Journal of Scientific Research & Reports
9(7): 1-7, 2016; Article no.JSRR.22714
ISSN: 2320-0227

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Perceived Risks of Breast Cancer Lung Cancer and Cardiovascular Disease in Irish Women

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Authors' contributions

This work was carried out in collaboration between all authors. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/JSRR/2016/22714
Editor(s):
(1) Viroj Wiwanitkit, Department of Laboratory Medicine, Faculty of Medicine, Chulalongkorn University, Bangkok, Thailand.
Reviewers:
(1) Wajeeha Razaq, Oklahoma University, USA.
(2) Ketan Vagholkar, D. Y. Patil University School of Medicine, India.
(3) Maamri Abdellatif, Health Career Training Institute, Morocco.
(4) Menelaos Zafrakas, Alexander Technological Educational Institute of Thessaloniki, Greece.
(5) Oner Mentes, Gulhane Military Medical Academy, Ankara, Turkey.
Complete Peer review History: http://sciencedomain.org/review-history/12802

Original Research Article

Received 21st October 2015
Accepted 4th December 2015
Published 25th December 2015

ABSTRACT

Background: Despite widespread availability of risk information, many women hold inaccurate perceptions of their risk for developing breast cancer. It is important to prevent women who overestimate risk from undergoing excessive screening and preventive strategies, and to encourage those who underestimate to take appropriate health care behaviour.
Objectives: The aim of this study was to assess women perception of relative risk of breast cancer, lung cancer and cardiovascular disease.
Methods: Prospective cross-sectional survey was carried out Galway University Hospital. Participants were recruited between July and August 2013. Three study cohorts were included in this study, non-cancer patients, non-cancer volunteers and health care professionals. Perceived risk for cancer was assessed by asking subjects to rate their perceived likelihood of developing breast cancer in their lifetime. The baseline used population risk as 1:10 time for breast cancer, 1:3 for cardiovascular disease and 1:40 lung cancer risks.
Results: A total of 428 respondents filled designed questionnaires. There were no male

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respondents. 75(17.5%) were non cancer patients, 206(48.13%) volunteers and 105(24.53%) health care professionals. Mean age was 42.50 years (+/- 16.64). On univariate analysis family history of breast cancer ($p < 0.001$) was associated with high cancer risk perception. No association was found between high perceived risk of breast cancer and smoking, cardiovascular disease diabetes and level of education. Smokers on univariate analysis perceived that their risk of lung cancer is not higher than population risk. Multivariate analysis showed that family history ($p < 0.001$) is strongest confounder for overestimating risks of cancer.

Conclusions: Public health information is required to prevent women who overestimate risk from undergoing excessive screening and preventive strategies, and to encourage those who underestimate to take appropriate health care behaviour.

Keywords: Breast cancer; lung cancer; cardiovascular disease; risk; lifestyle; perception; behaviour.

1. BACKGROUND

Although breast cancer is the commonest cancer affecting Irish women, lung cancer is leading cause of cancer deaths among Irish women [1]. Furthermore, cardiovascular disease exceeds both breast and lung cancer as a cause of mortality among women in Europe [2]. Modifiable significant risk factors have been identified for cardiovascular disease and lung cancer (i.e. smoking) the same cannot be said for breast cancer and early detection through screening is the primary population based method of reducing breast cancer mortality, [3] although this applies only to age groups from 50 to 69 [4-7]. Reduction in risk to other age groups generally less pronounced [8]. A recent survey showed that the Irish population is poorly informed and unaware of the real risk factors for cancer [9]. Risk perception inaccuracy has been related to a variety of factors including misinformation or a lack of knowledge, personal experiences and beliefs, and cognitive processes or biases that work to minimize threats [10]. While mammography screening has been positively and significantly associated with perceived risk for breast cancer, [11,12] lung screening does not affect lung cancer risk perceptions and is not itself a cue for changing smoking behaviour as main risk factor for lung cancer [13]. Behavioural studies have demonstrated that patients perceived control over the outcome (such as the ability to stop smoking) leads to more optimistic belief about the outcome [14]. Many women relate breast cancer with non-modifiable risk factors but associate screening with prevention rather than early detection [15].

Overestimation of breast cancer mortality risk by women and primary care physicians is cited as a significant reason for the increasing numbers of patients attending symptomatic breast units (SBU) [16]. The cancer detection rates among new attendees at SBU in Ireland have gone from 1:15 to 1:30 [17]. In contrast, the cancer detection among patients attending the rapid access lung cancer clinics has remained at 1:3 [18].

It is important to discourage women who overestimate risk from undergoing excessive screening and preventive strategies, and to encourage those who underestimate their risk to take appropriate health care behaviour.

The purpose of this study was to assess women's perception of the risk of developing breast cancer, lung cancer and cardiovascular disease and to identify factors influencing these risk perceptions.

2. SUBJECTS AND METHODS

A prospective cross-sectional survey was carried out Galway University Hospital. Participants were recruited between July and August 2013.

2.1 Subject Recruitment

Three study cohorts were included in this study; non-cancer patients, non-cancer volunteers and health care professionals. English speaking women without a self-reported personal history of breast or ovarian cancer and haven't attended triple assessment in symptomatic breast clinics in the past were eligible for the study. Subjects were recruited in a number of ways: Inpatients without a history of breast cancer were initially screened for study entry by the physician and then invited to participate; Health care professionals were selected on a base of a convenient sample from nursing staff and doctors; Nursing staff were selected from those actively involved in the management of hospital patients. These included outpatient nurses, inpatient nurses, oncology ward nurses and breast and oncology specialist nurses. Junior doctors were involved in patient care from a variety of hospital specialties. Non-cancer

volunteers were selected on the basis of a convenience sample from patient escorts, and a random cohort of women not affiliated with the hospital.

2.2 Questionnaire Design

The survey was self-completed, anonymous and conducted without any instruction from the study co-ordinators. Socio-demographic details were sought including age, degree of education and participant status such as patient, relative, doctor, nurse or other. Lifestyle activities were recorded including smoking, alcohol intake and daily exercise. Present co-morbidities such as diabetes, hypertensive disease, and high cholesterol levels and family history of breast cancer, lung cancer and cardiovascular disease were recorded.

Participants risk for developing breast cancer lung cancer and cardiovascular disease were estimated assessing risk factors provided in the designed questionnaire.

Participants were asked whether their risk for breast cancer, lung cancer and cardiovascular disease was below, at or above population risk. Average population risk for cancers was estimated based on Lifetime Risk Adjusted for Multiple Primaries [19] using 2010 data for the UK. Life time population cardiovascular risk was estimated according to data from Central Statistics Office (2013) Quarter and Yearly Summary 2013 [20]. The risk was then presented to the participant in descriptive form (Fig. 1).

The research protocol was approved by Galway University Hospitals Research Ethics Committee.

Statistical analysis was performed using SPSS 21.0 software (Chicago, IL, USA). Univariate comparison of variables was assessed using $\chi 2$ test for nominal or ordinal data. Multivariate analysis was performed using multinomial logistic regression. A p value of less than 0.05 was considered statistically significant for all tests. Questionnaire was designed by this study authors and reliability of questionnaire was assessed using Cronbach's alpha which was 0.5.

3. RESULTS

A total of 428 women agreed to participate in the study. There were no male participants. Four hundred and twenty five questionnaires (85%) out of five hundred were completed with sufficient data for analysis. The groups and demographics of these women are included in Table 1.

Table 1. Respondent's background and risk characteristics

	N=428
Education N,(%)	
1 degree education	11(2.64%)
2 degree education	112(26.92%)
3 degree education	293(70%)
Smoking history N,(%)	
Smoker	88(20.5%)
Ex-smoker	209(48.8%)
Non-smoker	131(30.6%)
Exercise per day N,(%)	
More than 30 min	254(60.62%)
Less than 30 min	165(39.66%)
Co-morbidities N,(%)	
Diabetes	49(11.44%)
Hypertension	78(18.22%)
High Cholesterol	80(18.69%)
No comorbidities	221(51.63%)
Family history N,(%)	
Breast cancer	138(32.24%)
Lung cancer	68(15.9%)
Stroke	119(27.8%)
Heart attack	202(47.3%)

The mean age of participants was 43 years (+/- 17 years). Most of the respondents (293; 70%) had a third level education. One hundred and thirty eight (32%) women had a family history of breast cancer, 68 (16%) had a family history of lung cancer and 321 (75%) had a family history of stroke or heart attack.

About a half of respondents accurately estimated their risk of developing breast cancer and cardiovascular disease however; two thirds of respondents underestimated their risk of developing lung cancer (Table 2).

On univariate analysis family history of breast cancer ($p < 0.001$) was associated with a higher perceived risk of developing breast cancer. No association was found between a perceived high risk of breast cancer and smoking. Interestingly smokers did not perceive that their risk of lung cancer was higher than the average population risk (Table 3).

Multivariate analysis demonstrated that a family history of breast and/or lung cancer ($p < 0.001$) is

strongest confounder for overestimating the risks of cancer. Smokers on multivariate analysis did not overestimate their risks of lung cancer or cardiovascular disease. Respondents who exercised more than 30 min a day perceived that their risk of cardiovascular disease decreased (Table 4). A family history of stroke or myocardial infarction did not influence cardiovascular risk perception.

4. DISCUSSION

In this study we have showed that family history is the strongest factor influencing the perception of cancer risk. Previous studies of Irish women found that they had a good knowledge about a breast cancer and its treatment options, but a poor knowledge of risk factors especially about modifiable risk factors such as reproductive

Table 2. Risk perception in relation to known risk factors

	Underestimated risk	Accurately estimated risk	Overestimated risk
Breast cancer	126 (30%)	198 (47%)	102 (23%)
Lung cancer	222 (53%)	135 (32%)	64 (15%)
Cardiovascular	142 (33%)	207 (49%)	77 (18%)

Table 3. Univariate and multivariate analysis of breast cancer risk perception

Variables	Univariate	Multivariate logistic regression		
	P value	OR	95% confidence interval	p value
Family history of breast cancer	< 0.001	10.731	(5.5-20.7)	< 0.001
Smoker	n.s	0.367	(0.151-0.889)	n.s
Ex-smokers	<0.05	2.776	(1.334-5.775)	0.006
Drinks alcohol	n.s	.700	(0.256-1.913)	n.s
Exercise >30 min/d	n.s	1.576	(0.867-2.865)	
Level of education	n.s	2.317	(1.006-5.336)	n.s

Table 4. Univariate and multivariate analysis of lung cancer risk perception

Variables	Univariate	Multivariate logistic regression		
	P value	OR	95% confidence interval	p value
Family History of lung cancer	0.001	5.837	(2.366-14.404)	0.001
Smoker	n.s	0.666	(0.254-1.746)	n.s
Ex-smokers	n.s	2.249	(0.930-5.436)	n.s
Drinks alcohol	n.s	0.876	(0.304-2.529)	n.s
Evercise >30 min/d	n.s	0.746	(0.336-1.658)	n.s
Level of education	n.s	0.746	(0.277-2.012)	n.s

Table 5. Univariate and multivariate analysis of cardiovascular risk perception

Variables	Univariate	Multivariate Logistic Regression		
	P value	OR	95% confidence interval	p value
Family history stroke	n.s	1.165	(0.582-2.331)	n.s
Family history MI	n.s	0.572	(0.303-1.082)	n.s
Smoker	n.s	0.571	(0.249-1.309)	n.s
Ex-smokers	n.s	1.245	(0.602-2578)	n.s
Drinks alcohol	n.s	0.731	(0.297-1.801)	n.s
Evercise >30 min/d	n.s	3.045	(1.474-6.289)	n.s
Level of education	n.s	0.821	(0.359-1.881)	n.s

1 in 10 women will develop breast cancer in their lifetime. What do you think your risk is?
Lower □ 1 in 10 □ Higher □
1 in 3 women will develop heart disease in their lifetime. What do you think your risk is?
Lower □ 1 in 3 □ Higher □
1 in 40 women will develop lung cancer in their lifetime. What do you think your risk is?
Lower □ 1 in 40 □ Higher □

Fig. 1. Assessment of risk perception

choices, body weight, nutritional choices, physical activity, and alcohol consumption [21-24]. Increased perceived risk of breast cancer is associated with the experience of previously having had a screening mammogram [25] or attending a symptomatic breast clinic. Studies showed that mammography screening has been associated with an increased perceived risk for breast cancer, however, there is limited evidence to support that screening mammography reduces specific mortality for the individual patient in the age group 40-49 [26,27,8,28].

The majority of respondents underestimate their lung cancer risk. Family history of lung cancer was significantly related to lung cancer risk perception and smokers more likely underestimated their lung cancer risk. This has been shown in previous studies [29,30]. Unfortunately smokers don't relate their habit to increased lung cancer risk as lung cancer is now the leading cause of cancer death in women according to Annual report of the National Cancer Registry [31]. In contrast to breast cancer screening, lung cancer screening does not affect lung cancer risk perceptions and is not itself a cue for changing smoking behaviour [32].

Participants did not relate their cardiovascular risk to hypertension, tobacco use, and diabetes or blood cholesterol levels but identified physical activity as a modifiable risk factor for cardiovascular disease [33]. A recent systematic review of 850000 patients demonstrated that women with diabetes carry a 44% higher risk of coronary heart disease [34]. In our study patients did not relate diabetes to an increased risk of cardiovascular disease. This may reflect a gap in public awareness and education that needs to be addressed in the public health and primary care settings.

Public awareness of the risks which predispose to cardiovascular disease is relatively high although misperceptions remain about how to lower those risks. Furthermore, even with the knowledge on how to reduce these risk factors and intensive lifestyle counselling, many people fail to engage in a long term healthy cardioprotective lifestyle [35,36].

The implementation of preventive healthcare strategies must be done carefully. We have demonstrated an overestimation of breast cancer risk among our sample population which may be attributable to increased public awareness of the disease without adequate awareness of either incidence or mortality risk. It can be difficult to predict how information around behavioural strategies to prevent death from disease will affect a population's behaviour. Health behavioural studies showed that subjective risk perception is important predictor of protective health behaviour [38-42].

This is the first study to the authors knowledge that compares the risk perceptions of women regarding breast cancer, lung cancer and cardiovascular disease, and demonstrates a gap in women's knowledge about modifiable risks factors for these diseases.

The experience and education of the respondents in this study might not be representative of the general female population but would be the most likely group to respond to a public health disease prevention campaign [43,44]. We did not assess every respondent's actual risk (Gail model) because it does not discriminate well at the level of individual [45-47]. Every respondent had been given information about population based risk and gave them opportunity to compare their perception to the general population. We were able to assess respondents knowledge and ability to link actual risk factors to specific conditions (breast cancer, lung cancer and cardiovascular disease).

5. CONCLUSION

Public health information is required to prevent women who overestimate risk from undergoing excessive screening and preventive strategies, and to encourage those who underestimate to take appropriate health care behaviour.

ACKNOWLEDGEMENT

I would like to acknowledge Ms Gloria Avalos who contributed to statistical analysis.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Peer-review history:
The peer review history for this paper can be accessed here:
http://sciencedomain.org/review-history/12802