

Effectiveness of a health education program to improve health literacy among females in their 20s: A quasi-experimental study

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Abstract

Background Japanese women cervical cancer rates are rising aged 20-30 years, few opportunities for sex education of appropriate for age are provided to females. Health literacy (HL) is an important concept in women's health. To improve HL for cervical cancer prevention, we developed a health program for females in their 20s. This study aimed to examine the effectiveness of the program. **Methods** A quasi-experimental design with control groups was conducted on female undergraduate students. The inclusion criteria for both groups were: (i) Japanese females, (ii) aged 20 years or older. The sample size for each group was set at ≥ 13 people based in a previous study. The participants were evaluated HL variables: HL scale score, confidence in explaining one's own body to a medical practitioner (Y/N), knowledge of women's health, and indicated whether they had undergone cervical cancer screening. Assessments were conducted baseline and 6 months after (follow-up) the program was implemented. Analysis of the results consisted of calculating intergroup comparisons of HL variables at follow-up using the Mann-Whitney U test and Fisher's exact test or chi-square test. **Results** 14 students for the intervention group participated in the study, while 60 students for the control group participated. Intergroup pair matching using the variables of concern for one's own body and HL scale score yielded a total final analysis population of 28 participants ($n=14$ in each group). Comparison of both groups at follow-up revealed a significant difference in median HL scale score, at 66 in the intervention group versus 60 in the control group ($P=.002$), also a significant difference in the percentage of participants who felt confident in explaining their own body to a medical practitioner ($P<.001$), and median knowledge score was 16 in the intervention group and 14 in the control group, which was significantly different ($P=.008$). There were no significant intergroup differences in cervical cancer screening behaviors. **Conclusions** The results indicated that the program was effective in improving HL, but was not effective in changing cervical cancer screening behavior. Further research is needed to determine how to provide appropriate sex education among females in their 20s.

Background

Cervical cancer is an important women's health issue worldwide, representing the second most common cancer affecting females with over 569,000 new cases and over 310,000 new deaths in 2018. Asia has had the highest prevalence of cervical cancer in the past 5 years [1]. Japanese cervical cancer rates are rising for women aged 20–30 years [2]. Cervical cancer can be detected early, which greatly increases the chances of successful treatment and results in an approximately 40% reduction in the incidence and mortality of invasive cancer [3]. In other words, cervical cancer is preventable, and it is important for women to be screened. The Ministry of Health, Labor and Welfare in Japan has been conducting cervical cancer screening for women over 20 years of age since 2008 and recommends screening once every 2 years [4]. However, cervical cancer screening rate in Japan is as low as about 40%, compared to 70 to 80% of OECD member countries [5]. In addition, the Ministry of Health, Labor and Welfare in Japan refrains from actively promoting inoculation because since 2012, there have been reports that such

vaccinations may cause health damage [6]. Therefore, the importance of cervical cancer screening for Japanese women is increasing.

Education is an important form of primary prevention for cervical cancer. The human papilloma virus is the most commonly acquired infection during sexual relations and it is commonly acquired early in sexual life. The World Health Organization recommended that a program tailored appropriately to age and culture be provided to sexually healthy boys and girls [7]. However, in most Asian cultures, many parents are reluctant to educate their children on sexual health topics because sexuality is taboo [8], and Japan is no exception. Additionally, few opportunities for sex education are provided to students after graduating from high school, and the education that is provided in high school is inadequate. Furthermore, sex education in Japan may differ between schools and regions [9]. It is important to provide Japanese women in their 20s with standardized sex education that is appropriate for their age.

Health literacy (HL), which is the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions [10], plays an important role in women's health care. Particularly, HL impacts many facets of woman's reproductive health care [11]. A systematic review of HL and cervical cancer screening shows that HL has been linked to cervical cancer screening behavior [12]. However, a study in Japan found that HL was lower among Japanese adults than European adults, suggesting the importance of improving HL [13]. A review study suggested that HL can be improved by providing information, effective communication and a structured education program [14]. We suggest that it is necessary to educate Japanese women to improve HL in Japan. However, no known Japanese study has been published to identify any programs to improve HL for the prevention of cervical cancer among female university students.

To begin to address this gap in knowledge, we previously developed a health education program to improve HL in Japanese women in their 20s [15]. This study aimed to evaluate the efficacy of the program. Findings from this study may help to implement more effective sex education for women in their 20s, thereby contributing to a rise in the cervical cancer screening rate in Japan.

Methods

Intervention program

The health education program we developed aimed to improve education for the prevention of cervical cancer, to reduce the risk of sexual transmitted infections (STIs), and to improve HL among female undergraduate students aged 20 and older. The program was developed with reference to previous studies using skills training for condom use [16,17] to improve HL education by using jargon-free communication, pictures to clarify concepts, and confirmation of participants' comprehension via the "show-me" or "teach-back" method [18] based on feedback from female nurses and undergraduate students. The program consisted of a group lecture and a demonstration to provide knowledge on the following: (i) use of a basal body temperature thermometer and a vaginal discharge model to understand one's own menstrual cycle; (ii) gynecological disease cases (e.g., general STIs, and cervical cancer) to

learn about recent trends in and the prevention of gynecological diseases; and (iii) using one's own smartphone to access health resources and worksheets regarding gynecological examinations and consultations. The teaching materials used in the program were created using Microsoft PowerPoint 2013 (Redmond, WA, USA). A literature review regarding HL and women's health suggested that readability, layout, and design were key components in developing effective printed materials [19]. We previously conducted a program development study, and all participants indicated high levels of satisfaction and understanding of the material, an appropriate level of difficulty of the curriculum, and had improved HL and knowledge of women's health after completing the program [15]. We sent e-mails (e.g., information about the menstrual cycle, gynecological diseases and women's health resources) to the participants' smartphone once a month for 3 months after the group lecture. The contents of the program are shown in Table 1. A researcher conducted the group lecture and demonstrations after providing an explanation of the study purpose and methods to the participants.

Study Design

In the present study, a quasi-experimental study with comparison groups was used.

Participants and setting

Participants for the intervention group and control group were recruited from one private university in Kyoto, Japan. Participants were recruited from three faculties designated by the university cooperating in the study to avoid cross contamination of information between groups. The intervention group participants were recruited from the faculties of economics and psychology and the control group participants were recruited from the faculty of bio-environment. A poster was placed in each of the three faculties requesting student participation. The inclusion criteria for both groups were: (X) female Japanese undergraduate students, (X) aged 20 years or older. The sample size for each group was set at ≥ 13 people based on the difference in HL scale scores in our previous study [15]. The study was conducted between March and October 2015. The start of the program was scheduled to coincide with the participating students' course registration and health checkup.

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Evaluations and variables

We conducted an anonymous self-administered questionnaire survey and managed the data using concatenate numbers. Assessments of each group were conducted before (baseline) and 6 months (follow up) after the program was implemented. The study variables were basic attributes and HL variables. Basic attributes consisted of age, gynecological history, sex education history, level of concern for one's own body, and cervical cancer screening history. HL variables consisted of HL scale score,

confidence in explaining one's own body to a medical practitioner (Y/N), cervical cancer screening behavior (Y/N). Test of knowledge for women's health was used to measure knowledge of women's health. The participant's cervical cancer screening behavior indicated whether they had undergone that screening within 6 months after the program (Y/N). HL scale for Japanese women in their 20s and 30s organized into four subscales (Cronbach's α , 0.75–0.83) was used to obtain HL scale score (score range, 21–84) [20], with reference to a previous study on the development of an HL scale for Japanese [21]. Questions to test knowledge of women's health (score range, 0–20) were developed with reference to previous studies on women's health [17,22,23]. Our study design did not randomly assign participants to the two groups, so we conducted intergroup pair matching using the variables of concern for one's own body (Y/N) and HL scale score at baseline. The evaluation protocol is shown in Figure 1.

Statistical analysis

The data were analyzed using SPSS, version 23.0 for Windows (SPSS Inc, Chicago, IL, USA). Statistical significance was set at $P < .05$. Analysis of the results consisted of calculating basic statistics and intergroup comparisons of HL variables, knowledge of women's health, and cervical cancer screening behavior at follow-up using the Mann-Whitney U test and Fisher's exact test or the chi-square test.

Ethical considerations

All participants were informed of the study aims and methods and assured that their participation was voluntary and that every effort would be made to protect their privacy. Written informed consent was obtained from all participants. We provided all participants with pamphlets on women's health after follow-up.

Results

Participant characteristics

14 of the 32 students targeted for the intervention group agreed to participate in the study (participation rate: 43.8%), while 60 of the 72 students targeted for the control group agreed to participate in the study (participation rate: 83.3%). At follow-up, there were 14 students in the intervention group (participation rate: 100%) and 56 students in the control group (participation rate: 93.3%). At baseline, intergroup pair matching using the variables of concern for one's own body (Y/N) and HL scale score yielded a total final analysis population of 28 participants ($n=14$ in each group). Table 2 shows a comparison of basic attributes in each group at baseline after pair matching. The mean of age of all participants was 20.6 years (standard deviation: 0.7 years) and the percentage of age composition in each group was not significant. Comparison of basic attributes in each group at baseline showed no significant differences.

Intergroup comparison at baseline and follow-up

Table 3 shows intergroup comparisons at baseline and follow-up. Comparison of the two groups at follow-up revealed a significant difference in median HL scale score ($P=.02$) and a significant difference in the percentage of participants who felt confident in explaining their own body to a medical practitioner ($P<.001$). Knowledge of women's health also showed a significant difference ($P=.008$). There was no significant intergroup difference in cervical cancer screening behavior or intention to modify health behavior in the future.

Discussion

The major finding of this study was that the health education program investigated was effective in improving HL and women's health knowledge. Similarly, studies on a cervical cancer prevention program for female university students in Korea [24] reported positive effects on cervical cancer knowledge. A study of Chinese college students showed only 55.6% of students had received sexuality education, and those that had received such education had higher sexual knowledge than those that had not [25]. Namely, receiving sex education at university age is important for expanding the sexual knowledge of undergraduate students. A previous study on interventions for improving HL for chronic disease behavioral risk factors reported that 73% of studies showed a positive change in a HL outcome through a combination of various interventions [26]. Our program consists of a lecture and follow-up via e-mail. Most Japanese female undergraduate students have a smartphone and can check their e-mail daily. Our results suggest that continuous intervention using a smartphone may improve HL and women's health knowledge.

However, our results showed no association between HL and cervical cancer screening behavior. There are two possible reasons for this. First, our study suggests that the timing of evaluation of cervical cancer screening was early, so the Japanese cervical cancer screening system was from April to the end of March of the following year, and this study of evaluation was August. Thus, our results suggest that methodological review is necessary. Second, in Japan, women can only receive free cervical cancer screening in areas where they are registered as residents, so it is inconvenient to visit a clinic that is far from home and university, and the system that offers cheap screening for cervical cancer recommends an examination once every 2 years. Inaccessible clinics, inconvenient locations, and appointment times have been cited as barriers to participation in cervical cancer screening [27]. We need to build a system that offers cervical cancer screening near universities after receiving sexual health education. In addition, emotional barriers may contribute to low cervical cancer screening behavior. A previous study of barriers to cervical cancer screening reported that emotional barriers, such as "fear of pain" and "embarrassment", seemed to be more prominent among Asian women than other ethnic minorities [28]. Many women feel that undergoing cervical screening for the first time is painful and uncomfortable. A study on the relationship between HL and adherence to the recommendation to undergo breast cancer screening

among Japanese women reported that breast and/or cervical cancer screening behavior is related to receiving a recommendation from a doctor and with having a primary care physician [29]. A study of primary care physicians' adherence to expert recommendations for cervical cancer reported that the specialty of obstetrician-gynecologist was associated with higher average adherence to cancer screening recommendations [30]. However, this is partly due to the lack of a general primary physician system in Japan. Particularly, it is important to provide female undergraduate students with up-to-date women's health and cervical cancer information. In other words, health care workers' recommendations and encouragement may promote awareness of cancer risk, so it is important for women to receive health education that is appropriate for their age a number of times. To overcome emotional barriers, it is necessary for education program contents to consider culture, for example, by participating in cervical cancer screening and sex education with their mother. We also found that HL may not directly affect health behavior. A cross-sectional study of HL in Japanese women suggested that the encouragement of nurses during women's life events can potentially improve HL [31]. Even in highly educated countries like Japan, HL may play a key role in health promotion [32]. Our study suggests that further research is needed to determine how to provide culturally appropriate sex education to improve HL among female undergraduate students in Japan.

Limitations

Several limitations of our study need to be considered. The most obvious limitation was that of a small sample size in a quasi-experimental design, although we set up sample size for each group based in a preceding study. In addition, our results are based on data from

participants attending a single university in Japan. Thus, the results may not be generalizable to all female undergraduate students in Japan. Further, randomized controlled trial and larger sample size would be necessary to confirm highly accurate causal effects.

Conclusions

Our program was effective in improving HL and women's health knowledge; however, an improvement in cervical cancer screening behavior could not be confirmed

Abbreviations

HL: health literacy, STI: sexual transmitted infection

Declarations

This study was conducted after obtaining the approval of the 2014 Research Safety and Ethics Committee of the Tokyo Metropolitan University Arakawa Campus (approval no. 14083). We informed all participants both verbally and in writing about the purpose of this study and assured all participants that

their personal information would be protected. We also informed them that their participation in this study was voluntary. All participants provided written consent to participate in this study. Clinical trial registration number UMIN000032444, May 2, 2018 (retrospectively registered).

Consent for publication

Not applicable.

Availability of data and materials

All data generated or analyzed during the present study are included in the published article.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

SK and ES conceived of the study and study design; SK collected the data; SK and ES analyzed and interpreted the data, and drafted and critically revised the manuscript for important intellectual contents. All authors read and approval the final manuscript.

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Tables

Table 1. Contents of the sex education program to improve HL

Session	Topic	Contents	Materials
Group lecture (one time)	1. Introduction	<ul style="list-style-type: none"> □ Explain educational objectives □ Morbidity of cervical cancer 	<ul style="list-style-type: none"> □ Slides delivered with presentation software
	2. Knowing my body	<ul style="list-style-type: none"> □ Menstrual periods 	<ul style="list-style-type: none"> □ Slides delivered with presentation software □ A basal body thermometer, graph and vaginal discharge model
	3. Preventing cervical cancer	<ul style="list-style-type: none"> □ Cervical cancer screening □ Education about condom use 	<ul style="list-style-type: none"> □ Slides delivered with presentation software
	4. Gynecological exams and consultations	<ul style="list-style-type: none"> □ Overview of gynecological examination □ How to select female health information 	<ul style="list-style-type: none"> □ Participants' smartphones □ A worksheet simulating a gynecological exam
Follow-up (Once a month, total of three times)	Topics 2 to 4	<ul style="list-style-type: none"> □ Send an e-mail about each topic once a month 	<ul style="list-style-type: none"> □ Participants' smartphones

HL: health literacy

Table 2. Comparison of basic attributes in each group after pair matching at baseline.

Variables		Intervention group (n=14)	Control group (n=14)	P- value
		n (%) or Mean±SD	n (%) or Mean±SD	
Age (years)	20	6 (42.8)	8 (57.1)	.710 ^a
	21	6 (42.8)	4 (28.6)	
	22	2 (14.4)	1 (7.1)	
Gynecological history	Yes	4 (28.6)	1 (7.1)	.163
	No	10 (71.4)	13 (92.2)	
Sexual education history	Junior	5 (53.7)	4 (28.6)	.500
	high school High school	9 (63.4)	10 (71.4)	
Cervical cancer screening history	Yes	2 (14.3)	1 (7.1)	.500
	No	12 (85.7)	13 (92.9)	

SD: standard deviation.

Fisher's exact test

^a χ^2 test

Table 3. Intergroup comparisons of HL variables at baseline and final analysis

HL Variable		Baseline		P-value	Final analysis		P-value
		Intervention group (n=14)	Control group (n=14) Median (IQR) or n (%)		Intervention group (n=14)	Control group (n=14)	
		Median (IQR) or n (%)			Median (IQR) or n (%)	Median (IQR) or n (%)	
HL scale score ^a		57 (5-61)	57 (55-61)	>.999	66 (62-71)	60(51-61)	.002
Confidence in explaining one's own body to a medical practitioner ^b	Yes	2 (4.3)	4 (28.6)	.500	14 (100.0)	4 (28.6)	<.001
	No	12 (85.7)	10 (71.4)		0 (0.0)	10 (71.4)	
		14 (13-15)	15 (14-16)	.701	16 (15-18)	14 (13-16)	.008
Knowledge of women's health ^a							
Cervical cancer screening behavior ^b	Yes	2 (4.3)	1 (7.1)	.500	4 (28.6)	1 (7.1)	.163
	No	12 (85.7)	13 (92.2)		10 (71.4)	13 (92.9)	

IQR: interquartile range

^a Mann-Whitney U test

^b Fisher's exact test

Figures

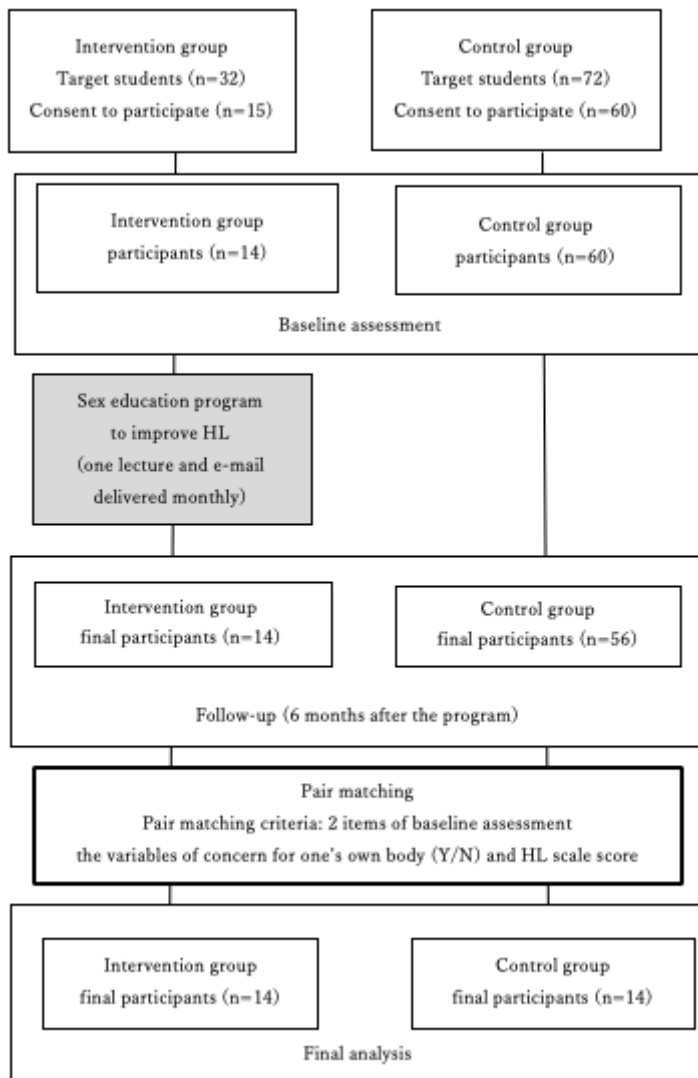


Figure 1

Evaluation protocol