Introduction

Cervical cancer is one of the major causes of disability adjustment years of women in developing countries (1). Approximately 87% of deaths from cervical cancer occur in less-developed countries. Among all malignant tumors, cervical cancer is one of the cancers that can be effectively controlled by organized screening programs. In this regard, Pap smear is a simple and cost-effective test for cervical cancer screening (2,3). It is reported that a regular Pap smear can reduce mortality by up to 80% (4). A study in Iran demonstrated that only 20% of women have never had this test, about two-third (68.7%) of them had this test only once in their life, and only 11.3% of them had taken a Pap test at standard intervals (5).

People may indicate an unwillingness to take screening tests when they are healthy, and performing regular screening tests largely depends on motivational factors. Accordingly, the present study aimed to investigate the effectiveness of motivationally tailored interventions on women’s cervical cancer screening.

Materials and Methods

This systematic review was conducted to determine the effectiveness of motivationally tailored interventions on cervical cancer screening behavior in women.

Search Strategy

All published articles before September 2019 were assessed in this study. To this end, articles were reviewed from several electronic databases (i.e., Cochrane
Library, Web of Science, PubMed, Scopus, Embase, and Google Scholar). The search terms were ‘motivational interviewing,’ ‘counseling,’ ‘cervical cancer screening,’ ‘Pap test,’ ‘randomized clinical trial,’ ‘protection motivation theory,’ and the ‘experimental and quasi-experimental study.’ The search was limited by language (English) and method (i.e., clinical trial, randomized controlled clinical trial, and experimental and quasi-experimental studies).

Further searches were carried out with the same strategy among dissertations, books, and available unpublished articles. Furthermore, resources were managed using Endnote software. Then, the title and abstract of the related articles were studied for selecting the corpus. This search yielded 216 abstracts, and finally, 7 articles were selected and assessed based on the aim of the study. The Cochrane tool was used to evaluate the quality of trial studies. This tool examines studies in six steps, the details of which are shown in Table 1 and Figure 1. Additionally, the characteristics and the judgment methods of the articles are presented in Table S1 (See Supplementary file 1). Eventually, the risk of bias rating for the included studies is displayed in Figures 2 and 3.

**Results**

This systematic review included 7 articles with 1337 female participants. Table S1 summarizes the characteristics and the intervention, judgment methods of the 7 articles. The result of our study demonstrated that different MI methods (i.e., face to face interviews, consultation sessions or calls, and educational programs) can effectively improve cervical cancer screening behavior in women. MIs in the assessed articles were categorized into two groups. Some studies were conducted using motivational interviewing and motivational phone calls. For example, Mahmoudi Majd Abadi et al reported that 77.8% of women took a Pap smear test after five group motivational interviewing sessions compared to vs. 11% of the control group (11). According to Pourebrahim et al, 32% and 22% of women performed a Pap smear test after three group motivational interviewing sessions, three motivational phone calls, and 4% of women in the control group (12). In a study conducted by Zolfaghari et al, 20.9% of participants in the intervention group vs. 9% in the control group performed a Pap smear after three motivational

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interviewing sessions (13).

Other types of MI studies were educational interventions based on the protection motivation theory (PMT). For instance, Dehdari et al reported that 60% of women uptake Pap smear vs 10% of the control group after receiving education based on PMT (14). According to Malmir et al, 48.6% of women underwent a Pap smear test vs. 32.4% of the control group after the PMT-based intervention (15). In another study by Ghahremani et al, the rate of the Pap smear test in the intervention and control group was 62.85% vs. 5.7% after the PMT-based intervention (16). Similarly, Khiyali et al, (17) showed a significant difference in the rate of performing Pap smear in the experimental group (58%) compared to the control group (3%). Table 3 presents the difference between motivational-based intervention and control groups.

The results of this systematic review, the motivationally tailored interventions are effective methods for boosting motivation regarding performing a Pap smear test. The evidence indicated that MIs could help reduce the barriers of cervical cancer screening and thus could help increase the cervical cancer screening rate.

The result of our study further showed that different MI methods (i.e., face-to-face interviews, consultation sessions or calls, and educational programs) are effective in cervical cancer screening uptake in women. In their systematic review, Lu et al reported that the combination of workplace-based educational programs with mobile screening services is effective in promoting breast and cervical cancer screening uptake in Asian women (18). In addition, Soares and Silva found that the use of media, telephone call, and invitation letter could increase women's knowledge about cervical cancer screening (19). Two other systematic reviews reported that one-to-one education and a reduction in constructive barriers could improve cervical cancer screening behavior (20, 21).

Conclusions

In conclusion, according to our systematic review, MI-based interventions were effective for improving cervical cancer screening and most relevant studies recommended using this type of interventions to increase the frequency of regular screening. It is noteworthy that MIs involve
strategies that increase one’s motivation to move from the pre-contemplation and contemplation stages toward action and maintenance stages. Therefore, the use of MI strategies facilitates making decisions on change by taking into account the positive and negative aspects of a change (22,23).

Authors’ Contribution
The first, second, and third authors performed an initial search of databases and were major contributors in writing the manuscript. Fourth and fifth authors reviewed studies to investigate eligibility criteria. The sixth author regulated methods and performed a meta-analysis. All authors read and approved the final manuscript.

Conflict of Interests
Authors declare that they have no conflict of interests.

Ethical Issues
Not applicable.

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Supplementary Materials
Supplementary file 1 contains Table S1.

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