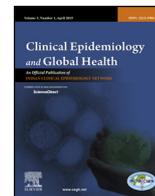




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Original research article

Effectiveness of peer education approach on improving HIV/AIDS related healthy behaviors among immigrant street children: A randomized controlled trial

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ABSTRACT

Objective: Foreign-origin street children are vulnerable to HIV/AIDS mainly due to poverty, violence, early sexual activity and poor access to health care services. This study aimed to highlight the effectiveness of peer education intervention to reduce HIV-risky behavior among street children with Afghan nationality. **Methods:** Sixty-one street children were stratified by sex and then randomly allocated to either an intervention or control group by assigning each participant computerized random numbers. The intervention provided peer education services, focused on mode of disease transmission, prevention approaches and awareness of HIV/AIDS services by peers.

Results: At least 80% of participants in the intervention and control groups completed the study period, respectively. At the end of the study, statistically significant increase of knowledge and attitude improvement as well as a decreased tendency to do risky sexual intercourse among the intervention subjects was shown. Moreover, there was a time intervention interaction for knowledge and attitude improvements followed by intervention (interaction p value = 0.001), while it was not significant for risky sexual behavior (interaction p value = 0.44).

Conclusion: Peer education was an effective and easy-to-apply educational method that increased knowledge and improved attitudes about HIV/AIDS among foreign-origin street children, while it was less efficient with regard to long-term reduction in risky sexual behavior.

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1. Introduction

Poor knowledge, wrong beliefs, and risky behavior among street children potentially expose them to HIV/AIDS infection.¹⁻³ In comparison to other general teenage populations, street children are more vulnerable to HIV/AIDS mainly due to poverty, violence, immigration from low-income countries, early sexual activity and

poor access to health care services.⁴⁻¹⁰ According to World Health Organization report (2000), there are about 100 million street children in the world of whom the majority spend most of their time on streets.¹¹ According to official reports, there are an estimated number of 200,000 street children in Iran^{6,12} of whom more than fifty percent are Afghan illegal refugees.^{13,14} Global prevalence rate of HIV/AIDS among street children is variable and it is ranged from 2% in Canada to 37.4% in Russia.¹⁵ The exact prevalence rate of HIV/AIDS among street children in Iran is unknown. Results of a survey on HIV seroprevalence in Tehran showed at least 5% of street children were infected with HIV.¹⁴ However, it would be expected that the number of children who are infected with HIV are higher than national figures.¹⁶

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HIV prevention studies that have focused on street children are limited and most studies involving street youth have estimated the incidence and prevalence of risky behavior rather than evaluating preventive interventions and their challenges.^{17,18} Furthermore, the cost-effectiveness of HIV/AIDS preventative approaches is a big challenge toward the generalizability of successful interventions, particularly in Low to Middle Income Countries (LMICs).¹⁹ In this way, a few studies implied that higher financial allocations for school-based education and Voluntary Counseling and Testing (VCT) yield better outcomes.²⁰

Among the several community-based educational models, peer education is known as an efficient approach to raise awareness and also better access to HIV/AIDS services for hard-to-reach populations.^{21,22} Therefore, we set out this randomized controlled trial to assess peer education approach effects on HIV/AIDS knowledge and attitude improvement, reduction in risky behavior as well as

this approach's feasibility among non-illegal Afghan immigrant street children.

2. METHODS

2.1. Study population and health service utilization among Afghan immigrants

Iran as a middle-income country is located in Eastern Mediterranean region with a population of 80 million.²³ This country is the main destination for Afghan refugees whose main purpose for immigration is to seek better opportunities for life, which seems to be a consequence of the long-lasting war in Afghanistan.²⁴ Based on official reports, the majority of immigrant populations in Iran has been comprised of people with Afghan nationality (at least 1.2 million people), of whom 39% are less than 15 years of age.²⁵ Notably, a large number of immigrants with

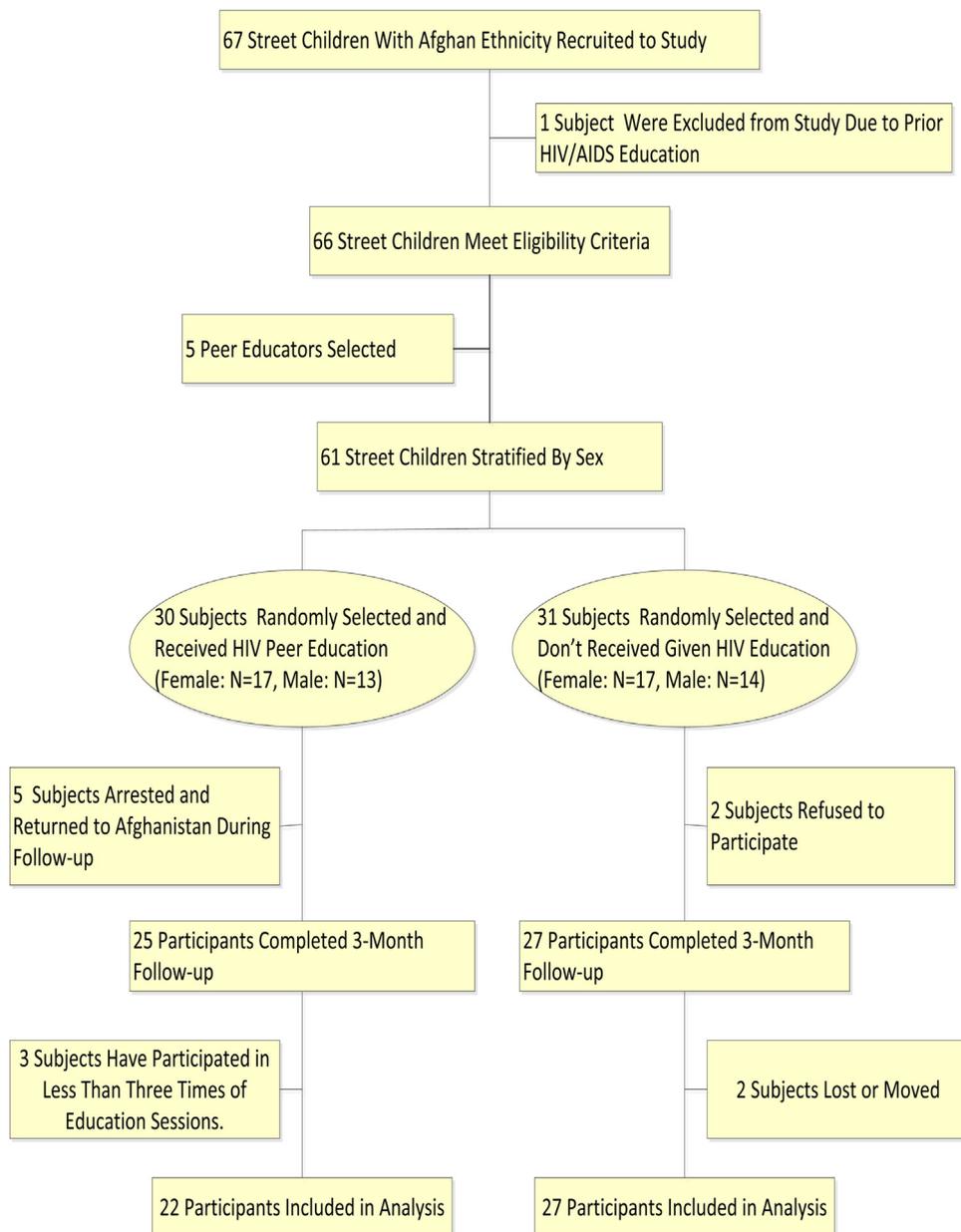


Fig. 1. HIV/AIDS and peer education flow diagram.

Afghan origin are unauthorized, which deprives them of health services and other social benefits.²⁶ The present study was undertaken in Karaj (the largest district of Alborz province) where more than 95% of street children are Afghan.^{13,27}

2.2. Study design and location of data collection

In this randomized controlled trial, we recruited a total number of 67 street children with Afghan nationality who received some educational supports by Kiana Street Children Center. The Kiana center, as a Non-Governmental Organization (NGO), was founded to offer educational opportunities, as well as literacy, for street children who are deprived of essential schooling.

2.3. Eligibility criteria for participants

Street children are defined as those of 14–18 years old who spend the majority of their time on the streets to work or prowl and return to their families or residences at night. Through baseline interviews, study subjects with a prior training for HIV/AIDS as well as those without minimum skills of reading and writing in Persian, were excluded.

2.4. Blinding

The study participants, research team and institutions' staff involved in this project were blinded to intervention assignment. To protect confidentiality, specific numeric codes were assigned to participants before beginning the study.

2.5. Data collection instrument and baseline measurement

At baseline, all study subjects were informed about the study aim, intervention protocols and the right to refuse to participate in the study. Then, written and verbal informed consent was obtained from participants and the relevant authorities at Kiana. Using questionnaires (Appendix 1) that were adapted from questionnaires for behavioral surveillance surveys by Family Health International (FHI)²⁸ and validated in several national studies in Iran,^{14,29,30} knowledge, attitude and risky behaviors in the context of HIV/AIDS were assessed among study participants. The integrated questionnaires included five main components with questions to cover aspects related to child's socio-demographic characteristics, high-risk behavior (such as alcohol consumption, smoking, substance abuse, drug injection and sexual activity) and also knowledge, attitude and behavior toward HIV/AIDS.

2.6. Peer educator selection process and content of training program

There were clear qualitative criteria to select peer educators and it was processed in consultation with the street children's supervisor at the Kiana Institute. These criteria include easy accessibility, known for reliability, and ability to make efficient connections with the other street children. Accordingly, we trained five peers for HIV/AIDS through four separate sessions with a self-administrated education protocol which was focused on the nature of the disease, mode of transmission, prevention methods, free of charge HIV/AIDS services, and how to communicate and teach their friends. Using a checklist by the research team, last session was devoted entirely for qualitative assessment of educational competency of selected peers through their lectures and brochure presentations. The intervention subjects were divided into five subgroups (each subgroup consisted of six subjects plus one peer) and were trained by peers for up to four weeks (one-hour session

per week). The control group participants also were trained for HIV/AIDS by the research team at the end of study period after they were evaluated for Pre-specified outcomes.

2.7. Sample size

Considering type I error (α)=0.05, power (1- β)=0.8, and means and standard deviation of knowledge the experimental and control group equal to 83, 76 and 10 respectively, the number of 68 samples (34 subjects per each group) was determined as an adequate sample size by PS software.³¹

2.8. Method used to generate the random allocation sequence

Through a blocked randomization approach, 61 eligible participants were stratified by sex, and then, by assigning computerized random numbers, they were separated into two groups, intervention and control (Fig. 1).

2.9. Follow up

To complete the training program, the intervention and control groups were followed up for three months during the initial phase of the study. Finally, about 75% and 90% of the participants in intervention and control groups took part in the entire study period, respectively. Training sessions were held on holidays for the intervention group whenever staff was not present at the institute.

2.10. Pre-specified primary and secondary outcomes

Using the same questionnaires at baseline, effects of intervention concerning knowledge enhancement and attitude improvement toward HIV/AIDS, as well as reduction in engaging in risky behavior were evaluated for all participants at the end of completion of the study period.

2.11. Statistical analysis protocol

Patients are normally analyzed within the group to which they were allocated, irrespective of whether they experienced the intended intervention (intention to treat analysis). In an attempt to highlight intervention effects, several comparative analyzes were performed by SPSS, version 18. The final scores were the average scores within questionnaires for knowledge, attitude, and risky sexual behavior. The higher scores for knowledge and attitude represent more awareness and better attitude toward HIV/AIDS, and conversely, the lower scores for tendency to risky sexual behavior indicates safe sexual activity. Accordingly, the distribution of knowledge, attitude and risky sexual behavior scores were checked for normality using Kolmogorov–Smirnov test for each group, separately. Chi-squared and Fisher's exact tests were used to compare expected frequencies corresponding to the observed frequencies between two randomized groups for socio-demographic characteristics, tendency toward substance abuse, as well as engaging in the use of VCT center services. Main effect of training on the knowledge, attitude and tendency to do risky sexual behavior as well as time interaction through intervention was computed by a Generalized Linear Model (GLM) univariate procedure.

2.12. Ethics

We obtained ethical verification from the ethical board of the Tehran University of Medical Sciences. In addition, we obtained

permission from the Kiana Institute authorities after explaining the study aims and procedures.

3. Results

Table 1 presents the distribution of socio-demographic characteristics and predisposing factors of HIV/AIDS transmission by category of study groups at baseline. Participants' mean age between two intervention and control groups was distributed with similar standard deviations. Around two-thirds of participants stated that they had never heard about HIV/AIDS and one-fourths of participants declared that they had experienced some degree of emotional, physical, sexual and verbal violence. In addition, at least one out of ten reported having engaged in sexual intercourse. In general, no statistical difference was observed for baseline characteristics, as well as healthy behavior, of participants in study groups.

As shown in Table 2, no difference for frequency of substance abuse (either by inhaling or injecting) was observed at baseline or at the end of the study. Neither participants with an intervention nor the control group were aware of VCTs at baseline, while higher numbers of participants in the intervention group reported the importance of VCTs centers and were willing to refer the center at the end of study.

As presented in Table 3, at baseline, the mean scores of knowledge and attitude among participants in the intervention group were slightly higher than the control group. While tendency for risky sexual behavior was higher among the control group, these findings were not statistically significant. At the end of study, compared to participants in control group, the mean scores of knowledge and attitude about HIV/AIDS in the intervention group were increased by two-fold in comparison to the baseline scores (p value = 0.001 and p value = 0.013, respectively). Further, the

intervention group showed decreased tendency to engage in risky sexual intercourse (p value = 0.025).

Table 4 shows GLM univariate analysis outputs with regard to main effects of time, intervention and multiplicative interaction of time-group for the knowledge, attitude, and tendency to risky sexual behavior. Accordingly, a significant change in increasing knowledge and improving attitudes was observed through intervention. Neither intervention nor time introduced statistically significant changes in participants' tendency to engage in safe sexual behavior (p value = 0.066 and p value = 0.173, respectively).

Considering knowledge, attitude and risky sexual intercourse, there was a time-intervention interaction so that the slope's difference for either knowledge or attitude was positively shifted. However, there was no significant intervention for the risky sexual behavior in multiplicative scale followed by intervention (Fig. 2).

4. Discussion

Findings of the study indicated that intervention by peers among street children is a successful approach to increase knowledge and improve their attitude toward HIV/AIDS. Even though general improvements were made in knowledge and attitude, it did not result in reduce risky sexual behavior. Moreover, having received enough knowledge about VCTs, the provided services were welcomed by participants who were deprived of such services normally. Although the participants in the study groups were no co-intervened with other educational programs about HIV/AIDS prevention over study period provided by media or other sources, an explanation for general improvements of study outcomes in the control relative to baseline suggests this group likely had received some of the initial training from subjects' close relatives or friends in the intervention group.

There is a growing range of evidence that the peer education method could be considered as one of the main prevention approaches in controlling HIV/AIDS epidemics, particularly in countries with poor resources.^{21,22–30,32–33} Furthermore, the peer education approach was introduced as an effective strategy to deal with health promotion among immigrant populations.³⁴ Accordingly, the experimental studies that use peer-based training programs in sex workers, Injecting Drug Users (IDUs), homeless youths and prisoners indicated some degree of success.^{30,35–37}

Similarly, other experimental studies that evaluated effects of peer education approaches on risky behavior reduction among sex workers, street children and runaway youths, revealed some degrees of success with respect to have safe sex by using condom.^{38–40} Moreover, results of a meta-analysis study, which centered on the peer education effectiveness on HIV prevention in developing countries, was associated with increase in knowledge and condom use, as well as reduction in equipment-sharing among IDUs, while it was less efficient with regard to Sexually Transmitted Infections (STIs).²²

However, there is limited evidence for peer education effectiveness assessment concentrated on sexual health promotion as well as unwanted adolescent pregnancy prevention for young people in European countries.⁴¹

Generally, the evaluation of risky behavior changes ensuing knowledge enhancement and attitude improvement in a linear correlation manner seems to be superficial. Although knowledge is a prerequisite to behavior change, it is not enough to explain the extent to which knowledge enhancement has been successfully resulted in avoiding or encouraging given behaviors.^{42–45} While several interventional studies revealed some degree of success in reducing HIV/AIDS related risky behaviors, effectiveness of these approaches likely depends on other related covariates in the context of social and cultural backgrounds.⁴⁶ Accordingly, there is

Table 1

Baseline street children's characteristics by study group.

[†] P value was calculated by Mann–Whitney test.

Street children's characteristics	Intervention (n = 30) (%)	Control (n = 31) (%)	P value
Age (Mean ± SD)	14.9 ± 1.18	15.1 ± 1.36	0.5 [†]
Sex			
Boy	13 (43.3)	14 (45.2)	0.8
Girl	17 (56.7)	17 (54.8)	
A history of arrest by police			
Yes	4 (14.3)	4 (12.9)	0.58 [‡]
No	24 (85.7)	27 (87.1)	
A history of being a victim of violence			
Yes	7 (24.1)	9 (29)	0.66
No	22 (75.9)	22 (71)	
A History of tobacco use			
Yes	4 (13.8)	7 (22.6)	0.56 [‡]
No	25 (86.2)	24 (77.4)	
Alcohol consumption			
Yes	1(3.7)	1(3.3)	0.72 [‡]
No	26(96.3)	29(96.7)	
Hearing about HIV/AIDS			
Yes	9 (32.1)	7 (22.6)	0.4
No	19 (67.9)	24 (77.4)	
Substance abuse			
Yes	0	1(3.2)	0.51 [‡]
No	29(100)	30(96.8)	
Having sexual activity			
Yes	3 (11.5)	6 (23.1)	0.23 [‡]
No	23 (88.5)	20 (76.9)	

[†]P values were calculated by Fisher's exact test.

[‡]P value was calculated by Mann–Whitney test.

Table 2
knowledge, attitude and intention to unsafe sexual behavior by study group.

Time outcomes measured		Knowledge (Mean ± Sd)	P value	Attitude (Mean ± Sd)	P value	Intention to risky sexual behavior (Mean ± Sd)	P value			
Baseline	Intervention (n = 30)	20 ± 17	0.086	20 ± 29	0.18	21 ± 38	0.35*			
	Control (n = 31)	13 ± 17		10 ± 26		34 ± 44				
End point of study	Intervention (n = 22)	86 ± 18	0.001*	43 ± 31	0.006	6 ± 23	0.025*			
	Control (n = 27)	27 ± 24		19 ± 28		29 ± 41				
Through study period (Pre-Post test)	Intervention Pre (n = 30)	20 ± 17	0.001†	20 ± 29	0.013	21 ± 38	0.17†			
	Intervention Post (n = 22)	86 ± 18		43 ± 31		6 ± 23				
	Control Pre (n = 31)	13 ± 17		0.002		10 ± 26		0.2	34 ± 44	0.85†
	Control Post (n = 27)	27 ± 24				19 ± 28			29 ± 41	

* P values were calculated by Mann–Whitney test.

† P values were calculated by Wilcoxon signed rank test.

Table 3
knowledge, attitude and intention to unsafe sexual behavior by study group.

Time outcomes measured		Knowledge (Mean ± Sd)	P value	Attitude (Mean ± Sd)	P value	Tendency to risky sexual behavior (Mean ± Sd)	P value			
Baseline	Intervention (n = 30)	20 ± 17	0.086	20 ± 29	0.18	21 ± 38	0.35			
	Control (n = 31)	13 ± 17		10 ± 26		34 ± 44				
End point of study	Intervention (n = 22)	86 ± 18	0.001	43 ± 31	0.006	6 ± 23	0.025			
	Control (n = 27)	27 ± 24		19 ± 28		29 ± 41				
Through study period (Pre-Post)	Intervention Pre (n = 30)	20 ± 17	0.001	20 ± 29	0.013	21 ± 38	0.17			
	Intervention Post (n = 22)	86 ± 18		43 ± 31		6 ± 23				
	Control Pre (n = 31)	13 ± 17		0.002		10 ± 26		0.2	34 ± 44	0.85
	Control Post (n = 27)	27 ± 24				19 ± 28			29 ± 41	

Table 4
GLM univariate analysis of main effects of time, group and interaction of time-group for the knowledge, attitude and tendency to unsafe sexual behavior.

Variables	Knowledge (F statistic)	P value	Attitude (F statistic)	P value	Tendency to risky sexual behavior (F statistic)	P value
GLM output						
Time	28.8	0.001	13.1	0.001	1.891	0.173
Group	37.3	0.0001	8.5	0.004	3.475	0.066
Time * Group	16.5	0.0001	1.2	0.001	0.584	0.447

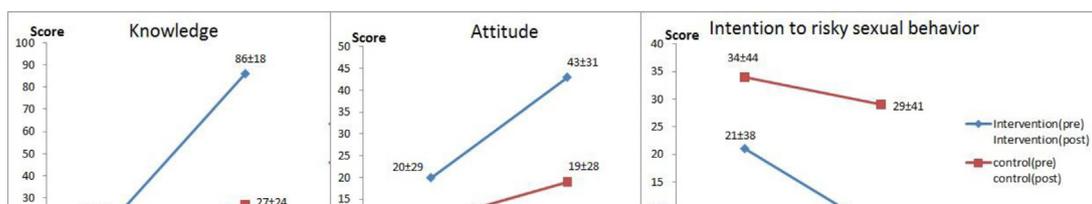


Fig. 2. knowledge, attitude and intention to unsafe sexual behavior changes through study period in intervention and control groups.

sufficient evidence for peer education effectiveness with regard to changing risky behavior among women of minority racial groups in the United States, ex. “Sisters Informing Sisters about Topics on AIDS (SISTA)” program has been extended nationwide to other age groups, such as adolescents and is facilitated by peers in a community setting.⁴⁷

To our knowledge this study is the first randomized controlled trial in a developing country that explains efficacy of HIV/AIDS training intervention by applying a peer education method in immigrant street children. Nevertheless, the present study faced some limitations. Even though the peer education approach faced minimal challenges to deal with the hard-to-reach population at the NGO institution, a question was remained on representativeness of study samples of which how does it would be deliver in different places where the majority of street children are accessible by peers. In addition, the efficacy of intervention in terms of sustainable outcomes was not evaluated for more than three months after the first training session, hence it can be a potential concern to maintain the positive long-term outcomes.⁴⁸

5. Conclusions

Peer education was an effective and easy-to-apply educational method that helped foreign-origin street children to benefit from opportunities to improve their knowledge and attitude toward HIV/AIDS infection. After having received enough knowledge about VCTs through peer-based education, the provided services were welcomed by the participants who were deprived of such services previously. However, this approach would be less effective with regard to reduction in risky sexual behavior in the long term.

Conflict of interest

None.

Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at doi: [10.1016/j.cegh.2017.09.004](https://doi.org/10.1016/j.cegh.2017.09.004).

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