



Children’s Knowledge of Cancer Prevention and Perceptions of Cancer Patients: Comparison Before and After Cancer Education with the Presence of Visiting Lecturer -Guided Class

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Abstract

The purpose of this study was to investigate the effect of the presence of visiting lecturer-guided class on children’s knowledge of cancer prevention and perceptions of cancer patients, conducting surveys before and after the cancer education classes at local elementary schools that are pioneering cancer education. We implemented self-administered questionnaire surveys with 571 sixth-grade children at nine elementary schools receiving cancer education in the Tokyo metropolitan area from September 2013 to February 2014. The surveys were conducted twice in each classroom: 1 week before the cancer education class and 1 week after. The questionnaire items included participants’ gender, cancer prevention information, and perceptions of cancer patients with the following description: “looks pitiful,” “always depressed,” “bedridden and hospitalized,” “excessive smoking and drinking,” “looks thin and pale,” “no visible change despite cancer,” and “always bright and cheerful.” Children who had not attended the cancer education day, or had not completed both the pre- and post-test, were excluded from the analysis. Regardless of whether there visiting lecturer-guided class was provided, the possibility of improving children’s knowledge of cancer prevention was demonstrated. On the other hand, in the post-class surveys, compared to the group with visiting lecturer-guided class, the group without it had a significantly lower percentage of persons selecting “Looks pitiful” (76.2%/63.5%, $p = 0.002$) and significantly higher percentages for “Too much smoking and drinking,” and “Looks thin and pale” (50.2%/63.5%, $p = 0.002$; 18.8%/31.1%, $p = 0.001$). Therefore, study is needed into cancer education coordinated with relevant institutions in order to more effectively utilize visiting lecturers and the like.

Keywords Health education · Primary prevention of cancer · Cancer stigma · School children · Japan

Introduction

One out of every two people in Japan will be diagnosed with cancer in their lifetime [1]. After the establishment of the

Cancer Control Act in 2006, the government enacted the Basic Plan to Promote Cancer Control Programs in 2007, 2012, and 2017 and has promoted cancer control based upon each of these 5-year plans. The second and third Basic Plan to Promote Cancer Control Programs in 2012 and 2017 emphasized education and public awareness, aiming to teach children the importance of life and health for the benefit of personal management and inculcate them with the proper knowledge of cancer and understanding of cancer patients. The plans in 2012 and 2017 investigated how to approach cancer in general health education, including current circumstances in schools, and declared that the objective was educational activities based upon investigation results [2, 3]. After enactment of the second plan, the Japan Society of School Health was commissioned by the Ministry of Education, Culture, Sports, Science, and Technology (MEXT) in fiscal year 2013 to set up an investigative commission on cancer education and in the course of its work was able to highlight the

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current state and direction of cancer education, as well as future issues [4]. MEXT thus initiated a 3-year comprehensive support project for cancer education beginning in 2014. In March 2015, in the “Current state of cancer education in schools” reported by the investigative commission, the objectives were (1) to properly understand cancer and (2) to subjectively consider the importance of life and health [5]. Further, in the new government curriculum guidelines released in March 2017, cancer is clearly addressed in middle school physical education (health education) [6, 7], and a similar intention has been indicated for senior high schools for the following year [8].

Specific examples of cancer education focusing on children in Japan include teaching materials for children and teachers via Ministry of Health, Labor, and Welfare research groups and developments by MEXT and boards of education in each municipality [5, 9, 10]. Information thus handled in cancer education includes cancer development, statistics, prevention, screening, treatment, palliative care, and mental health care. In other words, Japanese cancer education comprehensively handles everything from primary to tertiary prevention. Primary prevention has received particular emphasis in past health education programs, so further enhancement of school health education is expected from the introduction of secondary and tertiary prevention viewpoints through cancer education.

Reportedly, children’s knowledge of cancer from previous school health education programs has associated the disease with lifestyle habits, including smoking, alcohol consumption, and physical inactivity, while understanding of the many infection factors causing cancer among Japanese persons has been low [11, 12]. Furthermore, it has been indicated that the presence or absence of such knowledge is related to the influence of mass media such as television as a source of information on cancer, which may be a factor behind various intents in seeking cancer screening [13, 14]. Because of this, children have little understanding of cancer, revealing the need for cancer education.

On the other hand, some challenges face the educational environment in which instruction is offered. For example, while it is believed that promoting cancer prevention education can increase awareness about cancer prevention, it has been reported that increasing knowledge of cancer prevention can also cause an increase in stigma toward cancer patients [15]. Furthermore, an interview survey reported a lack of knowledge about cancer among teaching staff, as well as a resulting lack of confidence in providing instruction [16, 17]. In the second year of the comprehensive cancer education support project initiated in 2014, MEXT announced “visiting lecturer-guided cancer education guidelines,” along with teaching materials, to promote cancer education [5]. This included an expressed statement that collaborating with cancer specialists (visiting lecturers) in order to deepen understanding of cancer itself, as well as proper understanding of cancer

patients, is important in carrying out the work of the commission. However, since the commission has just begun its work, the effects of utilizing such visiting lecturers are still not clear.

Therefore, the purpose of this study was to investigate the effect of the presence of visiting lecturer-guided class on children’s knowledge of cancer prevention and perceptions of cancer patients; this was measured using questionnaire surveys before and after courses for children at local elementary schools that are pioneering cancer education.

Method

Survey Participants and Survey Method

We conducted self-administered questionnaire surveys with 571 sixth-grade children at nine elementary schools receiving cancer education in the Tokyo metropolitan area from September 2013 to February 2014. It was not possible to verify the state of cancer education nationwide in 2013, so we asked for the cooperation of two municipalities that had been previously been reported as precedent cases [18] and then selected the nine schools currently providing cancer education. The surveys were conducted twice in each classroom: 1 week before the cancer education class and 1 week after. The instruction asked the teachers to take no more than 10 min to administer the surveys.

Survey Items

The self-administered questionnaire surveys mainly asked about participants’ gender, cancer prevention knowledge, and perceptions of cancer patients. The educational objectives of cancer education, which include living alongside cancer patients, rest upon two pillars: proper knowledge about cancer followed by the importance of life and health [5]. The content of the surveys was considered valid, as similar information could be found in the second Basic Plan to Promote Cancer Control Programs [2].

We used the questions for cancer prevention knowledge used in prior research of cancer knowledge among children [9, 10, 16]. Respondents were asked to select everything that they thought was a cause of cancer among the list of 14 items such as “tobacco smoking,” “alcohol drinking,” “poor intake of vegetables and fruit,” “too much intake of salt,” “unbalanced diet,” “physical inactivity,” “obesity,” “cancer-causing viral and bacterial infections,” “food additives and pesticides,” “charred fish and meat,” “stress,” “air pollution,” “endocrine-disrupting chemicals,” and “heredity.”

We developed the list of the items to assess cancer patient perceptions with the representatives of cancer patient groups involved in previous education cases [18]. We also held a meeting with leaders from other organizations including

health centers and boards of education to complete the list. The final list included seven items with the following descriptions: “looks pitiful,” “always depressed,” “bedridden and hospitalized,” “excessive smoking and drinking,” “looks thin and pale,” “no visible changes despite cancer,” and “always bright and cheerful.” Participants were asked to select any of the seven given descriptions that they thought applied to cancer patients.

All of the survey items were intended for cross-comparison and were not examined in this study for their own validity, as they were not intended for developing criteria.

Cancer Education Class

In all nine schools, when teaching staff members and visiting lecturers created lesson plans, they used teaching materials [19, 20] that had been developed by the aforementioned research groups [9, 10].

Table 1 shows an outline of the cancer education class. In all nine schools (schools A to I), the cancer education class was held during teaching units for disease prevention in physical education classes following the government elementary school curriculum guidelines (March 2008) [21]. In five schools, this amounted to one unit hour (45 min), and in two schools, it amounted to two unit hours (90 min), in accordance with regular class times. In addition, at four schools, the course was conducted by homeroom teachers themselves or by the team with school nurses. At five schools, the course was conducted by visiting lecturers such as health center staff, cancer health care providers, or cancer patients.

Analytical Method

The questionnaire was distributed among the children who were present on each day during the pre- and post-test. Of the total 571 children, 554 participated in the pre-test while 518 participated in the post-test, who answered all the questions on cancer prevention and cancer patients’ perceptions and wished that they had the class on cancer. Then, we divided participants on the basis of whether s/he was in a cancer education class with the visiting lecturer and then made intergroup comparisons of cancer prevention knowledge and cancer patient perceptions, as well as before-and-after cancer education class comparisons. At one school of four without the visiting lecturer, cancer patient testimonials were introduced via live or taped lectures.

We then compared the mean values of correct answers on cancer prevention knowledge before and after the cancer education class between groups on the basis of whether they were given visiting lecturer-guided class. Correct answers were based on the findings of Inoue, et al. [22] and were selected from eight items listed as cancer risk factors for Japanese people (“tobacco smoking,” “alcohol drinking,”

“poor intake of vegetables and fruits,” “too much intake of salt,” “unbalanced diet,” “physical inactivity,” “obesity,” and “cancer-causing viral and bacterial infection”).

Regarding perceptions of cancer patients, we made before-and-after comparisons, and intergroup comparisons on the basis of whether the group was provided with visiting lecturer-guided class, based on the percentage of people who selected each of the seven cancer patient perception items.

Furthermore, we asked the participating children to respond to the surveys at two times, not including the day of the cancer education class, so the participants in the pre- and post-class surveys were not identical. Based on this, we used a chi-squared test and Student’s *t* test according to variable characteristics for intergroup comparison. The significance level for both tests was $p < 0.05$, and IBM SPSS Statistics Version 20 statistics software (IBM Japan, Ltd.) was used for analysis.

Ethical Considerations

This study is an observational study including classes conducted within the scope of regular school education and pre- and post-class surveys. The study was conducted after asking principals at participating schools for cooperation and then submitting approval forms. Participants were notified that they were free to refuse to participate in the study without penalty. They were given the questionnaire and were allowed to return the blank form, if they chose to do so. It was assumed that return of the questionnaires indicated consent to participate in the study. All questionnaires were completed anonymously, and data entry and management was done under the supervision of the primary investigators. This study was approved by the Ethics Committee of the Japan Women’s College of Physical Education (Application No. 2013-25, Approval date September 3, 2013).

Results

Table 2 shows the demographics of the participants of this study. Both the group with visiting lecturer-guided class (pre-class surveys $n = 288$, post-class surveys $n = 280$) and without (pre-class surveys $n = 267$, post-class surveys $n = 242$) had fewer participants in the post-class surveys than in the pre-class surveys.

Figure 1 shows a comparison of before-and-after mean values for the number of cancer risk factors selected and a comparison on the basis of whether there was visiting lecturer-guided class. In both groups, the mean values were significantly higher in the post-class surveys than in the pre-class surveys ($p < 0.001$). In addition, no significant difference in the mean values between the groups was found in the pre-class surveys ($p = 0.108$), but the group without visiting

Table 1 Cancer education class summary

	School A	School B	School C	School D	School E	School F	School G	School H	School I
Objectives									
A proper understanding of cancer	Yes								
A subjective understanding of the importance of life and health	Yes								
Instructors									
Teachers in charge of the sixth-year class	Yes								
School nurses	No	No	No	No	No	Yes	Yes	No	No
Visiting lecturers (health center staff, cancer health care providers, cancer patients)	Yes	Yes	Yes	Yes	Yes	No	No	No	No
Scheduling									
Physical education (health education)	Yes								
Regular class times	Yes	Yes	No						
Number of hours									
Time per unit (45 min)	No	Yes	Yes						
Time per two units (90 min)	Yes	No	No						
Curriculum									
Cancer statistics	Yes								
Cancer prevention	Yes								
Cancer screening	Yes								
Cancer treatment	Yes								
Patient testimony (including images)	Yes	No							
Class units									
Grade in school	No	No	No	No	No	Yes	Yes	Yes	Yes
Combined grades	Yes	Yes	Yes	Yes	Yes	No	No	No	No

lecturer-guided class scored significantly higher than the group with instruction in the post-class surveys ($p < 0.001$).

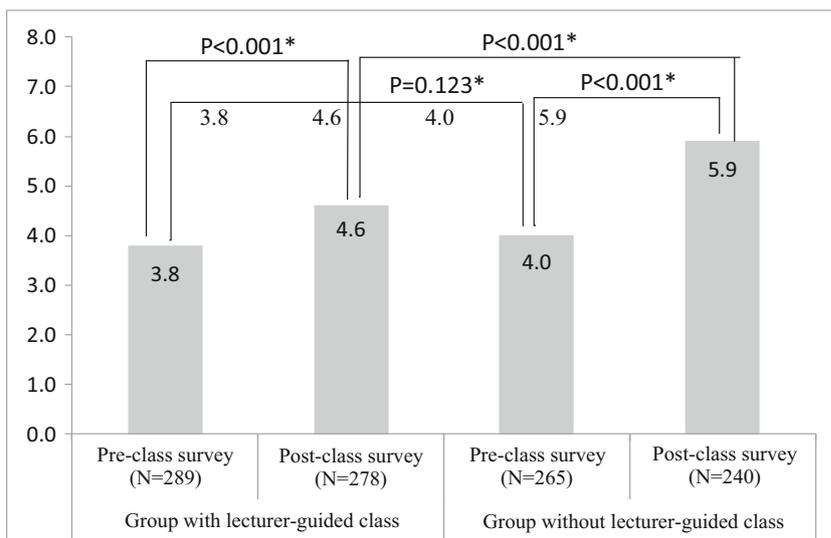
Table 3 shows a before-and-after comparison of cancer patient perceptions. In both groups (with and without visiting lecturer-guided class), the percentages of students who selected “Looks pitiful” were the highest (77.4%, 70.9%), followed by “Bedridden and in hospital” (43.1%, 42.3%) and “Too much smoking and drinking” (35.8%, 35.5%). On the other hand, in the post-class surveys, the percentages of students

who selected “Looks pitiful” were the highest (76.2%, 63.5%), while the group without visiting lecturer-guided class showed similar values (63.5%) for “Too much smoking and drinking,” which received the second highest values (50.2%) for the group with instruction. The percentage of students who selected “Too much smoking and drinking” was found to be significantly higher for both groups in the post-class surveys than in the pre-class surveys ($p < 0.001$). Additionally, the group with visiting lecturer-guided class showed a

Table 2 Participants of this study

			Pre-class survey		Post-class survey	
			<i>N</i>	(%)	<i>N</i>	(%)
Lecturer-guided class	Group with visiting lecturer-guided class (five schools)	Boy	141	(48.8)	126	(45.3)
		Girl	142	(49.1)	140	(50.4)
		Unknown	6	(2.1)	12	(4.3)
		Total	289	(100.0)	278	(100.0)
	Group without visiting lecturer-guided class (four schools)	Boy	131	(49.4)	114	(47.5)
		Girl	126	(47.5)	120	(50.0)
		Unknown	8	(3.0)	6	(2.5)
		Total	265	(100.0)	240	(100.0)

Fig. 1 Before/after mean value of cancer risk factor selections and comparison per presence of lecturer-guided class



* Students' t-test

significantly lower percentage post-class than pre-class for “Bedridden and in hospital” and “Looks thin and pale” ($p = 0.041$, $p = 0.031$).

Table 3 also shows the results of intergroup comparisons of cancer patient perceptions on the basis of whether the students were provided with visiting lecturer-guided class. In the pre-class surveys, the response percentages of both groups had no items for which a significant difference was seen. On the other hand, in the post-class surveys, compared to the group with visiting lecturer-guided class, the group without it had a significantly lower percentage of respondents selecting “Looks pitiful” ($p = 0.002$) and significantly higher percentages for “Too much smoking and drinking,” and “Looks thin and pale” ($p = 0.002$, $p = 0.001$).

Discussion

Characteristics, Limitations, and Issues of this Study

Cancer is a disease showing signs of increasing not only in Japan but globally [23]. As stated by the World Health Organization (WHO), World Cancer Research Fund (WCRF), and the American Institute for Cancer Research (AICR), cancer is a disease that can be controlled through improved lifestyle habits and infectious disease control [24, 25]. A cancer prevention method has been presented in Japan for its own people based upon specifically Japanese evidence evaluation [22]. It has been shown that Japanese schoolchildren are lacking in knowledge and awareness of

Table 3 Comparison of perceptions of cancer patients before and after class

	Lecturer-guided class group					Non-lecturer-guided class group					Pre-class survey	Post-class survey
	Pre-class survey (N=289)		Post-class survey (N=278)		p value*	Pre-class survey (N=265)		Post-class survey (N=240)		p value*	p value ^a	p value ^a
	N	(%)	N	(%)		N	(%)	N	(%)			
Looks pitiful	224	(77.5)	211	(75.9)	0.650	188	(70.9)	152	(63.3)	0.069	0.077	0.002
Always depressed	52	(18.0)	46	(16.5)	0.649	36	(13.6)	39	(16.3)	0.400	0.156	0.928
Bedridden and hospitalized	124	(42.9)	97	(34.9)	0.050	112	(42.3)	95	(39.6)	0.541	0.879	0.270
Excessive smoking and drinking	104	(36.0)	140	(50.4)	0.001	94	(35.5)	153	(63.8)	<0.001	0.900	0.002
Looks thin and pale	76	(26.3)	52	(18.7)	0.031	74	(27.9)	74	(30.8)	0.473	0.667	0.001
No visible change despite cancer	28	(9.7)	36	(12.9)	0.220	36	(13.6)	37	(15.4)	0.559	0.152	0.421
Always bright and cheerful	20	(6.9)	23	(8.3)	0.543	16	(6.0)	10	(4.2)	0.342	0.674	0.056
Other	23	(8.0)	15	(5.4)	0.222	21	(7.9)	8	(3.3)	0.027	0.988	0.256

* Chi-squared test

^a Compared between lecturer-guided class group and non-lecturer-guided group

cancer risk factors, mainly smoking and infection factors [11–14]. The participants of this study were confirmed in pre-class surveys to show the same tendencies regarding cancer knowledge as in past research [11]. Foreign cancer education based upon different evidence evaluation, particularly in the USA and in Europe, has often focused upon sunburn protection in lesson contents [26–29], but Japanese cancer education, in addition to lifestyle habits, has focused upon infectious disease control and needs to consider its own lesson contents. Since school health education training in Japan is supposed to be compulsory, physical education teaching staff and other instructors are expected to provide the instruction. However, the MEXT recommends the use of visiting lecturers, as they sometimes have required expertise [5].

In this study, we investigated children's knowledge of cancer prevention and perceptions of cancer patients depending on whether they had been given visiting lecturer-guided class. The results of questionnaire surveys conducted before and after cancer education classes were nearly identical. In addition, no control group was provided, so it cannot be said to have investigated the efficacy of the cancer education class according to before-and-after changes. This is not unique to cancer education, as there are often limits to designing on-site surveys for intervention studies on health education. However, there is potential in this study's application of observational research. Care should be taken in interpreting the results of this study in the light of its limitations, including the fact that there are a variety of instruction methods other than lecture-based guidance for effective cancer education classes, and the number of risk factor selections in cancer prevention knowledge should only be treated as variables and not given too much weight.

Effective Means of Cancer Education

In this study, regardless of whether the students were provided with visiting lecturer-guided class, the mean value of selected cancer risk factors was significantly higher at the post-class than in pre-class surveys. Furthermore, in comparing the two groups at the post-class, the group without visiting lecturer-guided class showed a significantly higher mean value. Consistent results in knowledge acquisition through education can be recognized in both groups, but it appears that the learning results were particularly high when instruction was mainly provided by teaching staff members. Training in school health education is compulsory in Japanese schools [6, 8, 21], and the nationwide establishment of cancer education in Japan may be expected through acquisition of prevention knowledge.

On the other hand, the percentage of students who selected "Too much smoking and drinking" as a perception of cancer patients was significantly higher at the post-class than at the pre-class for both groups. However, the group without visiting

lecturer-guided class responded at a significantly higher rate than the group that was provided with visiting lecturer-guided class. Smoking and alcohol consumption have been shown to be controllable risk factors for cancer [22, 24, 25] and are included in Japanese school health education lessons on preventing lifestyle diseases and the like [6–8, 21]. However, 44.0% of the population-attributable fraction is not presented [22], and this varies depending on cancer type; thus, improvement of cancer prevention knowledge may inadvertently encourage prejudice against cancer patients. For example, it is reported that prejudices such as "lung cancer patient = smoker" are more likely [30], and there is also the problem of raising the stigma of cancer [31]. In this study, lectures by cancer patients were introduced in all five schools using visiting lecturer-guided class groups. The percentage of students who selected "Too much smoking and drinking" was high at the post-class survey, but it is possible that this increase could be discouraged through visiting lecturer-guided class.

When it comes to improving cancer prevention knowledge and discouraging prejudice against cancer patients, the former is prioritized in the current school health education framework, which emphasizes primary prevention. Furthermore, in the December 2016 Central Council for Education's report [32], reducing the risk of disease was associated with lifestyle problems in outlooks and perspectives on health. We thus need to devise instruction that allows for cancer to be understood as a continuum, as with each phase of understanding, managing, and coping.

Usefulness of Visiting Lecturer-Guided Class and Regional Differences

In this study, we showed that consistent results in cancer education may be possible with visiting lecturer-guided class. Nine schools were used as participants, all specifically administering cancer education as part of the study. Since Japanese teaching staff members have the longest working hours in the world [33], it is critical that we consider the influence upon the health of the teaching staff when introducing new cancer education into actual schools.

On one hand, the usefulness of visiting lecturer-guided class in effectively introducing specialized topics into school education has been demonstrated in sex and drug abuse prevention education [34, 35]. However, it may be inferred from the results of this study that any demonstrable usefulness in visiting lecturer-guided class is premised upon instruction by the teaching staff. In addition, as seen in the MEXT guidelines [5], dispatching medical providers involved in cancer treatment and working with cancer patients (including cancer patient groups) to actual schools must be investigated in accordance with the character of local circumstances. In the USA and Europe, training in health education is not compulsory, and there are scattered cases where private groups, such as

cancer patients associations, foundations for cancer research, and insurance companies, go to schools and provide high-quality instruction [36–40]. In contrast, training in health education is compulsory in Japan, and there is an urgent need for training so visiting lecturers can provide effective cancer education.

Conclusion

In this study, we administered questionnaire surveys before and after a cancer education class for children in local elementary schools pioneering cancer education; regardless of whether there visiting lecturer-guided class was provided, the possibility of improving children's knowledge of cancer prevention was demonstrated. On the other hand, the study also showed the possibility that the acquisition of cancer prevention knowledge may encourage prejudice against the perception of cancer patients, so study is needed into cancer education coordinated with relevant institutions in order to more effectively utilize visiting lecturers and the like.

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Authors' Contribution HYS, KK, YK, and MY conceived and designed the experiments. HYS and KK performed the experiments. HYS, KK, HH, and KS designed the collaborative project. All authors contributed to interpretation of data, wrote, reviewed, and approved the final manuscript.

Compliance with Ethical Standards

This study was approved by the Ethics Committee of the Japan Women's College of Physical Education (Application No. 2013-25, Approval date September 3, 2013).

Competing Interests The authors declare that they have no competing interests.

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