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Implementing community-based cervical cancer screening programs using visual inspection with acetic acid in India: A systematic review

Prajakta Adsul[a,b,c,*], Nitin Manjunath[b], Vijaya Srinivas[b], Anjali Arun[b], Purnima Madhivanan[a,b]

[a] Robert Stempel College of Public Health and Social Work, Florida International University, Miami, USA
[b] Public Health Research Institute of India, Mysore, India
[c] National Cancer Institute, Rockville, MD, USA

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ABSTRACT

The objective of this review was to systematically appraise the existing published literature about community-based cervical cancer screening programs that have used visual inspection methods using acetic acid (VIA) in India. All peer reviewed journal articles till December 2015 were searched per PRISMA guidelines. Articles reporting results from cervical cancer screening programs in community-based settings, conducted in India, and using VIA were included in this review. The search resulted in 20 articles to be included in the review with a total of 313,553 women at 12 unique urban and rural sites across India. Seventeen (85%) studies were cross-sectional and three studies were randomized controlled trials; most studies compared accuracy of VIA with other screening tests such as visual inspection using Lugol's Iodine (VILI), HPV DNA, and cytology. Of studies that reported test accuracy for CIN Grade 2+, the VIA sensitivity values ranged from 16.6–82.6% and specificity ranged from 82.1–96.8%. Women between age groups of 30–59 years were recruited using motivational one-on-one counseling and local support staff. All studies conducted diagnostic follow-up using colposcopy and guided biopsies, when necessary. Three major themes were identified that facilitated implementation of screening programs in a community-based setting: standardized training that maintained competency of test providers; collaborations with community-based organizations that used health education for recruitment of participants; and employing the screen-and-treat method to reduce loss to follow-up. Summarized evidence presented in this review could substantially influence future implementation and sustainment of cervical cancer screening programs at a national level.

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* Corresponding author at: Cancer Prevention Fellow, National Cancer Institute, 9609 Medical Center Drive, 3E510, Bethesda, MD 20892-9712, USA.
E-mail address: prajakta.adsul@nih.gov (P. Adsul).

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1. Introduction

According to the World Health Organization estimates, approximately 122,844 new cases and 67,544 deaths were due to cervical cancer in India, accounting for nearly 1/3rd of the global cervical cancer deaths in 2014 [1]. Epidemiological and laboratory research has clearly established that a persistent infection with Human Papillomavirus (HPV) causes most cases of cervical cancer and the past decade has focused on primary prevention using HPV vaccinations, which have shown promising results [2,3]. Although there has been substantial progress in primary prevention strategies, an optimal effect on incidence and mortality due to cervical cancer can only be achieved by the addition of secondary prevention strategies, which include screening for precancerous and cancerous cervical lesions in women above 30 years of age [4]. For developing countries like India, it is critical that they achieve relatively high screening coverage rates as well as ensure that screen-positive women receive appropriate diagnostic and treatment services.

Establishing a quality assured cytology screening program, with national coverage can prove to be very challenging and probably beyond the capacity and resources available for India [5]. Moreover, underlying pelvic infections resulting in cervical smear abnormalities along with inherent difficulties in efficiently performing the different steps in cytology screening, which requires significant training and experience, can result in low sensitivity for the performance of Pap smears [6]. Repeated, yearly testing can improve the sensitivity of the Pap smears as seen in the US but can require significant resources [7]. Accumulating evidence on HPV testing as a screening strategy, highlights the test to be the most objective and reproducible of all cervical screening tests [8]. The test however, is expensive (approximately $20 US Dollars per test) and requires a sophisticated laboratory infrastructure which can be difficult to setup in primary care settings in India. On the other hand, visual inspection methods using acetic acid (VIA) and Lugol's iodine (VILI) have shown to be well accepted by women in India and the incidence of discomfort and pain during VIA is less than that reported for when Pap smears are conducted [9,10].

For large scale screening of populations, visual inspection methods have been extensively studied and proven to be effective, especially in the low- and middle-income countries. Visual methods involve the application of acetic acid (VIA) or Lugol's iodine (VILI) on the cervix to enhance the ability to detect the presence of pre-cancerous lesions thereby enabling the detection of cervical cancer at earlier stages [11]. It is now well established that with training, a physician or even a healthcare worker can identify acetowhite (with VIA) or mustard yellow (with VILI) lesions on the cervix, which are indicative of cancerous or precancerous tissue. Several studies in India have demonstrated that VIA and VILI have comparable sensitivity and specificity to cytology while offering the advantages of being simple to perform and cost-effective for large scale implementation [12]. A randomized controlled trial in India has shown a 30% reduction in cervical cancer incidence [11] and a modeling study showed that even a single VIA test at 35 years of age can significantly decrease the risk of mortality from and incidence of advanced cervical cancer when compared to no screening [13].

The Government of India's Ministry of Health and Family Welfare, recently launched the Operational Framework for the Management of Common Cancers which includes the use of VIA in primary care settings across India [14]. However, awareness about cervical cancer among the public is very low and there are only a few centers with cancer screening facilities throughout the country, which makes early detection and treatment very difficult. Furthermore, to move forward on this framework, it is important to consider the existing evidence in a critical manner. Public health evidence is usually the result of observation, theory and experiments, and the usefulness of this evidence may vary by the stakeholder type. Three distinct categories of scientific evidence have been proposed: (a) type 1 focuses on the causes of disease and the magnitude of risk factors, (b) type 2 on the relative impact on specific interventions, but Brownson and colleagues specifically emphasize (c) type 3 evidence, which shows how and under which "contextual" conditions, were the interventions implemented and how they were received [15].

In promoting evidence-based public health, contextual information is information that is needed to adapt and implement an evidence-based intervention in a setting or population. Contextual information can be critical for moving clinical interventions to population-level and policy level interventions. To date, there have been no systematic reviews of published literature on community based cervical cancer programs in India that could provide this contextual information. For this review, we sought to answer two specific questions concerning the context in which cervical cancer screening is delivered: How were community-based cervical cancer screening programs implemented in India and what were the barriers and facilitators to implementing community-based cervical cancer screening programs using VIA methodology in India?

2. Methods

2.1. Protocol and registration

The protocol for this review was registered with the PROSPERO International Prospective Register of Systematic Reviews (No. CRD42016032601). This review was conducted and is reported according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines [16].

2.2. Information sources and search strategy

The initial database search was conducted by one author (PA) and the search strategy is provided in Appendix A. The electronic databases included Medline, Embase, PsychInfo and Cochrane Database of Systematic Reviews searched using the OVID platform up to December 31st, 2015. Gray literature was not included, as