Attitude toward human papillomavirus self-sampling and associated factors among Thai women undergoing colposcopy

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Objective

To compare attitudes toward self-sampling for human papillomavirus (HPV) testing before and after specimen collection in women undergoing colposcopy. The factors associated with the pre-sampling attitude were also studied.

Methods

This prospective study enrolled women with abnormal cervical cytology and/or positive high-risk HPV who attended colposcopy clinics at 10 cancer centers in Thailand between October 2021 and May 2022. Prior to colposcopy, the attitudes of the women toward self-sampling were surveyed through a questionnaire. Written and verbal instructions for self-sampling were provided before the process and subsequent colposcopy. The attitudes toward self-sampling were reassessed after the actual self-sampling. Factors associated with the attitudes were analyzed.

Results

A total of 499 women were included in this study. The mean age was 39.28±11.36 years. A total of 85.3% were premenopause, and 98.8% had sexual experience. With the full score of 45, the attitude score after self-sampling was significantly higher than the attitude score before self-sampling (39.69±5.16 vs. 37.76±5.71; $P<0.001$). On univariate analysis, the factors associated with attitude before HPV self-sampling were age, menopausal status, sexual activity, education level, income, knowledge regarding HPV, and prior high-grade squamous intraepithelial lesion histology. The remaining significant factor on multivariate analysis was sexual activity within the past year (B=0.105, 95% confidence interval, 0.014-2.870; $P=0.048$).

Conclusion

Attitudes toward self-sampling improved after the actual self-sampling process, as evidenced by higher attitude scores. Sexual activity was the only independent factor related to the attitude before self-sampling.

Keywords: Cancer screening; Cervix; Attitude; Knowledge

Introduction

Cervical cancer is the fourth most common cancer among women globally. The world-age standardized incidence rate (ASIR) was approximately 5 per 100,000 women-years, with 604,127 new cases and 341,831 deaths in 2020 [1]. Cervical cancer had a very high disease burden and was a leading cause of death in Africa, Sub-Saharan Africa, Melanesia, South America, and South-East Asia. In Thailand, the cervical cancer ASIR and mortality rate are 16.4 and 7.4 per 100,000 women-years, respectively [1,2].

The target goal to conquer cervical cancer as planned by the World Health Organization (WHO) by 2030 is to increase the access and acceptability rates of cervical cancer vaccination, screening, and treatment to 90%, 70%, and 90%, respectively [3]. Focusing on cervical cancer screening, which is an essential step in achieving this goal [4] and detecting high-risk human papillomavirus (HPV), a vital etiological factor for cervical cancer, play important roles [5]. HPV testing is recommended as part of a comprehensive program for the prevention and control of cervical cancer [6,7].

The barrier to successful cancer screening lies not only in an effective screening technique but also in the screening coverage of the target population. The Thai National Cancer Institute reported 69% screening coverage among the target groups, and only 28% among women who should undergo screening based on recommendation [8]. Previous studies from other countries have reported many reasons for not undergoing cervical cancer screening, such as self-perception of good health, unavailability, shyness, problems of health access (the distance or personnel), and reluctance to undergo pelvic examination and/or to reveal personal or sexual history [9-11]. In Thailand, few studies reported the causes of 'no' or 'inadequate screening' as shyness or embarrassment, fear of pain, lack of knowledge about the cause of cervical cancer and importance of screening, anxiety about the abnormal results, low patient priority, and self-perception of good health or absence of any risk that the test deemed unnecessary [12-14]. Hence, self-sampling to collect specimens for HPV testing in patients who are not comfortable undergoing cervicovaginal examinations in health units may solve these problems [1,15,16].

Many studies have reported a high concordance rate of HPV detection between self-sampling and physician-sampling [17-19]. This finding has led to the implementation of self-sampling for HPV testing in some regions, including Europe,

Africa, America, and some Asian countries such as Malaysia and Myanmar [20]. In Thailand, HPV-based testing has been included in the National Cervical Cancer Screening Policy since 2020. In 2022, HPV self-sampling was offered by the Thai government to women in some areas as a pilot study and is planned to be launched nationwide in the future.

As this a screening technique performed by the women themselves, the women's knowledge of cervical cancer screening and attitude toward the self-sampling procedure are important. This information should help solicit and construct educational programs for target women.

This study aimed to compare attitudes toward self-sampling for HPV testing before and after specimen collection in women undergoing colposcopy. Possible factors associated with the outcomes were also evaluated. Knowledge of cervical cancer screening and HPV was also assessed, and is presented in detail elsewhere.

Materials and methods

1. Study design and women

This study was a parallel work of the primary prospective research entitled 'detection rates of high-risk human papilloma virus in women with abnormal cervical cytology: a comparison between self-collected and physician-collected specimens' which aimed to compare the detection rates of high-risk HPV from self- or physician-collected samples. The detection rates of high-risk HPV from the literature review were 41.6% in self-collected samples and 36.0% in physician-collected ones. After adding a 5% error, 500 women were required to complete the primary project. This study assessed the pre- and post-attitude self-sampling of each participant. This study was approved by the Thai Central Research Ethics Committee (COA-CREC082/2021). This study was a multicenter trial involving 10 institutes located in a metropolitan urban area of Thailand.

The inclusion criteria were Thai women aged ≥18 years who had abnormal cervical cytology and/or positive high-risk HPV testing results and visited the colposcopy unit of each institute from October 2021 to June 2022. The exclusion criteria were women who were pregnant, had active bleeding or abnormal vaginal discharge, had undergone vaginal douching within the past 48 hours, or had undergone hysterectomy, chemotherapy, or pelvic radiation. All the women

provided written informed consent before participating in the study.

2. Study questionnaires

All the researchers from each institution participating in the study discussed and refined the statements and questions from the literature review, especially the previous studies in Thailand, to construct the structured questionnaires (Supplementary Materials 1-3). Questionaire 1 included questions regarding knowledge about HPV. Questions related to self-sampling included questionnaire A (Q-A) (nine items of pre-test attitude toward HPV self-sampling) and questionnaire B (Q-B) (10 items of post-test attitude toward HPV self-sampling). The questions included the women's attitudes in terms of overall acceptance, convenience, privacy, proper devices, ease of use, explicit instructions, safety, confidence in performing, trustworthy results, and pain/discomfort (after the procedure only). The attitude or acceptance scores for each item were 1 (strongly disagree), 2 (disagree), 3 (neutral), 4 (agree), and 5 (strongly agree).

The questionnaires were assessed for validity by three Thai experts specializing in this field, who were not involved in the study. Reliability was tested in 30 women with characteristic features similar to those of the study population. The reliability was analyzed using Cronbach's alpha coefficients using IBM SPSS Statistics for Windows version 28.0 (IBM Cor., Armonk, NY, USA). The reliability of the attitude questionnaire was 0.907.

3. Procedure and data collection

The study process is illustrated in the study scheme (Fig. 1). On the day of the scheduled colposcopy, data obtained from the women included baseline characteristics, obstetric and gynecological history, and history of cervical cancer screening and its results. The research assistant then played a 5-minute video along with pictorial instructions about the self-sampling procedure. All questions were addressed verbally until all steps were clearly understood. Attitudes toward HPV self-sampling were assessed using the self-answered Q-A. The women then proceeded to collect samples with self-sampling tools for hrHPV mRNA (Aptima®; Hologic, Inc., San Diego, CA, USA) and HPV DNA testing (cobas® 4800 Systems; Roche Diagnostic Inc., Bangkok, Thailand). As the illustrated instruction (Supplementary Fig. 1). The colposcopy was then undertaken by a gynecologic oncologist who thoroughly
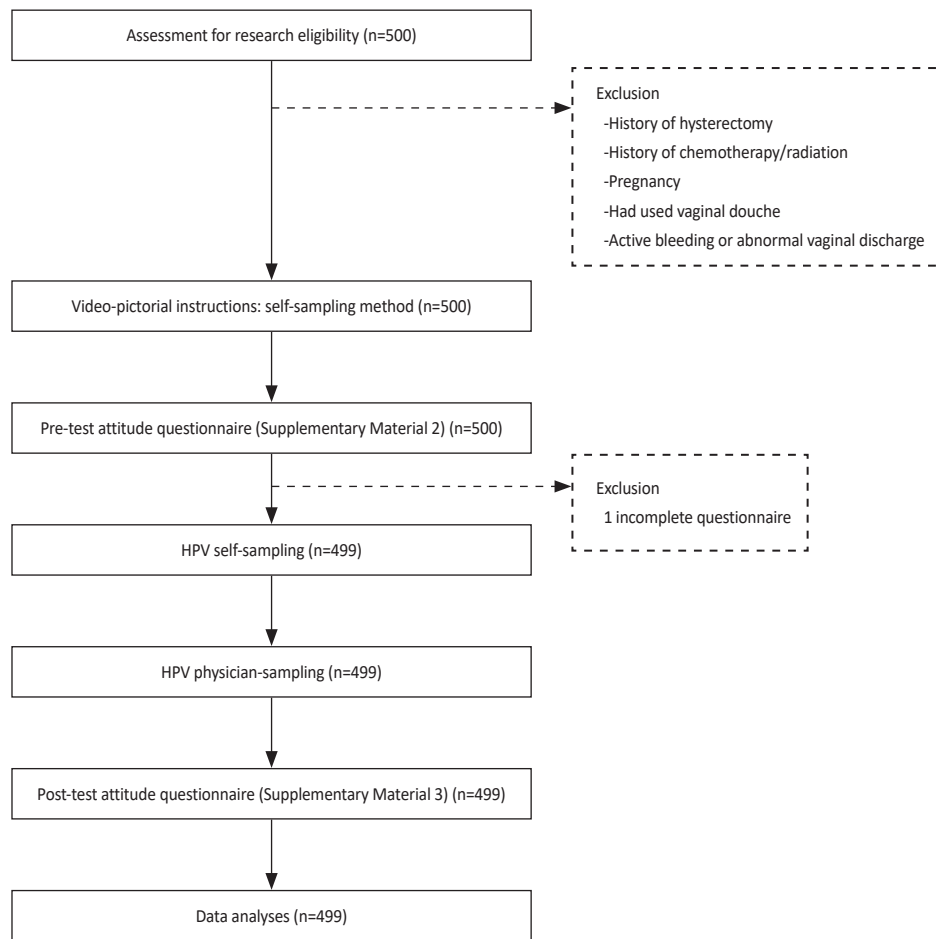
Fig. 1. Study scheme. HPV, human papillomavirus.

examined the cervix before collecting the cervical specimen for cytology and HPV mRNA testing (Aptima®; Hologic, Inc.). Subsequently, the attitude toward HPV self-sampling, with an additional question about pain and discomfort compared to the physician-collected procedure, was reassessed using Q-B.

4. Statistical analysis

Continuous variables were presented as mean±standard deviation (SD) for normally distributed data, or otherwise with median and interquartile ranges. Categorical variables were presented as frequencies and percentages. Attitude and total scores for each topic were presented as mean±SD. A higher score represents a better attitude or acceptance toward self-sampling. A full score for the total attitude score was 45 (pain/discomfort of self-sampling compared with physician sampling). A paired t-test was used to compare the total attitude scores before and after HPV self-sampling. Univariate linear regression analysis was performed to identify the factors associated with the total attitude score before HPV self-sampling. Factors that were statistically significant on univariate analysis ($P<0.1$) were analyzed with multivariable linear regression analysis to explore the independent factors associated with the total attitude score before using HPV self-sampling. A P-value <0.05 was considered statistically significant. Statistical analyses were performed using IBM SPSS Statistics for Windows version 28.0 (IBM Corp.).

Results

Of the 500 participating women, one did not complete the attitude questionnaire and was excluded from the analysis. Among the remaining 499 women, two did not provide clini-

Table 1. Clinical and socio-economic characteristics of women in the study (n=497)

Characteristic	
Age (yr)	39.0±11.4
Premenopause	424 (85.3)
Sexual activity	
Never	6 (1.2)
Ever, not active	133 (26.8)
Still active within 1 year	358 (72.0)
Parity	1 (0-2)
HPV vaccination	61 (12.3)
Marital status	
Married	335 (67.4)
Single/separate/divorces	162 (32.6)
Education level	
Below bachelor	144 (29.0)
Bachelor and higher	353 (71.0)
Family monthly income ≤672 USD	171 (34.4)
Occupation	
Unemployed/student/housewife	94 (18.9)
Employee/government officer	307 (61.8)
Own business	86 (17.3)
Other	10 (2.0)
Knowledge	
Cervical cancer screening (max=14)	7.1±1.8
HPV (max=6)	4.5±1.1
Previous abnormal cervical cytology	113 (22.7)
Previous positive HR-HPV testing	76 (15.3)
Previous cervical histology: HSIL or more	30 (6.0)

Values are presented as mean±standard deviation, median (interquartile range), number (%).

HPV, human papillomavirus; USD, United States Dollar; HR-HPV, high-risk human papillomavirus; HSIL, high-grade squamous intraepithelial lesion.

cal or demographic data. Table 1 summarizes the clinical and socioeconomic characteristics of the 497 women included in this study. The mean age was 39.0±11.4 years. Most patients were premenopause (85.3%) and had no HPV vaccination (87.7%). Approximately 72.0% of participants had been sexually active in the past year. Nearly half of the women (45.0%) had a history of abnormal cervical testing; 22.7% had prior abnormal cervical cytology, 15.3% had prior high-risk HPV infection, and 6.0% had a history of ≥high-grade cervical lesions (HSIL).

Before self-sampling, the mean sum attitude score toward HPV self-sampling was 37.8±5.7. On examining each item of the attitude questions, the pre-self-sampling scores for each attitude ranged from 4.2 to 4.4, except for two items. The two items with lower scores compared to the others were 'confidence to perform self-sampling' (score 3.9) and 'reliable results compared to physician sampling' (score 3.7).

After the self-sampling process, the mean sum attitude score increased to 39.7±5.2 (1.9 higher), which was significantly higher compared to the pre-self-sampling (P<0.001). The score for each attitude after sampling ranged from 4.2 to 4.6, showing a 0.2-0.3 higher score compared to presampling. Despite the overall improvement, one item, namely confidence in the reliability of self-sampling results compared

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Table 2. Attitude before and after use of HPV self-sampling (n=499)

Attitude (max=5)	Before	After	*P*-value
Overall acceptance score	4.2±0.8	4.4±0.8	<0.001
Convenience (can be done at home)	4.3±0.9	4.5±0.8	<0.001
Privacy (not exposure to else)	4.4±0.8	4.6±0.7	<0.001
Proper (small) collective device	4.4±0.8	4.6±0.6	<0.001
Easy procedure	4.4±0.7	4.6±0.6	<0.001
Clear instruction	4.4±0.8	4.6±0.6	<0.001
No harm with a correct use	4.2±0.9	4.4±0.8	<0.001
Confident in performing self-collection	3.9±0.9	4.2±0.9	<0.001
Similar yield of abnormality with physician collected	3.7±0.9	3.9±0.9	<0.001
Less pain and discomfort than the physician collected	NA	4.1±0.9	NA
Total score (max=45)	37.8±5.7	39.7±5.2	*t*=8.84

Values are presented as mean±standard deviation.
HPV, human papillomavirus; NA, not available.

to physician sampling, still had a lower score (3.9) than the other items. Table 2 provides a detailed overview of attitude scores before and after self-sampling.

When we assessed the association between attitude before the use of HPV self-sampling and the women's characteristic features using univariate analyses, a significant negative correlation of attitude with age (B=-0.079; *P*=0.077) and postmenopause status (B=-0.097; *P*=0.031) was revealed. In contrast, a significant positive correlation of attitude with active sexual activity within the past year (B=0.095; *P*=0.035), education level of bachelor's degree or higher (B=0.098; *P*=0.029), and family monthly income greater than 672 United States Dollar (B=0.089; *P*=0.047) were found. Although knowledge of HPV (B=0.097; *P*=0.055) and prior HSIL pathology (B=0.078; *P*=0.082) tended to have positive correlation, they were not significant. On multivariate analysis, the only remaining significant factor associated with a positive attitude was sexual activity within the past year (B=0.105; *P*=0.048) (Table 3).

Discussion

The present study was a multicenter study in Thailand that assessed women's attitudes toward HPV self-sampling. We found rather high overall and attitude scores for each item even before the self-sampling (37.8±5.7). The attitude score was higher after the actual use of self-sampling (39.7±5.2).

This result was similar to that of a previous single-center study in Thailand by Phoolcharoen et al. [19], who reported a mean attitude score of 4.2 out of 5 after use among 250 women attending colposcopy clinics. Another survey by Kittisiam et al. [21] in Thailand also reported a 40.3% acceptance rate of 2,810 healthy Bangkok women toward self-sampling. In several other studies, 57-100% preference rates toward HPV self-sampling have been reported [16-18,21,22]. This wide range of acceptance may lie not only in individuals' characteristics but also in religious and cultural differences.

We demonstrated significantly improved attitudes after actual self-sampling for all items. This was consistent with previous studies that reported that women's perceptions improved after an actual experience of self-sampling in terms of privacy, comfort, ease of use, feeling more relaxed during sampling, and time saving [16-18,22-25]. Privacy and comfort are the major benefits, especially for women who have never been or are under-screened due to embarrassment [18,25]. Although there was a statistically significant increase in attitude scores post-sampling (with a 1.9-point increase), further studies involving a larger sample size and healthy women are needed to confirm the clinical significance of this improvement.

The two issues that had the lowest attitude scores in this study were confidence in performing self-sampling and the reliability of self-sampling. These were consistent with findings from previous studies [16,17,19,22,25]. Nevertheless, our study demonstrated an improvement in confidence

Table 3. Factors associated with attitude scores before use of HPV self-sampling

Factor	Univariable analysis			Multivariable analysis		
	B	95% CI	*P*-value	B	95% CI	*P*-value
Age (yr)	-0.079	(-0.090 to 0.005)	0.077	0.024	(-0.067 to 0.094)	0.742
Menopausal status						
Premenopause	1	Ref		1	Ref	
Postmenopause	-0.097	(-3.196 to 0.154)	0.031	-0.034	(-3.199 to 1.957)	0.636
Sexual activity						
Never/abstinence	1	Ref		1	Ref	
Active within 1 year	0.095	(0.094 to 2.493)	0.035	0.105	(0.014 to 2.870)	0.048
Parity						
≤1	1	Ref				
>1	-0.061	(-2.019 to 0.371)	0.176			
HPV vaccination						
No	1	Ref				
Yes	0.024	(-1.202 to 2.095)	0.595			
Education level						
Below bachelor	1	Ref		1	Ref	
Bachelor or more	0.098	(0.139 to 2.513)	0.029	0.037	(-1.087 to 2.139)	0.522
Family monthly income (USD)						
≤672	1	Ref		1	Ref	
>672	0.089	(0.017 to 2.285)	0.047	0.061	(-0.636 to 2.266)	0.270
Previous cervical cancer screening						
Never or normal	1	Ref				
Abnormal	0.060	(-0.371 to 1.987)	0.179			
Previous cervical histology						
LSIL or less than	1	Ref		1	Ref	
HSIL	0.078	(-0.140 to 2.349)	0.082	0.079	(-0.297 to 2.572)	0.120
Knowledge of CCS	0.068	(-0.066 to 0.522)	0.128			
Knowledge of HPV	0.097	(-0.012 to 1.116)	0.055	0.100	(-0.011 to 1.140)	0.054

HPV, human papillomavirus; CI, confidence interval; Ref, reference; USD, United States Dollar; LSIL, low-grade squamous intraepithelial lesion; HSIL, high-grade squamous intraepithelial lesion; CCS, cervical cancer screening.

about performing self-sampling after a single actual performance. Poorer acceptability might be because the women did not know about HPV self-sampling or had scant opportunities to try the self-method, especially older women who were more familiar with traditional Pap smears [26]. Furthermore, due to the conservative culture, Thai women usually avoid touching or inserting any device into the vagina, for example, using a tampon or performing a pelvic examination [19,25,27].

Age and postmenopause were negatively associated with attitude. Previous studies also found that older age, lower income, level of knowledge, religious beliefs, and Pap smear experience are associated with low acceptance of HPV self-sampling [16,21,26]. In contrast, we found that the features showing a positive association were sexually active status, high education level, and previous HSIL cytology. The only independent positive factor was sexual activity within the past year. These women may have less fear or be more comfortable inserting devices into the vagina than non-sexually active women. Other studies have revealed that women with better HPV knowledge tend to have greater acceptance of and confidence in self-sampling [21,26,28].

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Previous studies in Thailand reported a low level of knowledge about HPV and cervical cancer screening [21,29]. A Canadian study demonstrated a strategy for the expanded coverage of HPV self-sampling by using healthcare providers to provide more details and information on the accuracy of HPV self-sampling [26]. The national policy should promote the population's knowledge of cervical cancer prevention and HPV infection as important causes.

With our finding that the women's attitude regarding the reliability of the testing results did not improve much after actual self-sampling, comparable performance of self-compared to physician sampling should be reassured to the women directly or as a public educational program. These factors should enhance the acceptance of, or attitudes toward, and self-sampling for HPV testing. Direct communication and assertion by regular or local healthcare providers may reassure women about the clinical application and reliability of self-sampling. Illustrating the basic lower genital tract anatomy before self-sampling using a model or animation may increase the confidence and trustworthiness in the HPV self-sampling results.

This study has some strengths, as it was a prospective multicenter study. Therefore, the heterogeneity among women from different institutions may represent a variety of female groups. Furthermore, data were collected immediately before and after self-sampling to avoid recall bias. However, this study had some limitations. First, a self-sampling survey of attitudes was conducted after colposcopy. This may have affected our results. Second, the study participants had specific characteristics; for example, all participating institutes were located in the metropolitan urban area of Thailand, only 1.2% of the women in this study had never had any sexual activity (intercourse), and all study participants had undergone abnormal cervical cancer screening. Hence, the clinical features of women that influence their attitudes may differ from those of women with different characteristics or backgrounds, and the study findings may not be applicable to all groups of women. Further studies on women from different backgrounds are required to determine the overall national situation. The data will serve as basic information for planning a comprehensive solicitation program to achieve the WHO target of 70% cervical cancer screening.

Attitudes toward HPV self-sampling were accepted, especially among sexually active women. Attitude scores improved after the actual self-sampling. Confidence in performing the procedure and the reliability of the results were issues to be resolved.

Conflict of interest

The authors declare no conflict of interest.

Ethical approval

This study was approved by The Thai Central Research Ethics Committee (COA-CREC082/2021).

Patient consent

All participants provided written informed consent prior to enrollment.

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