

A in "ABC" Approach: Systematic Review of Sexual Abstinence education in adolescents

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Abstract

Background: Abstinence is one of the most important aspects of "ABC" approach to prevent the spread of HIV through changing sexual behavior. The purpose of this study was to review the studies conducted in the field of sexual abstinence education.

Methods: We investigated the published experimental or quasi-experimental studies from 1998 to 2018 on the impact of sexual abstinence education in the Web of Sciences, PubMed, Scopus, Springer, PsycNET and Science direct databases. Inclusion criteria were: Randomized Controlled Trials on adolescents receiving abstinence education programs in both English and Persian languages. The outcome measure was sexual behaviors. Of the 1195 articles, 10 papers were evaluated and analyzed by two researchers separately. The quality of the studies was evaluated by Critical Appraisal Skills Program and judged by Cochrane Risk of Bias Tool and divided into three levels of low, high and unclear risk of bias.

Results: Seven of the ten included studies in this review reported positive results of abstinence education on sexual behaviors in adolescents.

Conclusion: Some evidence supports the efficacy of any particular abstinence education on different aspects of sexual behaviors in adolescents. But, unfortunately, there is no strong evidence in this area. Evaluations of sexual abstinence education using behavioral indicators and long-term follow-up are needed to truly assess its impacts.

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Introduction

More than two million adolescents are living with Human Immunodeficiency Virus (HIV) and HIV deaths among adolescents are rising. Also, every year, an estimated 21 million girls aged 15 to 19 years and two million girls aged under 15 years become pregnant in the developing countries (1).

Like other countries, there is an increase in the prevalence of high-risk sexual behaviors in Iran (2-4). According to the

National AIDS Prevention Center, pattern of HIV infection has been changed from injectable substance abuse to unprotected sexual behaviors. Of the total of new infected HIV cases, about 32% are attributed to addicts and 47.1% to the patients with sexually transmitted infections (5). Other studies also reported an increase in the prevalence of premarital sexual relationships in Iran (6-10).

Such sexual relations have led to a variety of social and cultural implications for society. Youth who begin early pre-

marital sexual activity are more likely to be engaged in unsafe sex (11) which exposes them to the risk of unintended pregnancy, early marriage, abortion and sexually transmitted infections (STIs), HIV and Acquired Immune Deficiency Syndrome (AIDS) (12, 13).

The key to prevent the spread of HIV is through changing sexual behavior. An

interest has been growing toward “ABC” approach in which A stands for Abstinence or delay of sexual activity, B for Be faithful, and C for Condom use (8).

Abstinence is one of the most important aspects of sexual upbringing which emphasizes on the correct control and satisfaction of sexual instinct (14). Sexual abstinence is a great choice for so many reasons including preventing unwanted pregnancy and forced parenting, STIs preventing, avoiding depression and unstable mental health, strengthening teenagers’ relationship with their parents and empowering teenagers emotionally and spiritually. It is known that adolescents who practice sexual abstinence are less likely to have depression, attempt suicide, live in poverty as adults and are likely to do better in school (15).

Abstinence-only sex education is a form of sex education that emphasizes on avoiding sex outside of marriage. This has been introduced as an educational or motivational program which causes the social, psychological, and health gains to be realized through abstaining from sexual activity and is the expected standard for all school-aged children, the only certain way to avoid out-of-wedlock pregnancy, sexually transmitted diseases, and other associated health problems. Also, abstinence-only sex education is the expected standard of sexual activity and teaches that bearing children out-of-wedlock is likely to have harmful consequences for the child, parents, and society and teaches the importance of attaining self-sufficiency before engaging in sexual activity (16). These

programs take into account the cultural characteristics of the target population (17).

Although sexual abstinence education is theoretically fully effective, in actual practice often fails to protect against pregnancy and STIs (18). Over the past decades, researchers have conducted many studies on the impact of abstinence interventions on adolescents’ sexual knowledge, intentions and behaviors. However, evidence for the efficacy of abstinence programs is controversy.

For example, some studies have reported significant effects of abstinence interventions (19-23) and other studies have reported that abstinence interventions could not reduce sexual behaviors in adolescents (24, 25). In this regard Kantor *et al.* (2008) in an overview about abstinence-only policies and programs have reported that concerns have been raised about the scientific accuracy of abstinence-only curricula and the federal government’s failure to develop standards for these programs (24)

In addition to the existence of conflicting results in studies, the results of systematic reviews in this context agree to this fact that most of the abstinence education studies are poorly designed and do not meet reasonable standards for scientific evidence (26).

Underhill *et al.* (2007) reviewed 13 trials totaling more than 15900 participants and indicated that sexual abstinence- only programs for prevention of HIV infection had not decreased or exacerbated sexual risk among youths in high income countries (25).

Thomas in his review in 2000 noted that abstinence is the only absolute protection against teen pregnancy and STDs and emphasized that it is necessary to evaluate the efficacy of abstinence-only programs using behavioral indicators and long-term follow-up to truly assess their impact (27).

In this regard, Phillips & Quigley (2007) and Kirby (2008) have reported positive findings generally, but they have mentioned low level of quality of evidence and need to more well-designed research on the efficacy of abstinence education (26, 28, 29).

The existence of poor-quality contradictory results confirms the need to have more review studies about the efficacy of abstinence education. Given the consistency of sexual abstinence programs with the religious and cultural beliefs in Iran, the results of this study appear to be helpful in designing sexual education programs for Iranian adolescents in future. Therefore, the purpose of this study was to review the studies conducted in the field of sexual abstinence education in adolescents.

Methods

This study was conducted as a systematic review in 2018. The structured question of the research is defined based on the PICOTS formula:

P=Population: Adolescent

I=Intervention: Abstinence education

C=Comparison: No or other interventions

O=Outcomes: Sexual behaviors

T=Time: 1998-2018

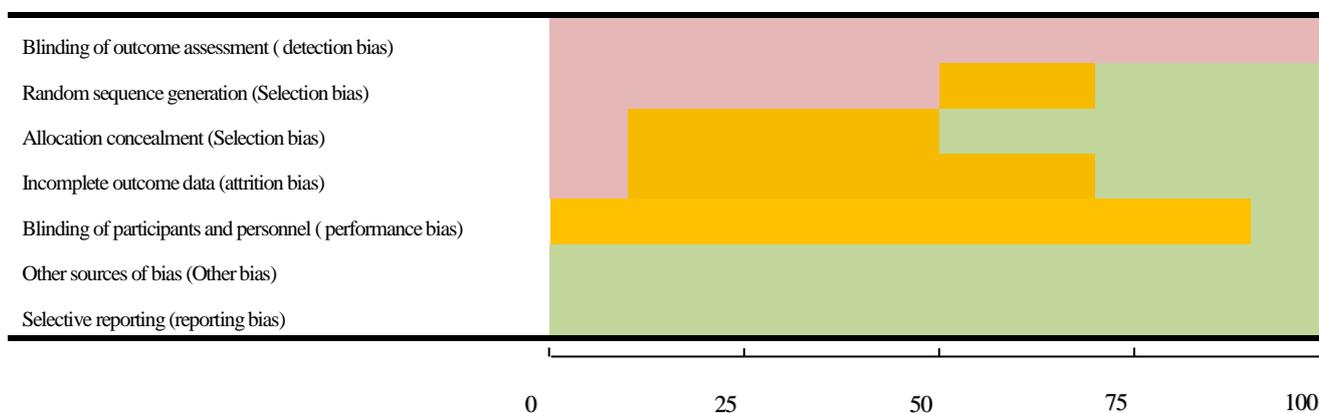
S=Study design: Experimental or quasi-experimental or RCT

In order to explain the strategy of systematic search of scientific resources, keywords were defined by the MESH as (Adolescents or Adolescence or Teen or Teenager or Youth) AND (Abstinence) AND (Education or Program or Intervention) AND (Sex or Sexual behaviors) in the title, abstract or keywords. Databases used in this study were Web of Sciences, PubMed, Scopus, Springer, PsycNET and Science direct. Persian databases were SID, Irandoc and Iran Medex.

All databases were searched for published RCTs in both Persian and English languages.

In addition, to identify further articles missed by the electronic search, reference section of the relevant trials, systematic reviews and meta-analyses were manually checked. Based on entry criteria, screening was done from 1998 to Jan 2018 in three stages: reviewing the titles, abstracts and full texts. In search of Persian sources, none of the articles on sexual abstinence was done by interventional methods. The study selection process has been shown by PRISMA flowchart in figure 1.

Figure 1. PRISMA Flowchart of the study selection process



Inclusion criteria were: topic related articles, fitness between methods and purposes of studies and the study design

(experimental or quasi-experimental or RCT). Interventions consisted of abstinence education programs for adolescents as

study participants. RCTs were included in both English and Persian languages.

For each study, the following data according to a pre-defined checklist were extracted: the first author, year and

location of the study, design of the study, participants, intervention, comparison, tools, outcomes, and quality of trials.

The summarized characteristics of the included studies (30-39) have been shown in table 1.

Table 1. Characteristics of 10 clinical trials included in the study (30-39)

Author Year Country	Design	Participants	Intervention	Comparison	tool	Results	Quality Assessment*
Jemmott JB 1998 USA(33)	RCT Pre-Post 0,3,6,12-month follow up	N=659 Adolescents mean age=11.8 years	Abstinence Intervention (N=215) safer sex intervention (N=218)	Control group (N=214)	Self-reported Sexual Behaviors	Significant differences in Abstinence-related variables and NS in Condom use related variables	Q1 to Q11 +/+/-/?/+/ +/?/+/?/+
Arnold EM 1999 Florida (USA)(30)	Quasi- experimental study Pre-Post	N=1450 Adolescents In middle school	Abstinence-based Sex Education Program (N=974)	Comparison group (N=476)	knowledge and beliefs about teenage pregnancy	Abstinence education is effective in affecting students' knowledge and beliefs about teenage pregnancy	Q1 to Q11 +/+/-/?/+/ ?/+/?/+
Lieberman LD 2000 USA(35)	Pre-Post 24-month follow up	N=312 Adolescents range of mean age=12.8-13.1 years	3-4 month abstinence-based, small-group pregnancy prevention program (N=125)	Control group (N=187)	Depression Self-esteem Locus of control Self-efficacy Teenage sex attitudes Teenage pregnancy attitudes Parental relationship Parental respect Parental sex attitudes Parental talk	Significant differences in locus of control, self-efficacy and parental talk and NS in other variables	Q1 to Q11 +/?/+/?/+/ +/?/+/?/+
Sather L 2002 USA(36)	Quasi- experimental study Pre-Post	N=132 Adolescents age range of 12-15 years	Abstinence-only Education (N=87)	Control group (N=45)	NYPS (Nebraska Youth Profile Survey)	Did not significantly change adolescents' values, attitudes and intentions to engage in premarital sexual activity Significant differences in Knowledge,	Q1 to Q11 +/?/+/?/+/ +/?/+/?/+
Borawski EA 2005 USA(31)	Nonrandomized control trial With a 5-month follow up	N=2069 Adolescents mean age of 12.8 years	abstinence-until-marriage curriculum (N=1096)	Control group (N=973)	Knowledge Abstinence values Self-efficacy Behavioral intentions Behavioral outcomes	Abstinence values and Behavioral intentions and NS in Condom use efficacy and sexual impulse control	Q1 to Q11 +/-/+/?/+/ +/?/+/?/+
Weed S 2005 South Carolina(38)	Quasi- experimental study Pre-Post With 12-month follow up	N=1535 Adolescents	the Heritage Keepers Abstinence Education Program (N=1281)	Comparison group (No abstinence Education Program) (N=254)	Abstinence values Abstinence efficacy Behavioral intention Future impact Justification for sex	Significant increase in Abstinence values, Behavioral intention, Future impact and NS in other variables	Q1 to Q11 +/-/+/?/+/ +/?/+/?/+

Denny G 2006 USA(32)	Quasi- experimental study Pre-Post With 18-month follow up	N=1411 Adolescents	Sex Can Wait curriculum in 3 levels: Upper elementary Middle school High school (N=830)	Comparison group (regular curriculum) (N=581)	Knowledge Attitudes Hopelessness Self-efficacy Decision making Abstinent intent	Level 1: IG had a higher level of knowledge, hopelessness and self- efficacy Level 2: there were just significant differences in sexual intercourse at 18-m follow up Level 3: IG had a higher level of Attitudes Abstinent intent and lower sexual behavior	Q1 to Q11 +/?/+/?/+/ +/?/+/?/+
Trenholm Ch 2008 (USA)(37)	Experimental design Pre-Post With 42 to 78- month follow up	N=2057 Adolescents range of mean age=15.4-18.5 years	Abstinence Education Program (N= 1209 in four programs) 1) My choice, My Future 2)Recapturing the Vision 3)FUPTP 4)Teens in Control	Control group (N=848)	Sexual activity Risks of pregnancy and STDs	No differences in sexual intercourse, unprotected sex and teen sexual activity and increased risk of pregnancy and STDs	Q1 to Q11 +/?/+/?/+/ +/?/+/?/+
Jemmott JB 2010 Canada(34)	RCT Pre-Post 0,3,6,12,18,24- month follow up	N=662 Adolescents range of 10-15 years	Abstinence-only intervention (N=134) safer sex-only intervention (N=129) comprehensive long intervention (N=131) comprehensive short intervention (N=134)	Health control intervention (N=134)	Sexual behavior outcomes	abstinence-only intervention reduced sexual initiation and coitus in the past 3 months and did not affect condom use, unprotected sexual intercourse and multiple sexual partners	Q1 to Q11 +/?/+/?/+/ ?/+/ +/?/+/?/+
Greene VL 2011 (USA)(39)	Randomized field trial Pre-Post	N=351 Adolescents age range of 9-15 years	Abstinence-only Intervention (N=242)	Control Group (N=109)	AFL Prevention Programs Core Youth Baseline questionnaire	no differences in initiating coitus and attitudinal, intentional, behavioral outcome variables	Q1 to Q11 +/?/+/?/+/ +/?/+/?/+

Quality assessment was done by 11 questions of CASP which reported Q1 to Q2 and marked by + as "Yes" and – as "No" and ? as "Can't tell"

The quality of the studies was evaluated by Critical Appraisal Skills Program (CASP 2018). Based on the CASP, in appraising the report of a randomized controlled trial, three following broad issues need to be considered: are the results of the trial valid?, what are the results? and will the results help locally? ; for systematic assessment of these three issues, 11 questions related to the way of addressing the trial clearly, assignment, blinding, similarity at the start of the trial, equality of the allocated groups, dropped out of participants, effect size, estimate of the treatment effect, Fitness with context, clinically important outcomes and costs-benefits of studies were

designed. These were assessed with three answers of ‘yes’, ‘no’ or ‘can’t tell’.

Finally, all of the included studies were judged by Cochrane Risk of Bias Tool and divided into three levels of low, high and unclear risk of bias.

In order to measure the reliability of the evaluation of articles, data extraction and quality assessment were done by two independent reviewers and the kappa coefficient was calculated 86% for measuring agreement between the two reviewers.

Results

A total of 10 articles out of 1195 met the inclusion criteria and were included in the systematic review (table 1). All of the articles had been designed to evaluate the efficacy of abstinence education on sexual behaviors in adolescents. A total of 10014 adolescents had been included in abstinence education (n=6193) and control or comparison groups (n=3821) and education had been provided through various methods, in the reviewed studies; for example, in Jemmott's study (1998), the intervention had been based on cognitive-behavioral theories (33) and Sather (2002) had designed a values and character-based educational program that teaches premarital abstinence as a health issue and human development goal (36). Trenholm (2008) in his study had used the Sex Can Wait curriculum series, consisting of three main divisions: Knowing Myself (self-esteem, reproductive anatomy and physiology, changes associated with puberty, values and decision making skills), Relating to Others (development and enhancement of communication skills) and Planning My Future (goal setting and life planning) (37). In Denny's study, abstinence until marriage had been defined and the study had focused on the benefits of abstinence and physical, emotional, psychological and economic consequences of early sexual activity (32). In Lieberman's study, IMPPACT curriculum had focused on the importance of abstaining from sexual intercourse and included genital anatomy, understanding pressure to have sex, coping with peer pressure and pressure from the media, risks of early sexual involvement, and STDs, HIV and AIDS (35). Intervention in Jemmott's study (2010) had been designed to 1) increase HIV/STI knowledge, 2) strengthen behavioral beliefs

supporting abstinence and 3) increase skills to negotiate abstinence and resist pressure to have sex. (34).

The number of sessions in intervention groups was from one to five times a week. The duration of follow-up periods varied between immediately after the intervention to 78-month follow-up (0, 3, 5, 6, 12, 18, 24, 42, 78 months).

Measured outcomes included: abstinence values, abstinence efficacy, abstinent intent, sexual behaviors, knowledge and beliefs about teenage pregnancy, depression, self-esteem, locus of control, self-efficacy, Hopelessness, teenage sex attitudes, parental relationship, intentions to engage in premarital sexual activity and risks of pregnancy and STDs.

Abstinence related variables had been assessed in four studies (31-33, 38) and the results had showed the significant effect of abstinence education on abstinence values and intents. Also, adolescent's knowledge was higher in abstinence education groups than in the control groups in three studies (30-32). Attitudes and beliefs about teenage pregnancy had showed significant differences between groups in two studies (30, 32) and controversial results in three studies (35, 36, 39). Although sexual behavioral intentions were lower in abstinence education groups in four studies (31, 32, 34, 38), Sather (2002) and Green (2011) studies had not reported the same results (36, 39). Condom use related variables and unprotected sexual intercourse had been assessed in 4 studies and none of them had confirmed the efficacy of abstinence education programs on these behaviors (31, 33, 34, 37).

The quality of articles was thoroughly assessed using Critical Appraisal Skills Program (CASP) checklist for RCTs. The author's judgment of risk of bias has been shown in table 2. Detection bias was in high risk conditions in all of the

included studies that may be justified by impossibility of blinding in educational interventions. On the other hand, no studies were detected reporting bias and all of them acquired low risk level in this review. Although randomization is important in educational studies, only three articles had described the method of random sequence generation (33, 34, 39) and just 50% of studies had described the method used to conceal the allocation sequence in sufficient details (30, 33, 34,

37, 39). The effect of the treatment diffusion is to reduce the amount of difference between the treatment and comparison groups, making it more difficult to detect a significant difference between the groups. In two studies of Liberman (2000) and Denny (2006), participants had been selected from the same place (32, 35), so we put them up in the other sources of bias group as a treatment diffusion bias.

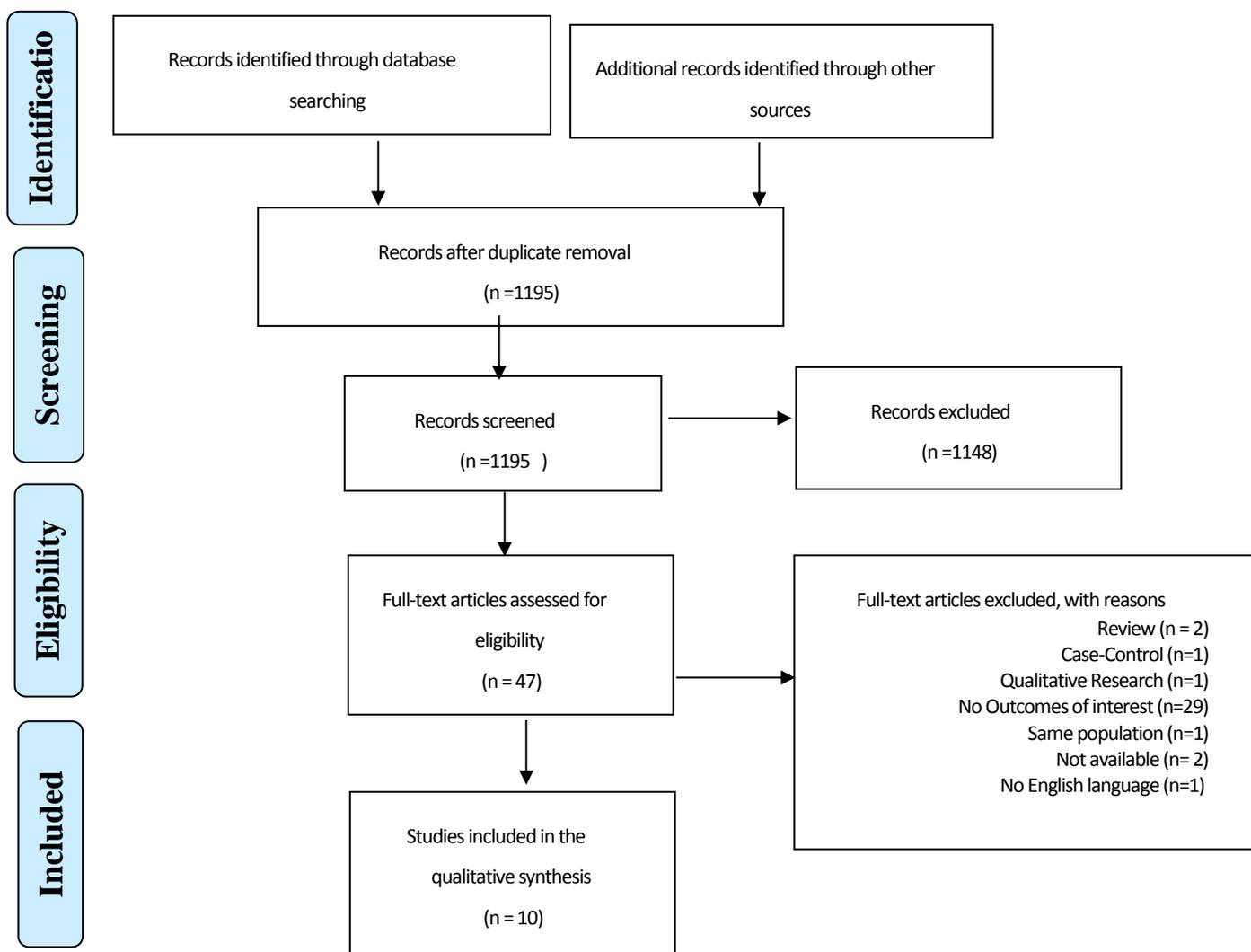
Table 2. Authors judgments of bias item for each included study by Cochrane Risk of Bias Tool

Study	Random sequence	Allocation concealment	Selective reporting	Blinding (participants and personnel)	Blinding outcome assessment	Incomplete outcome data	Other sources of bias
Jemmott JB 1998	+	+	+	?	-	+	+
Arnold EM 1999	-	+	+	?	-	?	+
Lieberman LD 2000	-	-	+	?	-	+	-
Sather L 2002	?	?	+	?	-	?	+
Borawski EA 2005	-	?	+	?	-	?	+
Weed S 2005	-	-	+	?	-	-	+
Denny G 2006	-	-	+	?	-	?	-
Trenholm Ch 2008	-	+	+	?	-	?	+
Jemmott JB 2010	+	+	+	+	-	+	+
Greene VL 2011	+	+	+	?	-	?	+

Key

- + Low risk of bias
- ? Unclear risk of bias
- High risk of bias

Figure 2. Author’s judgments of risk of bias presented as percentages across all included studies



Discussion

Seven of the 10 included studies in this review had reported positive results of abstinence education (30-34, 37, 38). For example Jemmott, et al (2010) had found that an abstinence-only intervention caused a substantial and statistically significant decrease in the risk of initiating coitus among adolescents during a 24- month period after the intervention compared to controls (34). A similar conclusion with respect to

abstinence education had been reached by Denny G and Young M (2006). According to them, although the Sex Can Wait curriculum series had demonstrated a statistically significant effect on sexual behavior, in most cases the effect size had been modest (32). The results of Weed *et al.* study support the premise that primary prevention efforts to influence teens towards sexual abstinence are a viable strategy (38). One of the other studies in this review was the study of Borawski *et al.*

(2005). This study has provided some evidence that an abstinence until marriage can affect short term sexual behavior among adolescents (31). In this regard, Jemmott *et al.* (1998) have also mentioned that abstinence interventions can reduce HIV risk (33). Also Arnold, *et al.* (1999) have provided support for the short-term efficacy of the abstinence-based sex education program on teens' knowledge and beliefs (30). Data in the study of Liberman, *et al.* (2000) suggested short-term outcomes in some variables such as locus of control, self-efficacy and parental talk, but the resulted differences were not significant one year later (35).

In contrast, Greene VL, *et al.* (2011) had reported no clear or strong support for the efficacy of abstinence education in terms of attitudinal, intentional or behavioral outcomes (39). Sather and Zinn (2002) had showed that abstinence-only education neither significantly change young adolescents' values and attitudes about premarital sexual activity nor significantly change their intentions for engaging in premarital sexual activity (36). The findings of the study of Trenholm, *et al.* (2008) had showed no significant impact on teens' sexual activity and any differences in the rates of unprotected sex (37).

Although most reviewed articles had support the efficacy of abstinence education, the quality of evidences was not so good that we can approve the positive results of abstinence education programs on sexual behaviors in adolescents. In this regard, Abstinence education had been given a C recommendation by Grading of Recommendations Assessment, Development and Evaluation (GRADE) in the review study of Phillips & Quigley (2007) (29). Kirby (2008) has reviewed 56 studies and evaluated 9 abstinence programs. He has reported some evidences that support the effectiveness of abstinence programs on delaying first sex for adolescents,

but has pointed out that the founded evidences were not strong (26). A literature review sponsored by Heritage Foundation found that 16 of the 21 studies had statistically significant positive results, such as delayed sexual activity initiation and reduced levels of early sexual activity, among teens who have received abstinence education (28). But since these studies were not randomized trials, these outcomes must be confirmed by a well-designed method with the lowest risk of RCTs bias.

Random selection, random allocation, blinding strategies and applying appropriate statistical analysis are important factors in evaluating the quality of studies, so researchers should pay attention to the methodology of their RCTs in abstinence education.

The existence of a series of differences in studies can affect the overall conclusion of this paper. For example there were differences between hours of exposure to the intervention, duration of follow up periods, previous experience of sexual activity and age range of adolescents. It seems that these are the factors that should be considered in studies on abstinence education.

Some studies indicated that in the same abstinence education program, younger teens gain different outcomes vs older teens. The same applies to sexual experienced vs inexperienced adolescents. Also, we should not forget that there are other factors influencing adolescents' decision making about sexual behavior and sexual education programs must be designed based on each special social context.

Based on the results of the present review, programs that involved the middle age adolescents had been more successful. The age group of early adolescent has not yet reached the perceived sensitivity; On the other hand behavior in older age groups is more difficult to be changed. Moreover, programs

that incorporate the cultural values of the community into educational content had better outcomes. Therefore, designing cultural-based abstinence education is recommended. At the end, considering the fading out of the effect of educational interventions over time, the design of repeated courses with a specific time frame to enhance the positive effects of training seems to be useful.

Educational and practical implications

The education and health care systems have a responsibility over adolescents' health and should provide them with information about safe sexual behaviors and consequences of early sexual activity. Abstinence education has some positive benefits that should be considered by those interested in sexual education programming in adolescents.

Conclusion

Some studies supported the efficacy of any particular abstinence education on different aspects of sexual behaviors in adolescents. But, unfortunately there is not strong evidence for this conclusion. Evaluations of sexual abstinence education using behavioral indicators and long-term follow-up are needed

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to truly assess its impacts. Our findings were limited by the used search terms and databases, so we might miss some relevant articles. Additionally, search was completed with language restriction. However, this review shows that there is a growing body of research on sexual abstinence education using experimental and quasi experimental designs. In this study, we accepted any intervention using abstinence concepts in the expression of sexual education methods to enable an in-depth investigation of the topic. We conducted the literature search following a systematic search protocol, using several comprehensive databases with a wide timeframe. A large number of citations were evaluated by two researchers first independently and then together to reach a consensus and to minimize selection bias.

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Conflicts of interest

There is no conflict of interest to declare.

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