ORIGINAL RESEARCH

Addressing Taiwan's high incidence of cervical cancer: Factors associated with the Nation's low compliance with Papanicolaou screening in Taiwan

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Summary *Background:* Despite cervical cancer being the leading female cancer, women in Taiwan have received fewer screening examinations for this disease than populations in Western countries.

Methods: Randomly selected telephone questionnaire interviews with women aged 20 years and over were conducted to investigate the factors associated with the subject's cancer screening practices.

Results: Among 1021 respondents, 51.6% self-reported no Papanicolaou (Pap) examination received within their lifetime. The multivariate logistic regression analysis revealed that, in addition to marital status, cancer knowledge was the most significant factor associated with screening practice compliance. Compared with women with correct answers for 22–28 cancer knowledge questions, the odds ratios (OR) for non-compliance were 1.4 (95% confidence interval (CI) = 1.0–2.0) for women with 17–21 correct answers and 2.3 (95% CI = 1.6–3.4) for women with less than 17 correct answers. Women aged 40–49 years had the best cancer knowledge scores. Unmarried women were at an elevated risk for no Pap examination (OR = 7.6, 95% CI = 5.2–11.3).

Conclusions: Women in Taiwan should be targeted for intervention to promote cancer knowledge and screening compliance.

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Introduction

Both the incidence and mortality from cervical cancer have shown remarkable decreasing trends in the USA and other developed countries over the past three decades.^{1,2} With 6431 new cases or an incidence of 55.66 per 100 000 in 1999, cervical cancer remains the most commonly diagnosed malignancy and the fifth leading cause of cancer death (9.1 per 100 000) among women in Taiwan. Cervical cancer is followed by deaths from lung, liver, colorectal, breast, and cervix uterus cancers.^{3,4} The incidence rate for cervical cancer in Taiwan was five times higher than that in the USA in 1999 (10.2 per 100 000⁵; the corresponding mortality ratio is 2.3).

Increased screening practices for cervical cancer have been attempted in many countries to identify the disease at an earlier stage for more efficacious treatment. Improving the screening rate is critical in order to reduce the disease burden for the high-risk population. Having been universally accepted as an early cervical cancer detection strategy, the Papanicolaou (Pap) cytology cervical scrape smear improves the early treatment and reduces mortality.^{6–10} The fall in both incidence and mortality from cervical cancer in the UK has been linked to the more effective screening campaign instituted in 1988.¹¹ Public health programmes and efforts aimed at improving the early detection rate have also been available in recent years in Taiwan.⁷ The proportion of women aged 20 years and older in Taiwan that reported having had a Pap smear grew slowly from 13% in 1991 to 18.5% in 1995¹² and 48.4% in 2000. Compared with the Pap smear screening rate of 94% among urban Southwestern American Indian women in 2000,¹³ a large number of women in Taiwan still receive no cervical cancer screening.

Further, investigations examining the correlation factors in screening women in Taiwan are sparse. Lin et al. investigated the factors associated with Pap smear practice in women in Pingtung, a rural county in Southern Taiwan.¹² Physicians and nurses were encouraged to promote cervical cancer screening. They acknowledged a higher Pap smear screening rate in women with higher education. Health education is essential for the promoting of Pap smear screening at appropriate intervals.^{13,14} A plan aimed at reaching women who will benefit from this intervention should be based on Pap smear use knowledge in the population. To better plan for the intervention and associated service needs, we have conducted a nationwide survey with the intent of documenting the characteristics of women in Taiwan who reported having and not

having Pap screening for the factors associated with the screening practice. Enhanced observation of the characteristics may allow more effective early detection efforts with a greater chance of reducing the mortality from this disease.

Methods

Taiwan is an island nation with a population of approximately 23 million in seven cities and 18 counties. This survey was conducted from 1 May–31 August 2000 using island-wide telephone questionnaire interviews with women aged 20 years and over. A computer assistant randomly selected the telephone numbers dialled. Approximately 15 students were trained to assist in these interviews. At least three telephone calls were attempted in the evenings for a selected number before giving that particular number up. At the beginning of an interview, the interviewer explained the study purpose and asked if the interviewee was a woman aged 20 or over who lived in the household. If there was more than one woman in the household, the woman whose birthday was closest to the interview date was selected for the interview. The interview was then initiated or a schedule was arranged for an interview.

A pilot test was conducted prior to using the questionnaire. The content of interest included the lifetime screening practices for breast, colon and cervix cancers and 28 knowledge questions on cancer such as the early stage signs of cancer, risk factors and prevention. Information such as socio-demographic characteristics, lifestyle factors, and barriers to health care were also collected. Each interviewer entered data using a similar programme into a personal computer while the interview was in progress. A supervisor reviewed the completed work for errors and missing data.

The primary data analysis determined women's Pap smear experiences — whether they had occurred within the previous year, more than one year previously or if they had never had a smear — using the subject's cancer knowledge level, age, ethnic group, education, marital status, occupation and the urbanization status of the area where the subject lived. The odds ratio (OR) and corresponding 95% confidence interval (CI) were measured using multivariate logistic regression analysis including factors associated with the screening practice found in the univariate analysis at $P < 0.10$. All analyses were completed using the statistical package SAS version 8.1 (SAS Institute, Inc., Cary, NC, USA).

Results

The random digit-dialling programme completed interviews with 1021 eligible women (response rate = 85.1%). Table 1 shows the relationship between Pap smear history and socio-demographic factors for the participants. Overall, only 23.5% of the women in the sample had undergone Pap smear examinations within the previous year; 51.6% had never had a Pap smear. The non-compliance rates were even greater in young women (81.2%) and the elderly (63.3%). Women between the ages of 40 and 49 years had the highest screening rate. Women with higher Pap smear rates were those with a high school education, those who were married, and those from a minority population. Natives were

more likely to have had the Pap smear test within the previous year than other ethnic groups ($P = 0.031$). However, there were no significant differences in the screening rates when the data were analysed by occupation and urbanization.

The rate of timely cervical screening practice among the study participants increased as their cancer knowledge scores increased (Fig. 1). The screening rate was much higher for women who scored 22–28 than women who scored 16 or less (60% vs 37%). Table 2 shows that cancer knowledge levels were significantly associated with socio-demographic variables including age, ethnic group, education, marital status, occupation and urbanization. A greater proportion of lower scores occurred among older women, natives and unknown

Table 1 Pap smear experience by socio-demographic characteristics of women in Taiwan ($N = 1021$).

	Screened		Never	Total	P-value
	≤ 1 year	> 1 year			
Age, years	<i>N</i> (%)	<i>n</i> (%)	<i>n</i> (%)	<i>N</i>	<0.001
20–29	23 (10.3)	19 (8.5)	181 (81.2)	223 (100)	
30–39	63 (27.1)	75 (32.2)	95 (40.8)	233 (100)	
40–49	97 (38.7)	77 (30.7)	77 (30.7)	251 (100)	
50–59	44 (25.9)	45 (26.5)	81 (47.6)	170 (100)	
60+	13 (10.8)	31 (25.8)	76 (63.3)	120 (100)	
Unknown	0 (0)	7 (29.2)	17 (70.8)	24 (100)	
Ethnic groups					0.031
Native	7 (31.8)	4 (18.2)	11 (50.0)	22 (100)	
Hakka	31 (29.0)	23 (21.5)	53 (49.5)	107 (100)	
South Mine	174 (24.1)	181 (15.1)	367 (50.8)	722 (100)	
Other	24 (21.8)	33 (30.0)	53 (48.2)	110 (100)	
Unknown	4 (6.7)	13 (21.7)	43 (71.7)	60 (100)	
Education					0.002
≤ 9 years	70 (21.7)	83 (25.7)	170 (52.6)	323 (100)	
10–12 years	98 (28.4)	95 (27.5)	152 (44.1)	345 (100)	
≥ 13 years	67 (22.5)	65 (21.8)	166 (55.7)	298 (100)	
Unknown	5 (9.1)	11 (20.0)	39 (70.9)	55 (100)	
Marital status					<0.001
Married/live together	220 (30.3)	216 (21.2)	290 (39.9)	726 (100)	
Unmarried/widow	20 (6.8)	38 (12.9)	237 (80.3)	295 (100)	
Occupation					0.480
Public employee	60 (25.2)	60 (25.2)	118 (49.6)	238 (100)	
Business	48 (23.6)	40 (19.7)	115 (56.6)	203 (100)	
Blue-collar	28 (25.0)	26 (23.2)	58 (51.8)	112 (100)	
Housewife/other	104 (22.2)	128 (27.4)	236 (50.4)	468 (100)	
Urbanization					0.101
High	81 (27.4)	75 (25.3)	140 (47.3)	296 (100)	
Moderate	75 (22.5)	88 (26.4)	170 (51.1)	333 (100)	
Less	70 (24.1)	67 (23.1)	153 (52.8)	290 (100)	
Unknown	14 (13.7)	24 (23.5)	64 (62.8)	102 (100)	
Total	240 (23.5)	254 (24.9)	527 (51.6)	1021 (100)

Fig. 1 Cervical cancer screening rate within 1 year and greater than 1 year by cancer knowledge score in women in Taiwan.

ethnic groups, women with less education, and those with blue-collar occupations. Women with no partner or living in rural areas were also less knowledgeable.

In the multivariate logistic regression analysis, women's cancer knowledge level and marital status were the only significant factors for women associated with no Pap smear experience (Table 3). The odds ratio for having no screening test was 2.3 (95% CI = 1.6–3.4) for women with a knowledge score of 16 or less, compared with women with a score of 22 or greater. Unmarried and widowed women had an odds ratio of 7.6 (95% CI = 5.2–11.3) for not having had a Pap screening experience compared with women who were married or living together with a man.

Discussion

This study provides evidence of the current knowledge about Pap smear screening practices in a high-risk cervical cancer population. The screening rate for the disease among women in Taiwan has been seen to be much lower than that in the general female population of the USA and also lower than that of populations in other developing areas.^{1,2,13–17} Sirovich and Welch¹⁸ found that in a representative sample of women in the USA, 93% reported having had a Pap smear. Among women with no abnormal Pap test, 55% received annual screening, 17% had biannual screening and 16%

received it at 3-year intervals, with 11% not receiving regular screening. In the USA, African American women are at higher risk than white women for cervical cancer. In 1988, 82% of African American women in general reported having received a Pap smear within the past year in a telephone survey by the Behavioural Risk Factor Surveillance System (US Centers for Disease Control).¹⁹ Sung et al.²⁰ found that 51.1% of adult women living in a low-income community in Atlanta from 1989 to 1990 had had a Pap test during the previous year. However, almost all women had received a Pap test in their lifetime.

Increasing Pap smear coverage is considered an effective strategy for reducing the incidence rate of invasive carcinoma in the uterine cervix in developed countries. The incidence of squamous cell carcinoma of the uterine cervix for women in the USA decreased by 45.8% after three decades, from 14.2 per 100 000 in 1973 to 7.7 per 100 000 in 1996.²¹ A similar screening impact on the incidence of cervical cancer has also been reported for women in European countries.^{2,22} A Norwegian programme provided two screening rounds in 1995–1997 and 1998–2000 with a total of 4744967 Pap smears for more than 1.4 million women.²³ The Norwegian women have seen a 22% reduction in invasive cancer in recent years compared with the period before the cancer screening programme began.²⁴ They found that women newly participating in the screening programme were 20-fold more likely to have the disease than women with regular screening practices.

In contrast, the incidence of cervical cancer for women in Taiwan in 1999 was more than five times higher than that for women in the USA.^{3,5} Women in Taiwan are ignorant of the risks for this leading cancer and their present screening practices are well below adequate. We found that the rates for Pap tests were substantially lower in younger women aged 20–29 years and the elderly; only 18.8% and 36.7%, respectively, had ever had a test in their lifetime.

The incidence of invasive carcinoma of the uterine cervix among women in Taiwan has increased, particularly in the past 5 years,⁴ and this trend indicates the real need for greater identification efforts for cervical cancer cases. A screening campaign launched in recent years may help to curb this increasing trend. Unfortunately, the enthusiasm for undergoing a Pap smear test remains debatable for women in Taiwan. Factors associated with non-compliance deserve investigation. In this study, we found that Pap smear screening had a strong association with age, ethnic

Table 2 Relationship between cancer knowledge scores and socio-demographic status for women in Taiwan (N = 1021).

	Scores		22–28 n (%)	Total N (%)	P-value
	≤16 n (%)	17–21 n (%)			
Age, years					<0.001
20–29	58 (26.0)	113 (50.7)	52 (23.3)	223 (100)	
30–39	46 (19.7)	86 (36.9)	101 (43.4)	233 (100)	
40–49	50 (19.9)	89 (35.5)	112 (44.6)	251 (100)	
50–59	52 (30.6)	63 (37.1)	55 (32.3)	170 (100)	
60+	70 (58.3)	21 (17.5)	29 (24.2)	120 (100)	
Unknown	12 (50.0)	7 (29.2)	5 (20.8)	24 (100)	
Ethnic groups					0.003
Native	10 (45.4)	6 (27.3)	6 (27.3)	22 (100)	
Hakka	30 (28.0)	43 (40.2)	34 (31.8)	107 (100)	
South Mine	190 (26.3)	273 (37.8)	259 (35.9)	722 (100)	
Other	27 (24.5)	40 (36.4)	43 (39.1)	110 (100)	
Unknown	31 (51.7)	17 (28.3)	12 (20.0)	60 (100)	
Education					<0.001
≤9 years	151 (46.7)	92 (28.5)	80 (24.8)	323 (100)	
10–12 years	70 (20.3)	139 (40.3)	136 (39.4)	345 (100)	
≥13 years	38 (12.7)	132 (44.3)	128 (43.0)	298 (100)	
Unknown	29 (52.7)	16 (29.1)	10 (18.2)	55 (100)	
Marital status					<0.001
Married/live together	193 (26.6)	252 (34.7)	281 (38.7)	726 (100)	
Unmarried/widow	95 (32.2)	127 (43.1)	73 (24.7)	295 (100)	
Occupation					<0.001
Public employee	39 (16.4)	102 (42.9)	97 (40.8)	238 (100)	
Business	44 (21.7)	77 (37.9)	82 (40.4)	203 (100)	
Blue-collar	52 (46.4)	28 (25.0)	32 (28.6)	112 (100)	
Housewife/other	153 (32.7)	172 (36.8)	143 (30.6)	468 (100)	
Urbanization					<0.001
High	69 (23.3)	118 (39.9)	109 (36.8)	296 (100)	
Moderate	82 (24.8)	119 (35.7)	132 (39.6)	333 (100)	
Less	93 (32.1)	109 (37.6)	88 (30.3)	290 (100)	
Unknown	44 (43.1)	33 (32.4)	25 (24.5)	102 (100)	
Total	288 (28.2)	379 (37.1)	354 (34.7)	1021 (100.0)	

group, education, marital status, and knowledge, in the univariate analyses. However, in the multivariate logistic regression analysis, only knowledge of cancer and marital status were significant factors associated with screening. We also found that women with a higher knowledge score were from the higher educated population. Women 30–49 years of age were more knowledgeable and had a greater lifetime screening rate of 65%. This screening rate remains unsatisfactory, compared with the screening practices in most developed nations. The screening rates for a similar age range were 74.4% for women in the USA within the past

three years in 1987¹⁶ and 83% for women in the UK in 1996.²⁴

Because women in urban areas are more likely to have a higher level of education than women from rural areas, urban women have better cancer knowledge with a higher screening compliance rate. The need for education in cancer prevention for our population is evident not only in people with lower levels of education but also at all levels of our society. This is because women with higher levels of education continue to exhibit high non-compliance rates for cancer screening, almost 56%.

Table 3 Odds ratio in multivariate logistic regression analysis for risk associated with women never having received a Pap smear exam in Taiwan.

Factors	OR (95% CI)
Knowledge scores of cancer	
≤16	2.3 (1.6–3.4)
17–21	1.4 (1.0–2.0)
≥22	1.0
Ethnic groups	
Native	1.1 (0.4–3.0)
Hakka	0.8 (0.5–1.6)
South Mine	1.1 (0.7–1.7)
Other	1.0
Education	
≤9 years	1.3 (0.9–2.0)
10–12 years	0.9 (0.6–1.3)
≥13 years	1.0
Marital status	
Married/live together	1.0
Unmarried/widow	7.6 (5.2–11.3)
Occupation	
Public employee	1.0
Business	1.5 (1.0–2.3)
Blue-collar	1.1 (0.6–1.9)
Housewife/other	1.0 (0.7–1.5)
Urbanization	
High	1.0
Moderate	1.1 (0.8–1.5)
Less	1.2 (0.8–1.7)

OR, odds ratio; CI, confidence interval.

It is possible that cervical cancer is still a taboo subject for the population in Taiwan. The perception of the disease in the general population is more negative than that for other diseases. A further problem is that women are generally shy in asking for a smear examination. The taboo and shyness are important matters to overcome. Both the pervasive lack of cancer knowledge and the negative attitudes toward Pap screening in our population need to be addressed in the media and also with physicians and other health professionals. Physicians have the obligation to remind and encourage their patients to have timely screening. In addition to training physicians to take action, the health authority is also under obligation to establish a system to call and recall women for screening. Pap smear examinations should become a routine practice at obstetrician, gynaecologist, general practitioner, and public health station clinics.

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