

## RESEARCH ARTICLE

# Awareness of Breast Cancer Risk among Female University Students from 24 Low, Middle Income and Emerging Economy Countries

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## Abstract

**Background:** The aim of this study was to investigate the awareness of breast cancer risk factors among female university students in 24 low, middle income and emerging economy countries. A cross-sectional survey was conducted with 10,242 undergraduate university students (mean age 20.7, SD=2.9) from 25 universities in 24 countries across Asia, Africa and the Americas. Using anonymous questionnaires the awareness of links between breast cancer and heredity, diet, overweight, exercise, alcohol use, smoking and stress was assessed. Results indicated that 35.4% of the women were not aware that any of these risk factors could influence breast cancer, 43.8% were aware of a genetic link, and only 12.5%, 10.9% and 10.6% correctly identified alcohol use, overweight and physical inactivity, respectively, as factors causing breast cancer. Moreover, 13.3% rated dietary fat and 11.5% fibre as influencing breast cancer; both low-fat and high-fibre diets may be weakly protective against breast cancer, and smoking (19.4%) and stress (13.5%), the most commonly chosen breast cancer lifestyle risk factors, have less clear impact on breast cancer. There were marked country differences, e.g., in regards of being aware of genetic causes of breast cancer risk in female students from Ivory Coast, India, Madagascar, Nigeria and Laos below 30% and female students from Pakistan, Singapore, Turkey, Grenada and Philippines 60 or more percent. This study provides insight in the breast cancer risk perception of young women, which can be utilized in breast cancer awareness and prevention programmes.

**Keywords:** Perception - breast cancer risk - lifestyle factors - heredity - stress - university students - multi-country

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## Introduction

Breast cancer risk factors can be broadly classified as non-modifiable risks, including age, race/ethnicity, genetics/family history, and age at menarche and modifiable risk factors, including diet, alcohol consumption, overweight, smoking and physical inactivity (Fasching et al., 2011; Seitz et al., 2012; Reynolds, 2013). Both low-fat and high-fibre diets may be weakly protective against breast cancer (Thompson, 2012; Alegre et al., 2013). Regarding the association between stress and breast cancer, Antonova et al. (2011) conclude that most physiological research supports a stress-breast cancer association, which seem to be consistent with findings from epidemiologic studies looking at the effect of life events on breast cancer risk.

Danaei et al. (2005) estimate that 21% of all breast cancer deaths worldwide are attributable to alcohol use, overweight and obesity, and physical inactivity. In low- and middle-income countries, the proportion of breast cancers attributable to these risk factors was 18%, and

physical inactivity was the most important determinant (10%) (Danaei et al., 2005). The differences in breast cancer incidence between developed and developing countries can partly be explained by dietary effects combined with later first childbirth, lower parity, and shorter breastfeeding (Peto, 2001; Danaei et al., 2005). The increasing adoption of western lifestyle in low- and middle-income countries is an important determinant in the increase of breast cancer incidence in these countries (Peto, 2001).

Peacey et al. (2006) found among female university students from predominantly high income countries that almost one third of the women were not aware of any of the 8 assessed breast cancer risk factors, 57% were aware of a genetic link and fewer than 5% correctly identified alcohol, exercise or overweight as factors contributing to breast cancer. Among sixth-grade American girls, the most frequently listed causes of cancer were cigarette smoking (91%), drugs (32%), an unhealthy diet (25%), heredity (25%), and less than 10% exercise, sun exposure, or alcohol consumption (Nichols et al., 2006). Among

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Egyptian female university students the most widely known risk factors of breast cancer were smoking 66.9%, followed by radiation to the chest 63.7% and genetic factors 63.7% (Boulos and Ghali, 2013). University students in Angola felt that fatty foods (43%), being overweight (37%) and stress (5%) contribute to the development of breast cancer (Sambanje and Mafuvadze, 2012). In a study among female university students in Yemen the most important reported risk factors of breast cancer were genetic causes (61.2%), use of contraceptive pills (39.1%), and obesity (20%) Ahmed (2010), and Kurtuncu et al. (2014) found in a sample of Turkish university students that most knew that smoking and stress causes cancer (Kurtuncu et al., 2014). Wang et al. (2010) found that unaffected women in the general population endorsed the following causes of breast cancer: heredity (84.4), diet or eating habits (46.4), pollution in the environment (57.6%), aging (48.8%), alcohol (29.9%), smoking (58.3%), stress (27.5%), and lack of exercise (35.7%). The aim of this study was to investigate the awareness of breast cancer risk factors among female university students in 24 low, middle income and emerging economy countries.

## Materials and Methods

### Sample and procedure

This cross-sectional study was carried out with a network of collaborators in participating countries (see Acknowledgments). The anonymous, self-administered questionnaire used for data collection was developed in English, then translated and back-translated into languages (Arabic, Bahasa, Chinese, French, Lao, Russian, Spanish, Thai, Turkish) of the participating countries. The study was initiated through personal academic contacts of the principal investigators. These collaborators arranged for data to be collected from intended 400 male and 400

female undergraduate university students aged 16-30 years by trained research assistants in 2013 in 1 or 2 universities in their respective countries. The universities involved were located in the capital cities or other major cities in the participating countries. Research assistants working in the participating universities asked classes of undergraduate students to complete the questionnaire at the end of a teaching class. Classes were recruited according to timetable scheduling using stratified random sampling. We included no incentive for participation, and there were no penalties for refusing to complete the survey. The students who completed the survey varied in the number of years for which they had attended the university. A variety of majors were involved, including education, humanities and arts, social sciences, business and law, science, engineering, manufacturing and construction, agriculture, health and welfare and services. Informed consent was obtained from participating students, and the study was conducted in 2013. Participation rates were in most countries over 90%. Ethics approvals were obtained from all participating institutions.

### Measures

Awareness of breast cancer risk factors was assessed with 8 questions, each asking if they believe that breast cancer is influenced by 1) smoking, 2) alcohol, 3) exercise, 4) stress, 5) heredity, 6) eating fat, 7) being overweight, and 8) eating fibre. For each option, the participant could either tick the corresponding box for "yes" or leave it blank for "no" (Wardle and Steptoe, 1991; Peacey et al., 2006).

### Data analysis

The data were analysed using IBM SPSS (version 20.0) in order to obtain the age-adjusted percentage of female students believing in the influence of 8 breast cancer risk factors in each study country.

**Table 1. Proportion of Female University Students Believing that Each Factor has an Influence on Breast Cancer**

	N	Heredity	Alcohol	Exercise	Overweight	Stress	Smoking	Dietary fat	Fibre	
All	10243	43.8	12.5	10.0	10.9	13.5	19.4	13.3	11.5	
Caribbean and South America										
	Barbados	239	52.5	2.5	3.8	6.3	10.8	9.2	6.3	4.2
	Grenada	278	62.4	7.9	6.5	10.8	13.6	12.9	10.8	6.8
	Colombia	456	56.6	3.9	2.9	4.2	8.1	5.9	4.4	6.4
	Venezuela	338	56.4	3.9	1.8	5.6	23.1	15.1	5.9	2.7
Sub-Saharan Africa										
	Cameroon	359	50.7	11.7	3.1	26.5	26.5	22.6	5.3	5.8
	Ivory Coast	368	16.0	1.4	3.5	3.0	6.8	3.8	1.4	1.4
	Madagascar	383	26.9	9.1	2.3	1.6	0.8	24.5	3.4	6.8
	Mauritius	331	30.1	5.1	5.5	9.4	7.3	14.8	6.4	3.3
	Namibia	335	40.1	3.7	2.3	3.3	3.0	7.5	1.5	6.2
	Nigeria	350	24.7	4.6	2.6	5.1	4.3	8.0	8.0	5.8
North Africa and Central Asia										
	Egypt	437	59.3	36.6	6.9	6.4	6.4	22.7	20.8	9.0
	Tunisia	629	29.3	12.2	7.0	6.2	11.0	18.3	7.5	14.6
	Turkey	395	59.7	14.4	9.9	12.4	36.7	31.4	9.9	8.9
	Russia	329	46.2	2.4	1.2	3.7	9.9	11.9	3.2	8.1
	Kyrgyzstan	479	52.2	11.5	4.4	10.4	26.9	22.5	8.6	7.3
South Asia and China										
	Bangladesh	334	31.1	9.9	8.4	9.9	5.4	9.9	7.8	14.8
	India	259	20.4	5.4	2.7	6.9	6.2	6.6	3.5	14.3
	Pakistan	473	73.6	37.4	7.1	28.5	29.2	18.3	11.4	19.4
	China	830	53.1	9.9	14.2	12.5	20.8	15.2	16.6	12.9
Southeast Asia										
	Indonesia	519	47.8	31.4	8.5	16.8	13.1	40.5	30.8	5.4
	Laos	533	29.9	2.4	1.7	1.5	2.8	3.0	7.9	1.3
	Philippines	578	66.1	5.0	9.7	5.2	17.8	13.5	9.7	8.1
	Singapore	438	68.2	11.6	12.1	12.3	19.4	22.1	12.6	8.4
	Thailand	622	34.9	6.6	4.8	4.0	6.1	17.6	6.4	7.7

## Results

Table 1 describes the proportion of female university students in each country that endorse a list of possible risk factors for breast cancer. In all, 35.4% of the women were not aware that any of the risk factors (heredity, alcohol, exercise, overweight, stress, smoking, dietary fat, fibre) could influence breast cancer. From all the individual risk factors participants were more likely to endorse heredity (43.8%) than any of each of the lifestyle factors. There were country differences in regards of being aware of genetic causes of breast cancer risk, ranging from country ratings below 30% in students from Ivory Coast, India, Madagascar, Nigeria and Laos to country ratings of 60 or more percent in female students from Pakistan, Singapore, Turkey, Grenada and Philippines. Among all female students the second most common endorsed risk factor for breast cancer was smoking (19.4%), with students from Indonesia (40.5%) and Turkey (31.4%) having the highest ratings. The two next most common endorsements were for stress (13.5%) and dietary fat (13.3%), while students from Turkey (36.7%) and Pakistan (29.2%) had the highest ratings for stress, and students from Indonesia (30.8%) and from Egypt (20.8%) the highest ratings for dietary fat. Alcohol use was endorsed by 12.5% of the female students, with high ratings in female students from Pakistan, Egypt and Indonesia. The remaining three risk factors (exercise, overweight and fibre intake) were endorsed by 10.0% to 11.5% of the female students. Comparing female students from all countries, China and Singapore gave the highest ratings for exercise and Pakistan and Cameroon the highest ratings for overweight (Table 1).

## Discussion

In this study of female university students from 24 low, middle income and emerging economy countries, predominantly genetic and to a lesser extent lifestyle factors were endorsed as causes of breast cancer. Similar findings were found in a previous survey among female university students predominantly from 23 high income countries (Peacey et al., 2006). The awareness of genetic breast cancer risk factors in this study was lower (43.8%) than in the predominantly high income country sample of female university students (57.1%) (Peacey et al., 2006), among Egyptian university students (63.7%) (Boulos and Ghali, 2013), Yemini university students (61.2%) (Ahmed, 2010), and among a general female adult population (84.4%) (Wang et al., 2010).

The second and third most common endorsed risk factor for breast cancer in this study was smoking and stress, as also found among female university students from the predominantly high income countries (Peacey et al., 2006) and Angola (Sambanje and Mafuvadze). For the well-established breast cancer risk factors of alcohol, physical inactivity and overweight, this study found an endorsement of over 10% for each of the factors, while this was across the same risk factors below 5% in the study among female university students from predominantly high income countries (Peacey et al.,

2006). Study participants underestimated the importance of behavioural factors. Similar results were also found among predominantly breast cancer survivors (Wold et al., 2005).

The study also found large country variation in terms of the ratings of each risk factor of breast cancer. It appears that female university students from lower income countries such as Madagascar, Ivory Coast, India and Laos had a lower awareness of genetic risks than female students from higher income countries such as Grenada, Turkey and Singapore. There was a striking similarity of the perceived genetic risks between students from Thailand and Venezuela surveyed in 2000 (Peacey et al., 2006) and 2013, namely, 34.9% and 35.1%, and 56.4% and 57.1%, respectively. Regarding, the lifestyle risk factors of alcohol, physical inactivity and overweight, there was a low (below 5%) breast cancer risk perception for female students from Colombia, Ivory Coast, Namibia, Russia and Laos, which should be particularly targeted for breast cancer reducing lifestyle prevention intervention programmes.

This study had several limitations. The study was cross-sectional, so causal conclusions cannot be drawn. The investigation was carried out with students from one or two universities in each country, and inclusion of other centres could have resulted in different results. University students are not representative of young adults in general, and the breast cancer risk perceptions may be different in other sectors of the population. Further, breast cancer risk perceptions were limited to a given eight options, and other factors such as family history of breast cancer (Al-Sharbatti et al., 2013) and health beliefs such as susceptibility to breast cancer should be assessed in future studies.

In general, low breast cancer risk perception was found across 8 different risk factors. In particular, low ratings of modifiable risk factors are cause for concern. Better awareness of risk factors and a breast cancer reducing lifestyle may be effective in reducing breast cancer risk.

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