



## Knowledge of HPV and Surgery among Women Who Underwent Cervical Conization: A Korean Multi-Center Study

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**Purpose:** Human papillomavirus (HPV) infection is a well-known cause of cervical cancer, which, along with its precursors, can be diagnosed and treated with cervical conization (CC). This study aimed to assess HPV- and procedure-related knowledge among women who had undergone CC.

**Materials and Methods:** Between February and May 2014, consecutive women who had undergone CC at five different educational hospitals were recruited. All patients had undergone a loop electrosurgical excision procedure as the method of CC. A survey was conducted with a self-developed, 29-item questionnaire, measuring knowledge related to HPV and CC. We analyzed the responses of 160 patients who completed the questionnaire.

**Results:** Mean total knowledge scores ( $\pm$ standard deviation) for HPV and CC were  $5.2\pm 3.0$  of a possible 13.0 and  $8.3\pm 4.2$  of a possible 16.0, respectively. While 73% of the patients knew that HPV is the main cause of cervical cancer, only 44% knew that HPV is sexually transmitted. The purpose of CC was correctly identified by 71% of the patients. However, 35% failed to indicate the anatomical area resected at the time of CC in the schematic diagram. Women who were younger ( $p<0.001$ ), had higher education level ( $p<0.001$ ), and higher family income ( $p=0.008$ ) had higher knowledge scores. In contrast, neither interval from CC to survey nor disease severity were associated with total knowledge score.

**Conclusion:** The level of knowledge related to HPV and CC was unexpectedly low in women who had undergone CC. Intuitive educational resources may improve this knowledge, and further cohort studies are warranted.

**Key Words:** Knowledge, human papillomavirus (HPV), cervical cancer, surgery

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## INTRODUCTION

Cervical cancer remains one of the most common female cancers in Korea.<sup>1-3</sup> It is caused by human papillomavirus (HPV) infection, which is sexually transmitted. HPV infection occurs in more than 50% of women who are sexually active during their lifetime.<sup>4</sup> Pre-invasive neoplasia of the cervix and cervical cancer can be diagnosed and treated with cervical conization (CC).<sup>5</sup>

In clinical practice, patients' understanding of or knowledge about the disease and its treatment plays an important role in

their decision-making.<sup>6,7</sup> According to the ethical guidelines of the Korean Medical Association, patients have a right to receive sufficient information and explanations related to the treatment of disease from a practitioner, and they can accordingly actively participate in the decision making process of the treatment.<sup>8</sup>

However, patients' understanding and practitioners' provision of information are two different concepts. Patients who have insufficient communication with medical practitioners often experience dissatisfaction and decisional conflicts.<sup>6</sup> Therefore, efforts to enhance patients' knowledge are important. Assessment of this knowledge is the first step.

According to previous studies, awareness of HPV is low am-

ong women, in general.<sup>9,10</sup> However, the level of HPV-related knowledge has not yet been investigated among those who have undergone CC for cervical intraepithelial neoplasia (CIN) or early cervical cancer. Thus, the aim of this study was to assess HPV- and procedure-related knowledge in women who had undergone CC. The factors associated with the level of knowledge were also investigated.

## MATERIALS AND METHODS

### Study design and participants

The current study was conducted between February and May

**Table 1.** Patients' Demographic Characteristics and Knowledge Scores

| Variable                           | n   | %     | M±SD       | t-test/F-test | p value | Sheffe test* |
|------------------------------------|-----|-------|------------|---------------|---------|--------------|
| Total                              | 160 | 100.0 | 13.47±6.49 |               |         |              |
| Age                                |     |       |            | 19.072        | <0.001  | c<b<a        |
| ≥20, <40 yrs <sup>a</sup>          | 41  | 25.6  | 17.60±5.50 |               |         |              |
| ≥40, <60 yrs <sup>b</sup>          | 104 | 65.0  | 12.56±6.09 |               |         |              |
| ≥60 yrs <sup>c</sup>               | 15  | 9.4   | 7.40±5.26  |               |         |              |
| Marital status                     |     |       |            | 2.384         | 0.072   |              |
| Single                             | 17  | 10.5  | 17.00±5.71 |               |         |              |
| Married                            | 123 | 76.9  | 13.06±6.47 |               |         |              |
| Divorced/separated                 | 10  | 6.3   | 13.20±9.05 |               |         |              |
| Widowed                            | 10  | 6.3   | 10.90±3.35 |               |         |              |
| Education                          |     |       |            | 21.566        | <0.001  | a<b<c        |
| Less than high school <sup>a</sup> | 25  | 15.6  | 7.88±4.80  |               |         |              |
| Completed high school <sup>b</sup> | 65  | 40.6  | 12.29±6.42 |               |         |              |
| More than high school <sup>c</sup> | 70  | 43.8  | 16.42±5.51 |               |         |              |
| Family income                      |     |       |            | 3.556         | 0.008   | a<b          |
| <2000 USD <sup>a</sup>             | 37  | 23.1  | 10.46±6.83 |               |         |              |
| ≥2000, <3000 USD                   | 27  | 16.9  | 12.64±6.89 |               |         |              |
| ≥3000, <4000 USD                   | 25  | 15.6  | 13.92±6.48 |               |         |              |
| ≥4000, <5000 USD                   | 34  | 21.3  | 14.06±6.24 |               |         |              |
| ≥5000 USD <sup>b</sup>             | 37  | 23.1  | 15.83±5.23 |               |         |              |
| Childbirth                         |     |       |            | -3.314        | 0.062   |              |
| Yes                                | 135 | 84.4  | 12.62±6.32 |               |         |              |
| No                                 | 25  | 15.6  | 17.20±6.38 |               |         |              |
| Abortion                           |     |       |            | -1.360        | 0.176   |              |
| Yes                                | 103 | 64.4  | 12.84±6.60 |               |         |              |
| No                                 | 57  | 35.6  | 14.33±6.32 |               |         |              |
| Previous surgery (other than CC)   |     |       |            | -0.558        | 0.577   |              |
| Yes                                | 68  | 42.5  | 13.03±6.58 |               |         |              |
| No                                 | 92  | 57.5  | 13.62±6.51 |               |         |              |
| Interval from CC to survey         |     |       |            | 1.032         | 0.380   |              |
| <1 yr                              | 79  | 49.4  | 12.88±7.14 |               |         |              |
| 1–3 yrs                            | 26  | 16.2  | 12.35±5.39 |               |         |              |
| 3–5 yrs                            | 44  | 27.5  | 14.77±6.18 |               |         |              |
| >5 yrs                             | 11  | 6.9   | 13.40±5.58 |               |         |              |

M, mean; SD, standard deviation; CC, cervical conization.

\*Post hoc comparison.

2014 at five different educational hospitals: National Cancer Center, Pusan National University Yangsan Hospital, Seoul National University Hospital, Inje University Ilsan Paik Hospital, and National Health Insurance Service Hospital, Korea. After obtaining approval from the Institutional Review Boards (IRB) of the five hospitals (IRB No: NCC2014-0010, PNUYH05-2014-040, SNUH1402-0056-556, IB-3-1403-011, and SUYON 2014-011, respectively), patients who had undergone CC by loop electrosurgical excision procedure (LEEP) were recruited. Women who declined to participate in the survey or had difficulty communication were excluded from this study.

**Instruments and analysis**

For all participants, we collected and analyzed: 1) demographic characteristics, including age, marital status, parity, level of education, family income, and history of abortion or other surgery; and 2) clinical characteristics, including Pap smear status, HPV test status, and cervical pathology.

To measure participants' knowledge related to HPV and CC, a questionnaire was developed through multiple steps. The first step was to obtain contents from relevant literature and the National Cancer Center Information Book for Cervical Cancer, an information book for patients. The second step was for clinicians to evaluate the content validity of the questionnaire; eight gynecologists were involved in this evaluation. By using a content validity index (CVI), questionnaire items were added, removed, or modified. The CVI was calculated by rating the relevance of items on a 4-point scale: 1=not relevant, 2=some-what relevant, 3=quite relevant, and 4=highly relevant. Only items whose CVI exceeded 0.8 were retained.<sup>11</sup> The last step was to confirm 13 items deemed to be related to HPV knowl-

edge and 16 items on CC knowledge. Response options for each item were "yes," "no," and "do not know." One point was assigned for each correct answer and no points for each incorrect answer (including "do not know"). By summing the points, total scores for HPV knowledge and CC knowledge were calculated (range of 0-13 and 0-16, respectively). Associations between patient characteristics and their knowledge scores were investigated. The differences in total scores were explored using analysis of variance and Student's t test. All statistical analyses were performed using SPSS software (version 21.0; SPSS Inc., Chicago, IL, USA). A *p* value <0.05 was considered statistically significant.

**RESULTS**

Of 190 participants, 30 were excluded from analyses because of incomplete responses. The mean total knowledge score ( $\pm$ standard deviation, SD) of the remaining 160 women was 13.5 $\pm$ 6.5 of a possible 29.0. Individual mean scores ( $\pm$ SD) for HPV and CC were 5.2 $\pm$ 3.0 of a possible 13.0 and 8.3 $\pm$ 4.2 of a possible 16.0, respectively.

Table 1 shows the demographic characteristics of participants from the five hospitals. The average age was 46.3 years. Most patients were married (76.9%) and were educated beyond high-school level (43.8%). The clinical characteristics of participants are summarized in Table 2. Regarding Pap smear status, 72 patients (45.0%) had a high-grade squamous intraepithelial lesion. Most patients (90.6%) had positive results on HPV testing. After CC, histopathological examination revealed CIN 3 in 92 patients (57.5%).

**Table 2.** Patient Clinical Characteristics and Knowledge Scores

| Variable             | n   | %     | M $\pm$ SD       | t-test/F-test | p value |
|----------------------|-----|-------|------------------|---------------|---------|
| Total                | 160 | 100.0 | 13.47 $\pm$ 6.49 |               |         |
| Pap smear            |     |       |                  | 0.481         | 0.790   |
| Normal               | 4   | 2.5   | 11.50 $\pm$ 4.43 |               |         |
| ASCUS                | 32  | 20.0  | 13.28 $\pm$ 6.36 |               |         |
| ASC-H                | 21  | 13.1  | 14.50 $\pm$ 6.51 |               |         |
| LSIL                 | 29  | 18.1  | 13.30 $\pm$ 6.47 |               |         |
| HSIL                 | 72  | 45.0  | 13.45 $\pm$ 6.86 |               |         |
| Cancer               | 2   | 1.3   | 8.00 $\pm$ 4.24  |               |         |
| HPV                  |     |       |                  | 1.211         | 0.273   |
| Positive             | 145 | 90.6  | 13.55 $\pm$ 6.43 |               |         |
| Negative             | 15  | 9.4   | 11.60 $\pm$ 7.34 |               |         |
| Conization pathology |     |       |                  | 0.711         | 0.586   |
| CIN 1                | 21  | 13.1  | 11.85 $\pm$ 5.98 |               |         |
| CIN 2                | 39  | 24.4  | 14.34 $\pm$ 6.08 |               |         |
| CIN 3                | 92  | 57.5  | 13.11 $\pm$ 6.82 |               |         |
| Cancer               | 8   | 5.0   | 15.25 $\pm$ 6.45 |               |         |

M, mean; SD, standard deviation; ASCUS, atypical squamous cells of undetermined significance; ASC-H, atypical squamous cells-cannot exclude HSIL; LSIL, low-grade squamous intraepithelial lesion; HSIL, high-grade squamous intraepithelial lesion; HPV, human papillomavirus; CIN 1, cervical intraepithelial neoplasia grade 1; CIN 2, cervical intraepithelial neoplasia grade 2; CIN 3, cervical intraepithelial neoplasia grade 3.

**Table 3.** Review of HPV Knowledge

| No. | Authors (yr)                     | Country            | Participants                                       | Measures                            | Result  |
|-----|----------------------------------|--------------------|--|-------------------------------------|---|
| 1   | Ramavath and Olyai <sup>26</sup> | India              | Adolescent<br>13–19 yrs<br>n=1000                  | HPV infection knowledge:<br>5 items | Knowledge of HPV infection and vaccine was of <30% level<br>72% did not know the relationship between cervical cancer and HPV<br>77.2% did not know that HPV is sexually transmitted                            |
| 2   | Dodd, et al. <sup>9</sup>        | USA, UK, Australia | Female, male<br>Mean 40 yrs<br>n=1473              | HPV knowledge: 15 items             | 50% had heard about HPV test<br>Greater knowledge in the USA than in the UK and Australia<br>Women had greater knowledge of HPV than men  |
| 3   | Lima, et al. <sup>24</sup>       | Brazil             | Female<br>Mean 30.4 yrs<br>n=706                   | HPV knowledge: 10 items             | 70% had poor knowledge of HPV and Pap tests<br>Greater knowledge of HPV associated with: age, education, marital status, income, pregnancy<br>Greater knowledge of Pap tests associated with: education, income |
| 4   | Wang and Wu <sup>10</sup>        | Taiwan             | Female college students<br>Mean 21.2 yrs<br>n=150  | HPV vaccine knowledge:<br>17 items  | Knowledge of HPV vaccine correlated with perceived risk of cervical cancer  |
| 5   | Hong, et al. <sup>20</sup>       | China              | Female workers<br>Mean 25.14 yrs<br>n=360          | HPV knowledge: 7 items              | 70% had heard about cervical cancer<br>22% had heard about HPV<br>Less than 10% knew the risk factors for cervical cancer   |
| 6   | Kang <sup>22</sup>               | Korea              | Mothers<br>Mean 42.93 yrs<br>n=101                 | HPV knowledge: 25 items             | 5.9% had been vaccinated against HPV<br>24.2% scored correctly on all questions on HPV  |
| 7   | Blödt, et al. <sup>16</sup>      | Germany            | Vocational school students<br>18–25 yrs<br>n=504   | HPV knowledge: 11 items             | 67% had been vaccinated against HPV<br>80% knew that HPV vaccine prevents cervical cancer<br>50% women knew about HPV<br>25% men knew about HPV   |
| 8   | Cho, et al. <sup>15</sup>        | Korea              | Female public health personnel<br>≥20 yrs<br>n=546 | HPV knowledge: 11 items             | 37.6% had heard about HPV   |
| 9   | Ragin, et al. <sup>13</sup>      | USA                | General population<br>≥18 yrs<br>n=202             | HPV knowledge: 10 items             | Most had heard about HPV<br>18% knew that HPV vaccine prevents genital warts and cervical cancer  |

HPV, human papillomavirus.

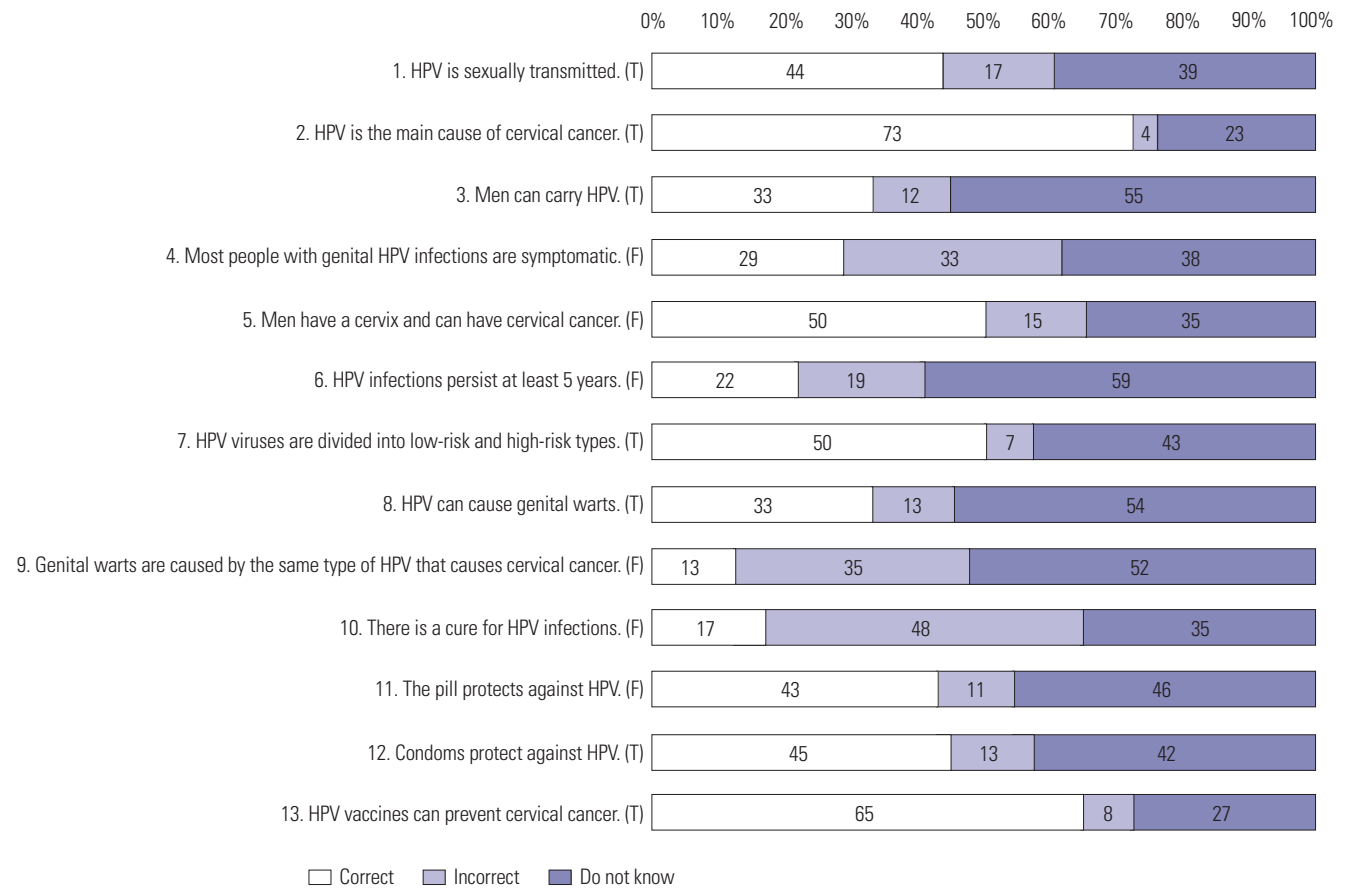


Fig. 1. Knowledge of HPV in women who had undergone cervical conization. HPV, human papillomavirus.

Fig. 1 shows the responses to the HPV knowledge questionnaire. The correct response rate for the questionnaire items ranged from 13% to 73%. Among the 13 items, only two were identified as being answered correctly by more than 50% of participants: ‘HPV is the main cause of cervical cancer’ (73%) and ‘HPV vaccines prevent cervical cancer’ (65%). However, only 44% of the patients knew that HPV is sexually transmitted.

Fig. 2 shows the responses to the CC knowledge questionnaire. The items answered correctly by more than 50% of respondents were #1, 2, 3, 5, 6, 7, and 8. Of the participants, 72% were aware of the common postoperative complications such as vaginal bleeding and discharge, and similarly, 71% knew the purpose of CC. However, 35% failed to indicate correctly in a schematic diagram the anatomical area resected during CC, despite having already undergone surgery. Only 29% of the patients answered correctly that the risk of preterm birth is increased with prior CC for cervical dysplasia.

Table 1 and 2 show total knowledge scores according to the patient demographic and clinical characteristics. Women who were younger ( $p < 0.001$ ), had higher education level ( $p < 0.001$ ), and reported higher family income ( $p = 0.008$ ) had higher total knowledge scores. In contrast, neither interval from CC to survey nor disease severity were associated with total knowledge score.

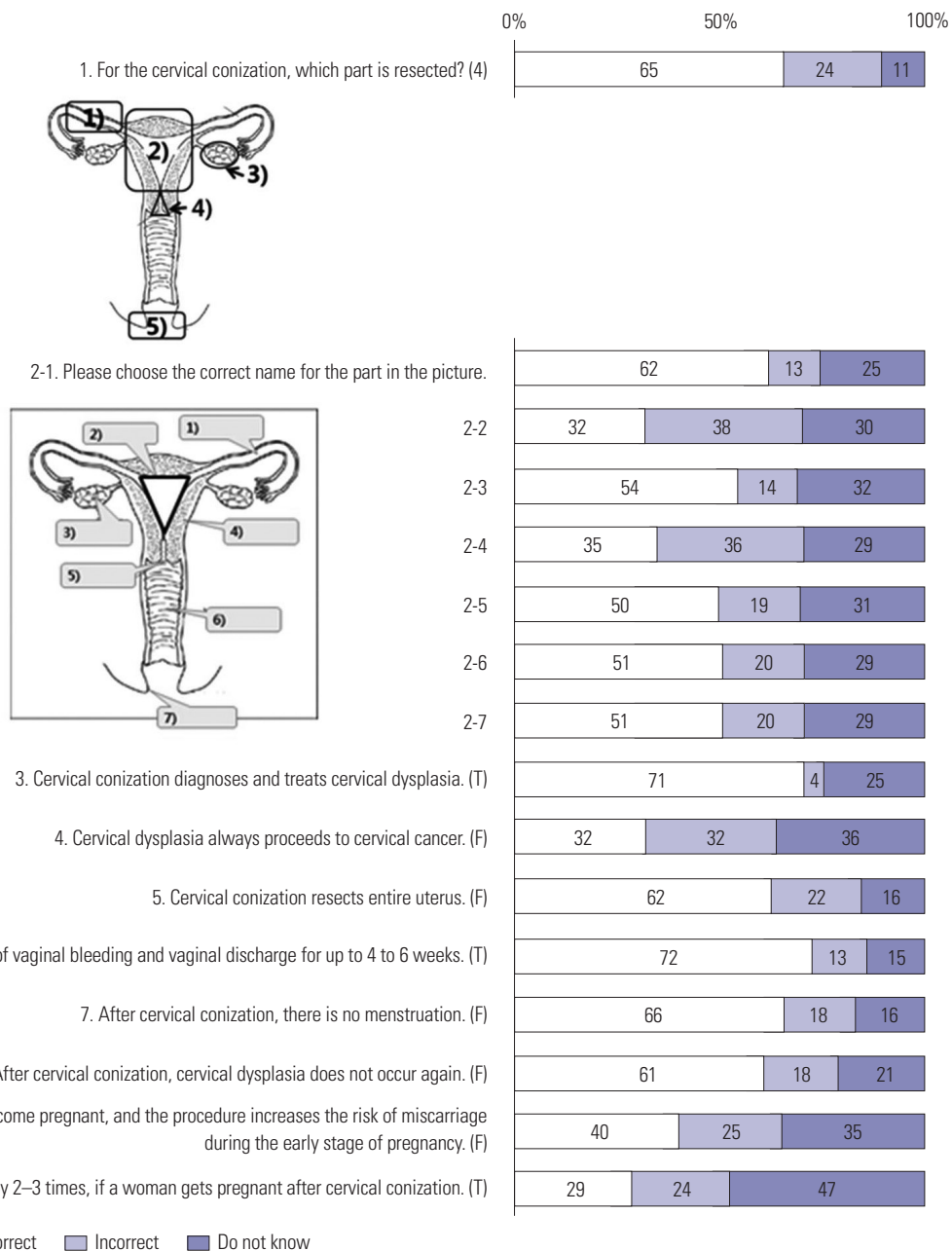
Table 3 shows the literature review of studies related HPV knowledge.

## DISCUSSION

In the current study, we investigated the level of knowledge related to HPV and CC. Contrary to expectation, even women who had undergone CC due to CIN or early cervical cancer exhibited poor HPV- and procedure-related knowledge. This suggests a need to improve preoperative education for patients who are scheduled to undergo CC.

Data from previously published studies on HPV-related knowledge are summarized in Table 3.

Most participants in the current study were aware that HPV is the main cause of cervical cancer and that the purpose of CC is to diagnose and treat CIN or early cervical cancer, in keeping with previous studies.<sup>12-14</sup> The anatomical area resected during CC was correctly identified in the schematic diagram by 65% of the women. Moreover, 51% of the women knew that HPVs are categorized into low-risk types causing genital warts and high-risk types causing cervical cancer. This percentage exceeds those found in previous studies: 45% of female public health personnel in Korea<sup>15</sup> and 20% of the vocational school



**Fig. 2.** Knowledge of cervical conization in women who had undergone cervical conization. HPV, human papillomavirus.

students in Germany.<sup>16</sup> Only 29% of the women correctly answered the question about the relationship between CC and increased risk of preterm birth, which was also reported shown in a Norwegian cohort study.<sup>17</sup> Interestingly, a recent meta-analysis reached a different conclusion on this issue: women who have undergone LEEP for cervical dysplasia have a similar risk of preterm birth to those with prior dysplasia but no LEEP.<sup>18</sup> We believe that well-designed prospective studies would help clarify this issue. In particular, the disease entity occurring before CC (e.g., CIN 3 or early cervical cancer), as well as the extent of cervical excision (both width and depth), should be considered in such studies.

The literature recommends that patients should be informed sufficiently about their exact diagnosis and the rationale and extent of treatment by medical practitioners, before making a decision to undergo a specific treatment.<sup>19,20</sup> Since the degree of patients' understanding of the disease and its treatment is a major factor in this decision making, assessment, as well as enhancement, of patients' knowledge of HPV and CC is necessary.<sup>6,7,21</sup>

The finding that younger women were more knowledgeable on the present topics is consistent with previous studies.<sup>22,23</sup> This finding might be explained by patients having varying accessibility to information according to their age. For example,

the proportion of Internet users is lower in older populations than in the average population.<sup>23</sup> Older patients with less exposure to the Internet might demonstrate both lower information literacy and lower level of knowledge.

Educational background is a well-established factor related to knowledge. In the current study, women with higher educational level tended to have higher level of knowledge, a finding consistent with the previous studies in the United States, the United Kingdom, Brazil, and Australia.<sup>9,24</sup> Considering the significance of educational background, we believe patient education should be provided in accordance with the patient's education level, to improve patient understanding. However, "proof-of-concept studies" are required to prove the benefit of such stratified education.

In addition, we found that level of knowledge was higher for women with higher family income. This is also consistent with a previous study in which higher income was associated with higher education level, which in turn was associated with better adherence and knowledge.<sup>25</sup> Therefore, patients' economic status and educational background should be considered at the time of preoperative counseling.

There were several limitations in this study. First, the questionnaire was developed by medical practitioners and therefore, might be difficult for patients to comprehend. Second, inevitable issues such as a recall bias might exist because the survey was performed more than one year after CC for most patients. Third, menopausal status was not considered: it will be evaluated in a further prospective interventional study in the near future. Fourth, in this multi-center study, the participants might have received different preoperative education or information. Nevertheless, the current study has definite strengths. First, to our knowledge, this study was the first to investigate HPV- and procedure-related knowledge in women who had undergone CC due to CIN or early cervical cancer. Second, the questionnaire was developed by gynecologists, and the items had a satisfactory CVI. Third, as a multi-center study, this study had advantages in terms of reproducibility.

In conclusion, the current study showed that the level of HPV- and procedure-related knowledge was low in women who had undergone CC. The prognostic factors for the level of knowledge included younger age, higher level of education, and higher family income. As these three factors are difficult to overcome in a short period of time, more individualized education strategies are necessary. In the near future, we will investigate whether knowledge level affects patients' decision-making regarding their treatment.

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