervention trials[25] and arrived at 47 participants for each study group. Ten percent was added to account for any attrition or loss to follow-up during the study. Fifty-two YLHIV were assigned to each group, and there was a 100% completion rate. Therefore, a total of 104 participants were enrolled in the study and participated throughout the study.

INSTRUMENTATION

Two instruments were deployed for this study, and the first was a 67-item interviewer- administered questionnaire (Cronbach alpha was 0.96). The second was a visual analog scale that fed into the last item on the questionnaire. The questionnaire contains four sections. Section A captured the socio-demographic characteristics of the participants, partner HIV status, and social climate. The age of the participants was assessed in an open-ended question; sex, ethnicity, and other demographic variables were coded. Section B captured information on knowledge relating to medication adherence and ART retention practices and was assessed on a 25-point scale with three response options (Yes/No/Don't know). Section C captured information on the Perception of medication adherence and ART retention. The perception of the YLHIV on medication adherence and ART retention

was assessed on an 82-point Likert scale which was categorized into four perception domains operationalized by variables of perceived seriousness of the consequences of poor adherence and retention (24-point scale); Perceived susceptibility to complications resulting from treatment failure (12-point scale); perception of benefit of taking recommended medication (30-point scale) and perception of self-efficacy to take recommended ART medications (16-point scale). The fourth section captured information on Medication adherence and ART retention practice.

Medication Adherence was measured using the combination of 4 response options Likert-type response categories, and three yes or no questions. At the same time, ART retention was also measured using the combination of 4-response options Likert-type response categories, and two yes or no questions. Aggregating the seven items and six items in the sub-scale created a 27-point scale and 16-point scale of measurement for Medication adherence practice and ART retention practices, respectively. The average time to complete the questionnaire was estimated to be 25 min. The instrument was validated through a rigorous review by the Project Supervisor, a Professor of Public Health, and other faculty members at the School of Public and Allied Health. The contents of the questionnaire were strengthened with items extracted from peer-reviewed literature. The internal consistency of the questionnaire was assured through retesting with equivalent groups (n=10) away from the intervention area. Content and item analysis was conducted with a Cronbach alpha score of 0.97.

Data management and analysis

Data Analysis was accomplished by using the open source R Studio. Data collected from participants using the instruments were reviewed for completeness, edited, and coded using a coding guide designed before data collection and entered into the computer by research assistants. Computations involving frequency distributions, summaries of descriptive statistics and independent t- tests, were used to process the data collected and to test the validity of the leading hypothesis concerning knowledge, perception, medication adherence practice, and ART retention practice among clients who participated in the study. All statistical tests are set at p=0.05 level of significance cut-off. The decision rule applied was that if computed $p \leq 0.05$, the null hypothesis will be rejected in favour of the alternative view; otherwise, do not reject. To standardize the magnitude of the impact accountable to the intervention conditions, since the p-value cannot estimate this change but only expresses that the change is present and is significant at a predetermined cut-off; hence the inclusion of Cohen"s d, also known as the effect size (ES) for the difference in means of two independent groups and the corresponding 95% confidence interval (95%CI). This became an effective tool to accurately estimate and compare the magnitude of the changes produced by the intervention across all variables of interest [26, 27].

Results

One hundred and four participants were engaged in the study with fifty-two participants in each group. The two groups had a proportion of females more than male where the control group had 86.5%, and the Intervention group had 82.7% female. However, the overall mean age of participants was 21.66±1.81 years. Participants in the control group had the highest mean age with 22.05±1.69 compared to the mean age of those in the intervention group with 21.27±1.84 years. Overall, slightly above half (58.7%) of the participants were of Hausa ethnicity, while each group has the same with those in the control group consisting of 61.5% and the Hausa in the intervention group were 55.8%. Overall, the highest level of education among all participants was “Secondary education” with 39.4% while those in the control group had half of the participants (50.0%) having Islamic education as their highest level of education and the other half had secondary education. However, some (34.6%) of those in the Intervention group had primary education as their highest level of education, followed by some (28.9%) who had Secondary school education. Islam is the dominant religion, (91.3%), however in the control group, none of the participants were Christians, while most (82.7%) of those in the Intervention group were Muslims as well (As shown in Table 1).

Table 1: Socio-demographic characteristics of the participants in the study for each group of the intervention at baseline

Variables	Control Group (n=52)		Peer Education (n=52)		Total
	Frequency N (%)		Frequency N (%)		Frequency N (%)
Sex:					
Males	7	(13.5)	9	(17.3)	16 (15.4)
Females	45	(86.5)	43	(82.7)	88 (84.6)
Age in years					
18-19	6	(11.5)	14	(26.9)	20 (19.2)
20-24	46	(88.5)	38	(73.1)	84 (80.8)
Age in years Mean ±SD	22.05 (±1.69)		21.27 (±1.84)		21.66 (±2.13)
Ethnicity:					
Hausa	32	(61.5)	29	(55.8)	61 (58.7)
Fulani	13	(25.0)	3	(5.8)	16 (15.4)
Yoruba	7	(13.5)	8	(15.4)	15 (14.4)
Igbo	0	(0.0)	0	(0.0)	0 (0.0)
Gwari	0	(0.0)	5	(9.6)	5 (4.8)
Gbayi	0	(0.0)	3	(5.8)	3 (2.9)
			4	(7.7)	4 (3.8)
Education:					
Islamic	26	(50.0)	9	(17.3)	35 (33.7)
Primary	0	(0.0)	18	(34.6)	18 (17.3)
Secondary	26	(50.0)	15	(28.9)	41 (39.4)
Tertiary	0	(0.0)	10	(19.2)	10 (9.6)
Religion:					
Islam	52	(100.0)	43	(82.7)	95 (91.3)
Christianity	0	(0.0)	9	(17.3)	9 (8.7)

Source: Authors 2022

Findings from the peer-led health education intervention group showed that between baseline and immediate post-intervention, there was a significant increase ($p<0.05$) in the mean score of knowledge (from 10.6±12.2; 42% to 23.5±3.7; 94%), perception (from 33.2±28.5; 40% to 79.8±3.8; 97%), medication adherence (from 14.2±8.4; 53% to 26.8±0.9; 99%) and ART retention practices (from 7.3±3.9; 46% to 15.8±0.9; 99%). (As shown in Table 2). However, for the control group, there was no significant ($p>0.05$) difference in the mean score of knowledge (from 10.3±11.1; 41% to 10.6±10.7; 42%), perception (from 34.8±25.2; 42% to 35.8±24.8; 44%), medication adherence (from 17.1±9.2; 63% to 17.2±9.2; 64%) and ART retention practices (from 9.0±5.6; 56% to 9.0±5.6; 56%). (As shown in Table 3).

Table 2: Impact Evaluation of variables at baseline and immediate post-intervention for peer-led health education

Variables	Max. Pts.	Baseline N=52	Immediate post-intervention N=52	6 weeks follow-up N=52	P-value
		$\bar{X}$ (±SD)	$\bar{X}$ (±SD)	$\bar{X}$ (±SD)	
Knowledge	25	10.58 (12.23)	23.46(3.64)	23.56 (3.75)	<0.0001
Perception*	82	33.19 (28.49)	79.81(3.82)	80.59 (3.16)	<0.0001
Severity	24	10.62 (8.07)	23.85(0.78)	23.85 (0.78)	<0.0001
Susceptibility	12	4.62 (5.89)	11.62(1.82)	11.77 (1.66)	<0.0001
Benefits	30	12.12 (14.56)	29.04(2.43)	29.33 (2.22)	<0.0001
Self-Efficacy	16	5.85 (2.23)	15.31(1.63)	15.65 (0.95)	<0.0001
Medication Adherence	27	14.23 (8.35)	26.77(0.94)	26.85 (0.67)	<0.0001
ART Retention	16	7.31 (3.86)	15.77(0.94)	15.85 (8.54)	<0.0001

*Perception is a composite aggregate of the components; severity, susceptibility, benefits and self-efficacy.
Source: Authors 2022

Furthermore, between baseline and 6 weeks of follow-up, there was a significant increase ($p<0.05$) in the mean score of knowledge (from 10.6±12.2; 42% to 23.6±3.8; 95%), perception (33.2±28.5; 40% to 80.6±3.2; 97%), medication adherence (14.2±8.4; 53% to 26.9±0.7; 99%) and ART retention practices (7.3±3.9; 46% to 15.9±8.5; 96%). (As shown in Table 2). However, for the control group, there was no significant ($p>0.05$) difference in the mean score of knowledge (from 10.3±11.1; 41% to 10.6±10.7; 42%), perception (from 34.8±25.2; 42% to 35.8±24.8; 44%), medication adherence (from 17.1±9.2; 63% to 17.2±9.1; 64%) and ART retention practices (from 9.0±5.6; 56% to 9.0±5.6; 56%). (As shown in Tables 2 & 3).

Table 3: Impact Evaluation of variables at baseline and immediate post-intervention for Control group

Variables	Max. Pts.	Baseline N=52	Immediate post-intervention N=52	P-value	6 weeks follow-up N=52	P-value
		$\bar{X}$ (±SD)	$\bar{X}$ (±SD)		$\bar{X}$ (±SD)	
Knowledge	25	10.29 (11.08)	10.58(10.74)	0.893	10.58(10.74)	0.893
Perception*	82	34.81 (25.15)	35.81(24.80)	0.839	34.88 (24.68)	0.989
Severity	24	10.69 (8.03)	10.69(7.59)	1.000	10.77 (7.58)	0.958
Susceptibility	12	4.85 (5.62)	4.85(5.62)	1.000	4.85(5.56)	1.000
Benefits	30	12.5 (13.41)	12.50(13.41)	1.000	12.50(13.41)	1.000
Self-Efficacy	16	6.77 (3.02)	6.77(3.02)	1.000	6.77(3.02)	1.000
Medication Adherence	27	17.13 (9.23)	17.23(9.16)	1.000	17.23(9.16)	1.000
ART Retention	16	9.00 (5.59)	9.00(5.59)	1.000	9.00(5.59)	1.000

*Perception is a composite aggregate of the components; severity, susceptibility, benefits and self-efficacy.
Source: Authors 2022

Discussion

In all the groups both the control and the intervention group had proportion of female more than male similar to a study[28] where females were over three times more than males which reflects the gender distribution of HIV/AIDS in Nigeria as revealed by other studies[29,30]. Additionally, it has been shown that women are particularly vulnerable to HIV infection because of inter-relationships among complex biological, cultural and socioeconomic factors, the female natural biological design predisposes women to HIV more than men during heterosexual contact because they have greater area of mucous membrane exposed during sex and are exposed to higher viral content of male sex fluids[31]. However, the overall mean age of participants was 21.47 years close to the overall mean age of what was reported in a study by[32] which the mean age was 18.5 years. Participants in the control group had the highest mean age with 22.05±1.69 but the study had its control mean age to be 18.2 years, however, there was little age difference between the control group and interventional group which was exhibited by[32] as well.

Overall, there were more Hausa than any other ethnic group which is expected as the study location has Hausa as their mother's tongue, it is therefore expected to have majority to Hausa. Also, they tend to value Islamic studies and at time they consider Islamic education as their formal learning environment which is why the majority have Islamic education as their highest level of education although some went to primary school as well. Islam seems to be the dominant religion, where most of the overall participant were Muslims contrary to a study by[33], where Christianity happens to be the dominant religion.

Also, the intervention group had improved knowledge and medication adherence immediately after the intervention compared to the control group. This can be attributable to the peer-led health education intervention. The mean knowledge score is close to the knowledge score reported by another researcher[34]. However, some of the respondents had medication adherence similar to a study conducted in Osun state[35] and the mean ART retention for peer-led health education group was higher than that reported by another study[36]. At baseline, the control group showed no statistical difference which is expected as no intervention was provided. However, the mean medication adherence at immediate post intervention showed significant improvement when compared to the

control group. In contrast, another study by Kiweewa which reported no change in adherence between the control group and the intervention group This could be as a result of the hospital settings where the study was carried out while the ART retention mean was way higher than what was reported according to a study[36]; however, it was on a 11-point scale rather than 17-point scale. There was a statistically significant difference in the perception of medication adherence at baseline and immediately after the 6 weeks of peer-led health education among youths living with HIV, in contrast to the Osun State study[35] where no such observation was observed. Nonetheless, our result could have been as a result of participant variation, in addition, there was no intervention whatsoever for this population group. The result replicated evidence in all the outcome variables between the baseline and the 6 weeks follow up due to sustained engagement in a peer behavior, or consumption of an intervention information over time. Evidently, the result showed significant effect at short term after intervention, but after, six weeks a follow up will be required for reinforcement over a longer period.

There were some limitations to the study. Due to the short intervention period of less than a year, the result will give a weak prediction of variables such as medication adherence and ART retention, as any event could change the course of adherence or retention. In addition, the primary measure by self-report of medication adherence and ART retention is associated with recall biases resulting in overestimation. The self-reports may not have reflected proper behavior-change over a more extended time frame because patients may become more adherent in the few days preceding their appointment.

Conclusion

This study provides evidence on the extent to which peer-led health education can influence medication adherence and ART retention practices among young people between 18 to 24 years living with HIV. Also, the evidence of the effect over a 6-week follow-up period after intervention showed sustained significance over the period. The study thus contributes to the body of evidence on the effectiveness of peer-led health education for improved medical adherence and ART retention. Additionally, it supports peer-led health education as a critical intervention method for HIV medication adherence and ART retention among young people. Findings from this study can be used to design projects, interventions or plan for youth's health programs for enhanced outcomes.

We provide the following the recommendations:

1. Scale-up of peer education intervention nationally to increase medication adherence and retention among YLHIV, and accelerate progress towards the UNAIDS 95:95:95 goals
2. Hospitals and drug pickup centers should adopt peer-led education which can improve the care and health of YLHIV.
3. Funding should be provided for developing, producing and distributing peer-led curriculum to youths, health workers, ART coordinators to guide scale-up and replication of this project.
4. Due to the potential impact of the peer-led education program there is a need to build the capacity of youths and encourage their participation in peer-led training sessions.

Declarations

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Ethical approval for the study was obtained from the Babcock University Health Research Ethics Committee (BUHREC) and the Niger State Ministry of Health Ethical Review Committee (NSMOH ERC). Participation in this study was voluntary, and at the point of data collection, informed consent was obtained from all participants. Participants' confidentiality and anonymity were ensured through data collection and analysis. Written informed consent was obtained from all participants.

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Conflicts of Interest Statement

The authors declare that no conflict of interest exist, be it financial, materials and patent ownership with any commercial entities within the last 24 hours

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