


RESEARCH ARTICLE

Effectiveness of an educational intervention on vulvo-vaginal discharge for family healthcare workers: A nonrandomized controlled trial

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Abstract

Women's delay in seeking medical advice for abnormal vaginal discharge can cause serious effects such as infertility, ectopic pregnancy, and advanced cervical cancer. Family healthcare workers are in a unique position to help in the promotion of vaginal health. A nonrandomized controlled trial was conducted among a sample of family healthcare workers in the intervention (n = 37) and a control (n = 37) group to assess the effectiveness of an educational intervention, which was a 2-day intensive workshop combining reading materials. Data were analyzed using SPSS software (version 20), and the effectiveness of the intervention was determined using a mixed between-within subjects analysis of variance. The total knowledge and attitude scores were significantly greater for family healthcare workers in the intervention group immediately and at 3 and 6 months after the educational intervention, compared to the control group. A substantial main effect was observed concerning the time, showing an increase in family healthcare workers' knowledge and attitude scores across the four time periods. A statistically significant difference in the median overall health education competency score across the two groups was also observed. The mean score differences in all sub-competencies in health education were significantly higher among the intervention group, compared to the control group between second postintervention and the baseline. The educational intervention had revealed successful and sustainable improvements in family healthcare workers' knowledge, attitude on vaginal discharge, and health education competency. This can be implemented as an in-service program for family healthcare workers to improve health education practices.

KEYWORDS

female, health education, health personnel, intervention, uterine cervical neoplasms, vaginal discharge

1 | INTRODUCTION

Women experience one or more symptoms of gynaecological morbidity from the time of puberty to menopause (Mathew, Ansuya, & Francis, 2017), and it can compromise the sexual and reproductive health of women (von Glehn, Sidon, & Machado, 2017). Reproductive tract infections carry an

enormous burden, being one of the most important causes of maternal and perinatal morbidity and mortality (Ravi & Kulasekaran, 2013).

Sri Lanka has a large sexually active and potentially susceptible population between the ages of 15 and 49 years (Abeywickreme, 2000), which is 51% of the total population (Annual Health Bulletin, 2015). Further, there is an increasing trend of reported

sexually transmitted infections (STIs) over the years in the country (NSACP, 2016).

Vulvo-vaginal discharge (VVD) is a common symptom of gynaecological morbidity; especially reproductive tract infections/STIs (WHO, 2016). Women do not seek medical advice for abnormal vaginal discharge unless vaginal discharge is recurrent or suggesting a pathological cause (Amina, Zainab, Amina, Augustine, & Adebisi, 2015) and are willing to self-treat (Nyirjesy, 2008). Most women fail to report symptoms due to the failure of recognizing mild degrees of discharge or malodor as abnormal (Klebanoff et al., 2004). A summary of data from previous studies shows that women living in socially marginalized communities, such as the urban slum communities in Sri Lanka, have a poor level of knowledge and different cultural practices related to abnormal vaginal discharge (Ilankoon, Goonewardena, Fernandopulle, & Perera, 2017; Ilankoon, Goonewardena, Fernandopulle, & Perera, 2018).

Furthermore, socioeconomic and cultural factors play a role in the health and well-being of women (D'Souza, Somayaji, & Nairy, 2011), and those who live in socially marginalized communities are vulnerable to many unhealthy practices and lifestyles. A public health midwife is the available family healthcare worker (FHCW) at the grass-roots level of the Sri Lankan health system including socially marginalized communities. Women living in these communities in Sri Lanka need more support from the FHCW in order to recognize pathological VVD and seek medical advice. In addition to the routine maternal and child care health services, FHCW provides health education (HE) and advice to adolescents on reproductive health and educates women and promotes their participation at "well women clinics" (FHB, 2011). They can educate women on personal hygiene and preventive strategies for reproductive tract infections, which in turn can promote vaginal health.

HE and proper referral will help in early detection of pathological vaginal discharge, prevent complications of delaying treatment, and improve women's health. Although there was no evidence in the literature on the intervention on vaginal discharge for FHCWs, it was evident during the need assessment done prior to this study (Ilankoon, Goonewardena, Fernandopulle, & Perera, 2016) that FHCWs possess an inadequate level of knowledge on VVD. It is evident that if the health care professionals had the knowledge, experience, and resources, it would have been more likely that they would have identified and treated female sexual complaints well (Blair, Arnow, Haas, & Millheiser, 2013). Hence, educational interventions related to VVD would be an advantage in empowering FHCWs with adequate knowledge, attitudes, and HE competencies on VVD. This will further assist in improving awareness and health-seeking behaviors of women living in a community setting.

Therefore, an educational intervention was planned for FHCWs on VVD, with main contents being anatomy and physiology of the reproductive system, common causes and consequences of abnormal VVD, health education, communication skills, adult education/learning, developing teaching aids, and designing an HE session.

1.1 | Study aim

The purpose of this study was to evaluate the educational intervention on vulvo-vaginal discharge for FHCWs in improving their knowledge and attitudes (KA) and HE competencies.

2 | METHODS

2.1 | Study setting

This study was carried out in an urban slum population in Colombo District, Western Province of Sri Lanka. Colombo city is the commercial capital of Sri Lanka with 555 031 inhabitants, covering an area of 37 km²; two-thirds of Colombo city residents living in slums and shanties without basic amenities (UNHABITAT, 2007). The Public Health Department of the Colombo Municipal Council (CMC) plays a major role in maternal and child welfare (MCW), community development, HE, and other public health-related programs (CMC, 2015). The intervention study was carried out among MCW centers attached to the CMC.

2.2 | Participants

This study was conducted between November 2017 and June 2018 among the FHCWs who have worked at least 6 months in the CMC area prior to the commencement of the study. The FHCWs who were on maternity leave by the time of the study were excluded. Each group located in different settings was considered to be the most effective way to prevent contamination in nonrandomized controlled trials (Dimitrov & Rumrill, 2003; Oupra, Griffiths, Pryor, & Mott, 2010). Therefore, all FHCWs ($n = 37$) who were attached to MCW centers in the Northern CMC area were selected for the intervention group and all FHCWs who were attached to the MCW centers in the Southern CMC area were selected for the control group ($n = 37$).

The total number of FHCWs attached to CMC was 82, and the sample size for a nonrandomized controlled trial was calculated using the following formula $n \geq K \sigma_d^2 / \delta^2$ (Daily & Bourke, 2000). The chosen significance level and β error of the study were 0.05 and 0.2, respectively. According to Cohen (1988), standardized effect size can be categorized as small (≤ 0.2), moderate (≤ 0.5), and large (≥ 0.8). In this study, the chosen standardized effect size is 0.5. The expected loss to follow-up was taken as 10%, and the final sample size was 36. Consented available number of FHCWs were enrolled in this study (Figure 1).

2.3 | Development and validation of the educational intervention

The focus and the content of the educational intervention were developed according to the findings of the need assessment phase of the

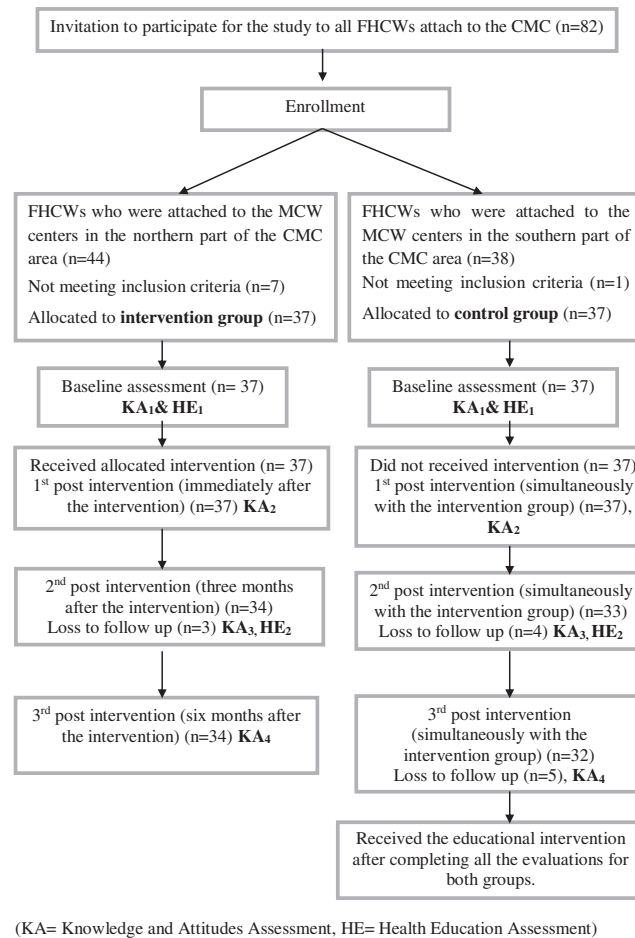


FIGURE 1 Flowchart of the nonrandomized controlled study and outcome measures

study (Ilankoon et al., 2016; Ilankoon et al., 2017; Ilankoon et al., 2018) and the assessment of the existing curriculum of FHCWs. The curriculum was assessed for contents related to VVD, covering STIs, reproductive tract infections, uterine cervical neoplasms, communication skills, and HE. Vaginal discharge was identified to be a topic that is discussed as a minor disorder during pregnancy, STIs, and sexual and reproductive health in the existing curriculum of FHCW training in Sri Lanka. Bloom's taxonomy provided the conceptual framework for the development of the structure of the educational intervention (objectives, teaching and learning strategies, methods of evaluation) (Williams et al., 2006). A comprehensive review of the literature on STIs, reproductive tract infections and training programs for primary healthcare workers was conducted prior to the development of the content for the educational intervention (Blair et al., 2013; Bradshaw, Lovell, Bee, & Campbell, 2010).

Educational intervention and all study instruments for educational intervention were developed through the Modified Delphi technique, which can contribute to construct validity, which relies on a clear definition of the construct (Okoli & Pawlowski, 2004). Ten specialists were included as Delphi panelists, which included subject experts such as consultant obstetrician and gynaecologists, consultant community physicians (including STIs experts), general practitioners and

senior professor in community medicine, senior lecturers in nursing, and HE officers. The developed study instruments were evaluated for the content, face, and consensual validity by subject experts to measure the reliability and validity.

2.4 | Educational intervention

The educational intervention was a 2-day intensive workshop conducted for the FHCWs in the intervention group. It has been identified that workshops are one of the public health educators' preferred formats for training, as it is more convenient and enables delivery of more information, providing more opportunities to practice more skills (Lindley, Wilson, & Dunn, 2005).

The workshop was conducted by consultant obstetrician and gynaecologists, registrar in obstetrics and gynaecology and venereology, consultant community physician, and HE officers from Health Promotion Bureau, Sri Lanka. A teaching guide consisting of the synopsis, learning objectives, teaching materials, questions to ask from participants, interactive activities, and summarize and review key messages was given to the resource persons prior to the workshop. A reading folder, including agenda, a flow chart, a book, and a pamphlet on

TABLE 1 The content of the educational intervention

Session	Content of each session	Duration	Teaching methods
The anatomy and physiology of the reproductive system	What are the external female reproductive organs? What are the internal female reproductive organs? What are the functions of these organs? What are the life cycle changes?	45 min	PowerPoint presentation with images of reproductive organs
Differentiate normal and abnormal vaginal discharge	Origin and functions of normal VVD Any associated symptoms Differences between physiological and pathological discharge	30 min	Group exercise, PowerPoint presentation with pictures
The common causes and consequences of abnormal vaginal discharge	Common possible causes for abnormal VVD <ul style="list-style-type: none"> • Infective (nonsexually transmitted) causes • Infective (sexually transmitted) causes • Non-infective causes Possible consequences of untreated pathological VVD	1 h	PowerPoint presentation with pictures
Sexually transmitted infections that can cause abnormal vaginal discharge	STIs that can cause abnormal VVD. <ul style="list-style-type: none"> • Infective (sexually transmitted) causes • Possible consequences of untreated STIs that can cause abnormal VVD The importance of testing periodically and treating for STIs if sexually active woman	1 h 30 min	PowerPoint presentation with pictures
Improve skills on history taking	The relevant information related to vaginal discharge Skills of taking relevant history related to vaginal discharge to do proper referral	30 min	Discussion/role play
The general measures and nonmedical management options for a woman complaining of abnormal VVD	General measures and nonmedical management options for a woman complaining of abnormal vaginal discharge Assisting in examination of a woman presenting with abnormal vaginal discharge The abilities to identify abnormalities of the vaginal discharge while doing postnatal and antenatal visits	1 h 15 min	Lecture/discussion PowerPoint presentation Video clips
Importance of having positive attitudes towards women complaining on VVD	The importance of having positive attitudes towards women complaining on VVD The content areas for health education The preventive behaviors for infectious vaginal discharge	45 min	Case discussion
Knowledge game: Vulvo-vaginal discharge	Compare and contrast the characteristics of normal and abnormal vaginal discharge Possible causes of abnormal vaginal discharge Associate symptoms of STIs The consequences of untreated abnormal vaginal discharge	30 min	A game
Health education	Define "health education" The qualities of good health educators The strategies to promote interest in learning among women at community Professionalism and ethical conduct	1 h 30 min	Brainstorming session
Overcome the barriers for health education activities	The challenges faced during health education activities The skills of time management The skills in managing the learning environment The skills in motivation women for learning	2 h	Small group discussion/ brainstorming session/ PowerPoint presentation
Communication skills	Communication skills	1 h	Brainstorming session, PowerPoint presentation
Adult education/ learning	Definition of learning (pedagogy (directed learning), and andragogy (facilitated learning)) Definition of adult leaning Adult learning behaviors	30 min	Brainstorming session
Developing teaching aids	Design teaching aids	30 min	Brainstorming session/ group work

TABLE 1 (Continued)

Session	Content of each session	Duration	Teaching methods
Designing a health education session	Design a health education session	30 min	Brainstorming session/practical session
Practical application of the knowledge gained through the educational intervention	Health education session	45 min	Practical session/group work

VVD, was provided to the FHCWs in the intervention group during the workshop.

The workshop consisted of lectures, discussions, interactive activities, role plays, videos, games, brainstorming sessions, and practical sessions. The detailed contents of each session are presented in Table 1. A role play was conducted to practice history taking from a woman complaining of abnormal vaginal discharge. Feedback was given by the consultant obstetrician and gynaecologists regarding the necessary actions/referral recommendations, how to improve communication skills and how to ask sensitive questions. Then the resource person explained the general measures and nonmedical management options for a woman complaining of abnormal vaginal discharge and how to assist in the examination of a woman complaining of abnormal vaginal discharge.

Further, video clips were shown to the FHCWs on the correct and incorrect behaviors of healthcare workers, while assessing a female with gynaecological complaints. A case was discussed to emphasize the need of privacy and confidentiality while caring for a female with abnormal vaginal discharge. Critical reflection activities were undertaken in small groups using guided discussions, practical experience sharing, and brainstorming.

The topics included in the second day of the training were adult learning, communication skills, HE, time management, and developing teaching aids. FHCWs practiced the development of teaching aids as well as the preparation and conduction of HE sessions.

2.5 | Data collection

Sociodemographic and service information of all participants was collected at the baseline. KA assessment and HE competency assessment were conducted at the baseline, first postintervention, second postintervention, and third postintervention (Figure 2) (Liu, Edwards, & Courtney, 2010). Data were collected from both groups (intervention and control group) using the same procedure.

2.5.1 | KA assessment

Assessment of the FHCWs' KA related to VVD was carried out using a pretested, validated questionnaire. It consisted of multiple-choice questions (MCQs), short answer questions (SAQs), and attitude statements. MCQs focused on the knowledge of anatomy and physiology of the reproductive system, vaginal discharge, and causes for vaginal

discharge, STIs, and their features. The total marks obtainable for MCQs were 80. SAQs focused on normal vaginal discharge, STIs and non-STIs that can cause abnormal vaginal discharge, possible noninfective causes, consequences of untreated pathological vaginal discharge, and HE regarding vaginal discharge. The total marks obtainable for SAQs were 60.

There were 14 statements on attitudes related to VVD with a 5-point Likert scale of strongly agree-1, agree-2, don't know-3, disagree-4, and strongly disagree-5 (Walpola, Fois, McLachlan, & Chen, 2017). Total marks obtainable for attitudes were 35.

2.5.2 | HE competency assessment

FHCWs' competencies in HE related to VVD were screened by non-participatory observation using a pretested, validated observational checklist. The six competency areas identified for the HE competency for self-management of disease by health professionals (Vågan, Eika, & Skirbekk, 2016) were considered in the observational checklist, which included 50 items. The maximum marks obtainable for one item were three (03). Scoring for the sub-competencies in HE competency assessment is shown in Table 2. The total marks obtainable for HE competency were 150.

HE competency was assessed by three external examiners who were retired health education officers attached to the Health Promotion Bureau of Sri Lanka. On the assessment day, FHCWs were asked to continue their routine HE for the topics selected by themselves. Each examiner marked the checklist independently and they were not aware of the intervention and control groups. Examiners were informed not to give feedback for the FHCWs performance at that time.

2.5.3 | Feedback for the workshop

A session evaluation form was administered after each session of the workshop, and it assessed the level of satisfaction of the intervention group about their knowledge, attitudes, and skills after the intervention. End program evaluation form was used to measure FHCWs' satisfaction with the whole educational workshop, including the resource persons, HE materials, methods of teaching, and detailed feedback, in order to improve the educational intervention. At the end of the workshop, a certificate of successful completion of the course was awarded to the FHCWs.

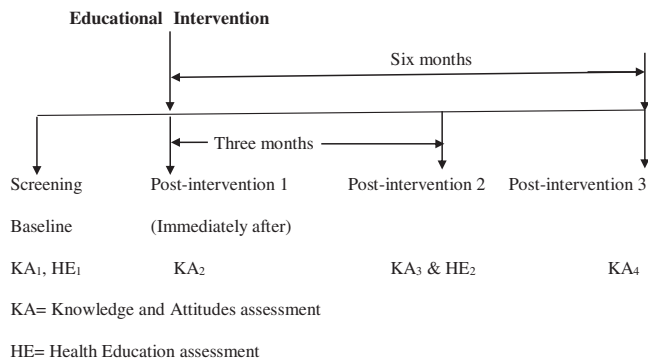


FIGURE 2 Follow-up chart of research activities

TABLE 2 Scoring for the sub-competencies in the health education competency assessment

Sub-competency	Number of items	Maximum marks
Preparation for teaching	09	27
Conducting teaching	13	39
Effective communication skills	09	27
Ability to motivate clients to engage in behavior change	09	27
Feedback and evaluation	04	12
Professional attributes and attitudes	06	18

2.6 | Data analysis

Data were analyzed using SPSS software (version 20). Descriptive statistics were applied to obtain percentages and means with standard deviations. Associations of categorical variables among the two groups at the baseline were assessed using a chi-square test. Comparisons of knowledge score, attitude score, and score on HE competencies between two groups at the baseline and postinterventions were assessed using the independent sample t-test or Mann-Whitney U test based on normality. The effectiveness of the educational intervention was determined using a mixed between-within subjects analysis of variance (ANOVA) and post hoc t-test with Bonferroni adjustment (Lee & Yen, 2007; Tang, Hung, & Chen, 2015). A probability of $P < 0.05$ was considered statistically significant for all tests.

2.7 | Ethical consideration

Recruitment of all participants was strictly voluntary and informed written consent was obtained prior to the recruitment. If a FHCW shows a poor level of knowledge for the post-test, they were provided with additional support. The educational intervention was conducted for the control group of FHCWs after the completion of follow up assessments. This study was approved by the Ethics Review Committee, Faculty of Medical Sciences, University of Sri Jayewardenepura, Sri Lanka (ERC approval No. 39/16).

3 | RESULTS

Thirty-seven ($n = 37$) FHCWs were enrolled in each intervention group and control group. The respondent rate was 100% in two groups at baseline and the first postintervention. The respondent rate was 91.9% ($n = 34$) in the intervention group at second and third post-interventions. The respondent rate in the control group was 89.2% ($n = 33$) at second postintervention and 86.5% ($n = 32$) at third post-intervention (Figure 1).

3.1 | Baseline characteristics

The median ages of the FHCWs in the intervention and control groups were 32 (± 8.00) and 33 (± 16.50) years, respectively. All FHCWs were Sinhalese and had completed the basic midwifery certificate as the highest professional qualification in each group. None of the sociodemographic characteristics showed a statistically significant difference between the intervention and control groups at baseline ($P > 0.05$).

The median years of service was similar in each group of FHCWs. Nearly 65% of the FHCWs in the control group had had the experience of handling women with excessive VVD. Most of the FHCWs in each group had had not participated in an in-service training program on "VVD, STIs, reproductive tract infections, communication skills or HE." None of the service characteristics of FHCWs showed a statistically significant difference between the two groups ($P > 0.05$).

The median total knowledge score, mean attitudes score, and mean score for the overall HE competency at baseline were slightly higher in the control group, compared to the intervention group. However, there was no statistically significant difference between groups at the baseline ($P > 0.05$) (Table 3).

3.2 | Comparison of KA score

The mean difference of the total knowledge score (38.42 ± 15.17) was significantly higher in the intervention group, compared to the control group ($P = 0.00$, $M = 37.57$, 95% CI = 30.72–44.41) at the first postintervention to the baseline. Similarly, a statistically significant mean attitudes score difference was observed in the intervention group, compared to the control group ($P = 0.00$, $M = 6.81$, 95% CI = 4.92–8.70) at the first postintervention to the baseline.

Further, the mean score differences of the total knowledge score were higher among the intervention group, compared to the control group at the second postintervention compared to the baseline. A statistically significant difference was observed in the mean differences of total knowledge score ($P = 0.00$, $M = 40.36$, 95% CI = 32.96–47.73) among the two groups at the second post-intervention from baseline.

Furthermore, the mean score differences of the total knowledge score was significantly higher among the intervention group, compared to the control group at the third postintervention from the baseline ($P = 0.00$, $M = 38.50$, 95% CI = 31.78–45.22). Mean score differences of the attitude score were significantly higher among the intervention group, compared to the control group ($P = 0.00$, $M = 7.91$, 95% CI = 5.77–10.05) at third postintervention from the baseline (Table 4).

3.3 | Comparison of HE competency score

The mean score differences of the overall HE competency of the FHCWs was significantly higher among the intervention group, compared to the control group at second postintervention, compared to baseline ($P = 0.00$, $M = 43.05$, 95% CI = 34.76–51.35). The mean score differences in all sub-competencies in HE were significantly

TABLE 3 Mean/median knowledge, attitudes and health education competency score at baseline among the two groups

Variables	Intervention group (n=37)	Control group (n=37)	P value
Total score for the MCQ paper [§]	65.00 (18.13)	62.50 (20.00)	0.88 [‡]
Total score for the SAQ paper*	22.25 (10.09)	20.90 (10.56)	0.57 [†]
Total knowledge score [§]	44.29 (17.86)	47.14 (15.71)	0.46 [‡]
Attitudes score*	16.00 (2.67)	14.97 (3.21)	0.14 [†]
Overall health education competency score*	44.16 (11.07)	42.36 (13.67)	0.53 [†]

Note: Total knowledge score = total score for the MCQ questions + total score for the SAQ questions.

*Variable outcomes are shown as mean with \pm SD.

[†]Independent sample T test.

[‡]Mann Whitney U test.

[§]Variable outcomes are shown as median with IQR.

higher among the intervention group, compared to the control group between second postintervention and baseline ($P < 0.00$) (Table 5).

3.4 | Effectiveness of the educational intervention

Following a mixed between-within subjects analysis of variance, there was a significant interaction between group and time, Wilks' lambda = 0.33, $F(3, 63) = 42.48$, $P = 0.00$, partial eta squared = 0.67. A substantial main effect for time was observed, Wilks' lambda = 0.30, $F(3, 63) = 49.0$, $P = 0.00$, partial eta squared = 0.70, showing an increase in the knowledge score across the four time periods. The main effect comparing the intervention and control groups was significant, $F(1, 65) = 259.0$, $P = 0.00$, partial eta squared = 0.80, suggesting a significant difference in the knowledge scores for the two groups.

Figure 3 illustrates the changes in the knowledge score over time between two groups. The Bonferroni's multiple comparison post hoc test pointed out significant differences in knowledge scores in the intervention group between the baseline and three postinterventions ($P < 0.05$ for three tests), but not between the posttests ($P > 0.05$) (Table 6).

The impact of the intervention on FHCWs' attitudes score across four time periods was assessed by mixed between-within subjects analysis of variance (baseline, first postintervention, the second postintervention, the third postintervention follow up). There was a significant interaction between group and time, Pillai's Trace = 0.50, $F(3, 62) = 20.3$, $P = 0.00$, partial eta squared = 0.50. There was a substantial main effect for time, Pillai's Trace = 0.71, $F(3, 62) = 49.87$, $P = 0.00$, partial eta squared = 0.71, showing an increase in attitude score across the four time periods.

The main effect comparing the intervention and control groups was significant, $F(1, 64) = 82.10$, $P = 0.00$, partial eta squared = 0.56, suggesting a significant difference in the attitude scores for the two groups. The Bonferroni multiple comparison post hoc test showed significant differences in attitudes scores in the intervention group between the baseline and three postinterventions ($P < 0.05$ for three tests), but not between the post-tests ($P > 0.05$) (Table 6). Figure 4

TABLE 4 Mean/median differences of outcome variables among the two groups

Variables	First postintervention			Second postintervention			Third postintervention		
	Intervention group (n = 37)	Control group (n = 37)	P value	Intervention group (n = 34)	Control group (n = 33)	P value	Intervention group (n = 34)	Control group (n = 33)	P value
Total knowledge score*	38.42 (15.17)	0.85 (14.37)	0.00 [†]	39.91 (16.07)	-0.45 (14.01)	0.00 [†]	39.71 (14.17)	1.20 (13.07)	0.00 [†]
Attitudes score*	9.11 (4.33)	2.30 (3.81)	0.00 [†]	8.00 (5.00)	2.00 (5.50)	0.00 [‡]	9.38 (5.06)	1.47 (3.43)	0.00 [†]

*Variable outcomes are shown as mean with \pm SD.

[†]Independent sample T test.

[‡]Mann Whitney U test.

TABLE 5 Mean differences of health education competency score between second postintervention and baseline among the two groups

Variables	Intervention group (n = 37)	Control group (n = 37)	P value
Overall health education competency score*	47.22 (12.16)	4.16 (20.51)	0.00†
a Preparation for teaching*	9.94 (2.98)	1.47 (4.04)	0.00†
b Conducting teaching*	11.67 (3.99)	0.01 (5.37)	0.00†
c Effective communication skills*	8.10 (2.66)	1.19 (4.43)	0.00†
d Ability to motivate clients to engage in behaviour change*	9.21 (3.56)	1.13 (4.24)	0.00†
e Feedback and evaluation*	3.94 (1.95)	0.28 (2.37)	0.00†
f Professional attributes and attitudes*	4.36 (1.71)	0.07 (2.97)	0.00†

*Variable outcomes are shown as mean with \pm SD.

†Independent sample t test.

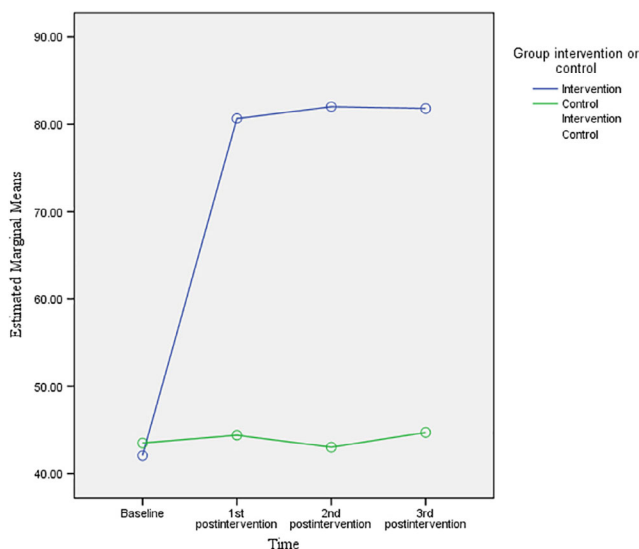


FIGURE 3 Estimated marginal means of knowledge score

shows the changes of the attitude score over time between two groups.

3.5 | Feedback for the workshop

FHCWs who attended the intervention filled an end program evaluation form, and majority of them strongly agreed that they were able to learn what they expected to learn (78.4%), program objectives were clear (75.7%) and the content was helpful (86.5%). More than 90% of FHCWs strongly agreed that the materials presented were relevant to practice. Further, 95% (n = 35) of the FHCWs strongly agreed to the

fact that the workshop changed their KA about vaginal discharge, and majority (95%) strongly expressed their interest in attending a follow-up, more advanced workshop on this same subject. For the overall quality of the program, majority of the FHCWs rated five (86.5%) and four (13.5%) (Table 7).

4 | DISCUSSION

This study was undertaken to assess the effectiveness of an educational intervention on VVD through the improvement of KA and HE competencies of the FHCWs, as the primary outcome measure. Healthcare professionals need a comprehensive understanding and a sufficient knowledge in order to be competent in caring for those who suffer and experience symptoms of vaginal infections (Adolfsson, Hagander, Mahjoubipour, & Larsson, 2017). Healthcare workers who lack proper knowledge could result in unnecessary or late referrals (Abdul-Rahman, Rabiou, & Alhassan, 2015). Gaps of knowledge was identified during the need assessment study in the areas of reproductive tract infections, including the other possible causes for pathological vaginal discharge, which need be improved in order for FHCWs to be competent in HE at the community level (Ilankoon et al., 2016; Ilankoon et al., 2017; Ilankoon et al., 2018). The educational intervention was designed to fill those gaps and educate an individual FHCW engaged in HE activities at the community level in Sri Lanka.

The findings of this study have highlighted that knowledge regarding VVD among FHCWs has significantly improved by educational intervention. It is evident that training programs are effective in improving knowledge among healthcare workers (Ajuwon, Funmilayo, Oladepo, Osungbade, & Asuzu, 2008; Blair et al., 2013; Goonewardena, Rajapaksha, & Wickremasooriya, 2001). Following an educational intervention on intrapartum and postpartum care, FHCWs have shown a significant improvement of knowledge scores on different stages of labor and care of newborn (Goonewardena et al., 2001). A progressive improvement of the knowledge levels over time in this study was observed and sustainability of the improved knowledge would be possible even after the cessation of educational intervention to the intervention group, which is in keeping with the findings of other studies (Kennelly, Kennedy, Rughoobur, Slattery, & Sugrue, 2010). The observed significant improvement in knowledge scores of the FHCWs in the intervention group of this study is a result of the educational intervention and the educational materials given to them to read and to be used in their day-to-day practices.

In this study, the attitude score of the FHCWs' in the intervention group had increased compared to the baseline values, which suggests that the educational intervention was instrumental in influencing FHCWs' attitudes about the importance of HE and health promotion activities related to vaginal health. Furthermore, similar results are found in another study by Blair et al. (2013), in which over 94% of participants (healthcare workers) reported that the workshop had changed their attitudes about assessing female sexual complaints. It is noteworthy to state that a positive development in attitude score across the four time periods is observed where there have been

TABLE 6 PHMs' knowledge and attitude toward VVD in intervention and control groups over time (n = 66 at follow up)

Measure	Time	Intervention group,		Control group,		Group		Time		Group × time		P value
		mean ± SD	SD	mean ± SD	SD	F	d.f.	F	d.f.	F	d.f.	
Total knowledge score	Baseline	42.10 (12.24)		43.53 (12.24)		259.03	1 (64)	49.00	3 (62)	42.48	3 (62)	0.00*
	First postintervention	80.67 (8.57)		44.42 (11.40)								
	Second postintervention	82.01 (9.25)		43.06 (9.49)								
Attitudes score	Baseline	15.85 (2.68)		14.94 (3.33)		82.10	1 (64)	49.87	3 (62)	20.35	3 (62)	0.00*
	First postintervention	25.47 (3.93)		17.47 (4.19)								
	Second postintervention	24.44 (3.81)		16.25 (3.47)								
	Third postintervention	24.21 (3.84)		16.41 (3.02)								

*Repeated measures of analysis of variance and Bonferroni multiple comparison post hoc test.

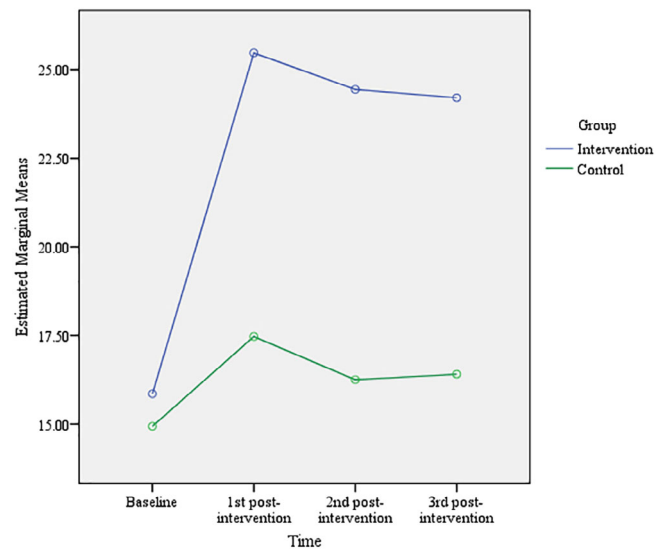


FIGURE 4 Estimated marginal means of attitude score

significant increases in attitude scores in the intervention group between baseline and the three postinterventions ($P < 0.05$ for three tests) of the this study, showing positive outcome and sustainability.

Knowledge scores have been found to be significantly correlating with the positive attitudes in a review conducted among intervention studies that focused on increasing the breastfeeding knowledge, self-confidence, and supportive behaviors of healthcare professionals (Watkins & Dodgson, 2010). Improvements in the FHCWs knowledge on abnormal vaginal discharge lead to the positive attitudes toward caring for a woman complaining of abnormal vaginal discharge and educating women on preventive behaviors.

Educational interventions are effective in increasing competencies among healthcare workers (Blair et al., 2013). Consistent with this fact, more importantly, a significantly increased HE competency in the intervention group of FHCWs in this study was observed after 3 months of the educational intervention. This might be due to the update of their knowledge and skills on HE, techniques, developing teaching aids, communication skills and adult learning, during the educational intervention. The study by Goonewardena et al. (2001), which is similar to the present study, have highlighted that the FHCWs HE improves following an educational intervention.

It has also been identified in this study that, there is a high level of engagement and interest in the educational intervention by the FHCWs in the intervention group. They had given positive verbal feedback, suggesting that FHCWs are eager to develop their knowledge and skills, and improve care provided, similar to what was identified in other studies (Cross, Hindley, & Carey, 2017). Similar to this study, the healthcare workers demonstrated a significant increase in the level of comfort when talking to their patients about their sexual health and sexual habits, following their participation in an educational intervention (Blair et al., 2013). The FHCWs practiced history taking of a woman complaining of abnormal vaginal discharge, which provided the FHCWs an opportunity to increase their comfort levels and develop language related to the topic of vaginal health. During the evaluation of the

TABLE 7 Number of responses for the evaluation of the workshop (n = 37)

Statements	Strongly agree n (%)	Agree n (%)	No idea n (%)	Disagree n (%)	Strongly disagree n (%)
1 I was able to learn what I expected to learn.	29 (78.4)	8 (21.6)			
2 The program objectives were clear to me.	28 (75.7)	9 (24.3)			
3 The content was helpful.	32 (86.5)	5 (13.5)			
4 The materials presented were relevant to practice.	34 (91.9)	3 (8.1)			
5 Programme was well organized.	33 (89.2)	4 (10.8)			
6 Adequate amount of time was allocated for each session.	23 (62.2)	14 (37.8)			
7 Audio visual aids were helpful to learn.	28 (75.7)	8 (21.6)		1 (2.7)	
8 The handouts were helpful.	29 (78.4)	7 (18.9)		1 (2.7)	
9 The resource persons were well prepared.	29 (78.4)	8 (21.6)			
10 The length of the program was appropriate.	26 (70.3)	11 (29.7)			
11 The facilities/resources were appropriate.	30 (81.1)	7 (18.9)			
12 I had adequate support and supervision by the program staff.	30 (81.1)	7 (18.9)			
13 The workshop changed my knowledge and attitudes about VD.	35 (94.6)	2 (5.4)			
14 The educational program motivates for proper health education on VD.	33 (89.2)	4 (10.8)			
15 I would be interested in attending a follow-up workshop on this same subject.	35 (94.6)	2 (5.4)			

whole educational intervention, almost all FHCWs agreed that the workshop content is clear and useful to their day to day practice, and that they found it to be a helpful way of learning the content.

Lack of training and experience are primary reported barriers to sufficiently address issues relevant to women's sexual health (Feldhaus-Dahir, 2009). With the emergence of new health issues and subsequent demands placed on practitioners continuing to change, continuing education is an important aspect for public health educators (Lindley et al., 2005). Continuous education and in-service training are equally important for maintaining the competencies of the FHCWs. Moreover, continuous education is essential for the sake of the public safety and professional responsibility (Arulkumar, et al., 2011). Therefore, capacity building of FHCWs in managing VVD will help in promotion of vaginal health in order to prevent consequences associated with untreated pathological VVD.

This study ascertains that a significant improvement in FHCWs' KA related to VVD and HE competency among FHCWs could be achieved by the developed educational intervention on VVD. With a positive attitude and additional skills gained through the educational intervention, FHCWs will be able to provide efficient care at the community level, promoting women's health.

4.1 | Study limitations

There were several limitations to this study. First, the sample size was minimal due to the number of FHCWs attached to the CMC was 82, and thus it was not possible to randomize them to the

intervention and control group of the study. Second, reliability and validity of the educational intervention and all study instruments were achieved through the modified Delphi technique, and the judgmental validation as the construct validity was not possible with the unavailability of a gold standard. Moreover, HE competency assessment was done during the routine clinic activities during which the FHCWs conduct HE. Hawthorne effect was minimized by taking measures to minimize this contamination. Collumbien, Busza, Cleland, and Campbell (2012) have stated that it is not easy to maintain artificial standards of behavior for prolonged periods, and therefore any initial contamination is unlikely to persist. Hence, it is expected that this contamination will not affect the results of this study.

Finally, this study was conducted among FHCWs working only in urban slum communities. Results and solutions offered here, therefore, can be applied to the study community of similar communities. Hence, it is strong recommended and encouraged that similar studies on the same aspects are conducted in other areas of the country.

4.2 | Conclusions and implications

VVD is a frequent gynaecological complaint among women in reproductive age. Early identification of pathological discharge would be advantageous in preventing complications of gynaecological morbidities. As the silence nature associated with this subject, especially when it comes to women living in Asian countries, improving awareness on VVD is essential. FHCWs, who have a strong connection with women in reproductive age can engage in health promotion activities

at community to improve health-seeking behaviors of women for VVD. Hence, an educational intervention on VVD was developed and validated to empower FHCWs with adequate KA on VVD and improve their HE competencies.

The developed educational intervention on VVD in this study was identified be sustainable and had a progressive effect on FHCWs' knowledge, attitudes, and HE competencies on VVD. The educational intervention on VVD, combined with developed reading materials, carries the potential of a successful an in-service program that would increase the motivation of the FHCWs to update their knowledge and improve their HE practices.

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CONFLICT OF INTERESTS

Authors declare that there is no conflict of interest.

AUTHORSHIP STATEMENT

All authors listed meet the authorship criteria according to the latest guidelines of the International Committee of Medical Journal Editors and all authors are in agreement with the manuscript.

AUTHOR CONTRIBUTIONS


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Data analysis: I.M.P.S., C.S.E., and P.P.R.

Manuscript writing and revisions for important intellectual content: I.M.P.S., C.S.E., R.C.F., and P.P.R.

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