

Towards prevention of breast cancer in the Pacific: Influence of diet and lifestyle

Afolabi I R

C/o Fiji School of Medicine

PMB Suva

Email: rotimiore@yahoo.com

Abstract

Breast cancer is a multifactorial disease which has created a significant health problem worldwide. The literature suggests that there is an increase the prevalence of breast cancer among the Pacific Islanders in the last two decades. Factors which influence breast cancer risk include gender, genetic mutation, diet, parity and endocrine. Nutritional studies and epidemiological surveys show that dietary and lifestyle factors play significant role in breast cancer risk. Breast cancer risk is reduced by regular intake of fruits, vegetables and omega-3 fatty acids-rich diet. Whereas obesity, smoking, alcohol consumption and sedentary lifestyle increase breast cancer risk. Breast feeding practice is protective against breast cancer. Intensive awareness campaigns and public education are necessary to discourage risk behaviour among the pacific islanders.

Introduction

Statistics showed that breast cancer is a major problem worldwide. In developed countries, breast cancer is the second leading cause of cancer-related deaths among women and it is estimated that 1 in 8 women will develop the disease during their life time.¹ Studies performed in University of Hawaii showed that the incidence and mortality of breast cancer have been rising among native Hawaiian women who have been living in Hawaii since 1976.² Similar findings of rising incidence of breast cancer among Asian American and Pacific Islanders (AAPI) were also reported from California State University.³ Higher mortality from breast cancer has been reported among Maoris compared to non-Maori women in New Zealand.⁴ Anecdotal statistics from the Ministry of Health Fiji 2005 annual report showed that there has been a high incidence of breast and cervical cancers in Fiji.

Despite advances in surgical and oncological treatment, breast cancer still remains a significant problem in most countries. International agency for research on cancer estimates that 25 percent of breast cancer cases worldwide are due to overweight / obesity and a sedentary lifestyle.⁵ Dietary factors and physical inactivity are estimated to account for about 35 percent of cancer death in the United States.⁶ From the foregoing, it is obvious that diet and lifestyle, among other behavioural and environmental factors, are important risk factors in the prevalence of breast cancer. Certain risk factors can be modified by increasing public awareness of the disease. Research performed in Queensland, Australia, for example, revealed that Aboriginal women's attitudes and perceptions towards breast cancer prevention can be improved by increasing societal awareness of the disease, highlighting

...Aboriginal women's attitudes and perceptions towards breast cancer prevention can be improved by increasing societal awareness of the disease.

the benefits of preventive health services and provision of counseling services.⁷

The paper is written to highlight the role of dietary and lifestyle factors in breast cancer, and to advocate for awareness campaigns against high risk habits among Pacific Islanders.

Discussion

Role of diet Fruits, vegetables and soy rich foods.

Regular consumption of fruits, vegetables and soy rich foods is associated with significant reduction in risk of developing breast cancer in women. Examples of such foods are leafy vegetables, carrot, pumpkin, lettuce and cabbage based on observational and epidemiological studies performed in Western countries and Asia.⁸⁻¹⁰ Consumption of soy rich food is significantly inversely related to breast cancer risk in many studies.¹¹ Soy food contains a phytochemical isoflavone genistein, a biologically active compound associated with reduced breast cancer risk in women who consume soy rich diets. Isoflavone has been reported to cause suppression of cell proliferation and stimulation of apoptosis thereby inhibiting tumorigenesis.¹² Early introduction of risk-reducing diet is associated with reduced breast cancer risk.¹³

Studies have shown that there is a racial variation in biological characteristics of breast cancer. Lifestyle among other factors is an important contributor to these observed variations.¹⁴ For example research has shown that majority of native Hawaiian women living in Hawaii have predominantly estrogen/progesterone receptors (ER/PR) positive tumours.¹⁵ In contrast, reports from other studies revealed that ER/PR

receptor negative tumours are more common among many races (migrants) living in the USA¹⁴. Recent studies show that Samoan women tend to present at young age with advanced breast cancer¹⁶. Phytochemical isoflavones found in *red clover* and soy have affinity for estrogen receptors, alpha and beta, (ER α and β), progesterone receptors (PR) and androgen receptor (AR). The higher affinity of isoflavones for ER β relative to ER α is responsible for the observed efficacy of *red clover* in reducing the risk of breast cancer and amelioration of post menopausal symptoms¹⁷. These phytoestrogens have antioxidant properties in addition to oestrogen receptor modulator and oestrogen enzyme modulator activities¹⁷. One may postulate that women with ER/PR positive tumours may benefit from the use of *red clover*.

Flaxseed is another plant that has been demonstrated in many studies to have an antitumor effect. The plant contains edible oil and a lignan precursor (secoisolariciresinol diglycoside). Both components have been shown to inhibit breast cancer growth and metastasis.¹⁸⁻²⁰ Indole-3 carbinol is found in cruciferous vegetables (cauliflower, broccoli, brussel sprouts). The latter has been shown to reduce the amount of carcinogenetic forms of oestrogen and increase the beneficial form²¹.

Fats and Oil

According to the American Dietetic Association's guidelines, a healthy balanced diet contains 50 percent of calorie as carbohydrate, 30 percent as fat and 20 percent as protein¹¹. When the fat content of diet is more than 30 percent, the diet is said to be a high fat diet¹¹. Consumption of a high fat diet is common place in some Pacific Islands. For example, there is an increasing trend in the consumption of food high in salt and fat content such as ham, spam and canned fish among the Palauans. This dietary habit is a result of westernization but could be changed by public enlightenment and development of nutritional health education to address issues such as selection of healthy food, preparation of balanced meals and obesity²².

A diet high in dietary fats especially the omega-6 fatty acids found in dairy fats, animal fat and oils is associated with an increase in mammary tumour incidence²³. Whereas a diet rich in omega-3 fatty acids protects against breast cancer and heart disease^{13, 23}. Omega-3 fatty acids are found in mackerel, herring, sardines, tuna and salmon. Other sources of omega-3 are soy beans, soy sauce, canola, walnut, flaxseed and their oils. The American Heart Foundation and the Heart Foundation of Australia recommend that food rich in Omega-3 fatty acids such as mentioned above should be consumed twice a week²⁴. Similarly intake of high fat diet (omega 6) coupled with high body mass index (BMI) is associated with increased lipid peroxidation (cell damage). Increased intake of arachidonic acid, which is found abundantly in meat, is directly related to DNA damage²⁵. Lipid peroxidation, which leads to cell membrane instability as well as DNA damage, increases susceptibility of cells to malignant transformation. Moreover, low serum level of high density lipoprotein-C (protective lipid) is associated with

increased risk of post-menopausal breast cancer²⁶. Foods such as egg, animal butter and oil are poor in serum high density lipoprotein (HDL) but rich in serum very low density lipoprotein (VLDL). The later is associated with increase risk of heart disease and breast cancer²⁴.

Lifestyle

Alcohol consumption and smoking

In addition to other effects of alcohol on body metabolism, there is a strong association between alcohol intake and prevalence of breast cancer in women. The evidence is based on epidemiological studies reported by World Health Organisation⁶. Studies have shown that the relative risk of breast cancer is increased, in both premenopausal and postmenopausal women, by 7% for every 10g of alcohol consumed per day⁵. The association between alcohol consumption and increased breast cancer risk has been observed irrespective of type of alcohol consumed⁵. Data from animal experiments suggest many possible mechanisms of alcohol's action in the observed increase in the risk of breast cancer⁵. Smoking may inhibit detoxification of alcohol, or impair liver clearance of carcinogen.⁵ Studies have also shown that those who consume alcohol are likely to be exposed to both active and passive smoking²⁷.

Smoking and environmental tobacco smoke (ETS) are associated with increased breast cancer risk^{27, 28}. There is an increase in breast cancer risk in women who start smoking as teenagers and continue to smoke for at least 20 years^{8, 29-31}. Similarly, prolonged exposure to environmental tobacco smoke (passive smoking) is associated with increased breast cancer risk^{32, 33}.

Tobacco use is almost in epidemic proportions among Asian Americans and Pacific Islanders (AAPI) men, and recently it has also been revealed that there is an increase use of tobacco among AAPI women and girls. In fact, the highest percentage of smokers aged 15 years and over reside in East Asia and the Pacific with smoking prevalence of 34%³⁴. Rampant tobacco use has become a social norm in Palauan society including the use of smokeless tobacco (Quid) especially among women³⁴. This implies that many of the AAPI are exposed to the hazards of passive and active tobacco smoking (ETS).

Exercise and obesity

Studies indicate that women who engage in moderate exercise 3-4 hours per week have a 30-40 percent lower risk of breast cancer than sedentary women^{5, 8}. Overweight and obesity increase the risk of breast cancer in post-menopausal women^{6, 35}. The risk of breast cancer is increased significantly when body mass index (BMI) is equal to or greater than 25kg/m². Similarly, the serum level of high density lipoprotein-C decreases appreciably²⁶. Moreover there is a 50 to 250 percent increase in breast cancer risk for post menopausal women who are overweight or obese (10 percent above normal body weight)⁵. In contrast, total calorie restriction, which directly contributes to weight reduction, is associated with reduction in breast

For example, there is an increasing trend in the consumption of food high in salt and fat content such as ham, spam and canned fish among the Palauans.

cancer risk¹. The problem of obesity among Pacific populations is exemplified by a study of Palauan elderly which showed that majority of subjects were obese with a mean body mass index (BMI) of 27.0 in males and 28.9 in females, and with mean body fat percentage of 20.3 in males and 39.8 in females²².

Breast feeding and child bearing

Breast feeding practices and child bearing decrease breast cancer rate. The longer the duration of breast feeding, the lower the odds of developing breast cancer¹. This effect is cumulative and becomes appreciable in risk reduction after a total period of one year of breast feeding³⁶. Breast cancer risk decreases with early child bearing, high parity and physical activity²¹. The effect of breast feeding practices and child bearing on breast cancer rate are complementary.

Conclusion

Evidence from the literature shows that the intake of some food items and indulgence in certain behaviours are associated with an increased risk of breast cancer. In view of the fact that consumption of unhealthy foods, alcohol, smoking, obesity and other lifestyle risk factors are common in the Pacific, targeted intervention is required. The intervention should include strategies that will focus on development of nutritional education, reduction in importation of high-risk foods, formulation of government policies to discourage indulgence in risk behaviour, awareness campaigns about breast cancer and benefits of preventive health practices, training of local health professionals, and provision of family and social support. Coordinated efforts on the parts of the governments of the Pacific countries, international organizations, and the local community are required to ensure the success of these strategies.

Recommendation

- Reduction in total calorie intake coupled with regular and moderate exercise will keep the body weight within an acceptable range.
- Balanced diet rich in vegetables, fruits and omega-3 fatty acids is recommended.
- Abstinence from smoking (both passive and active) is essential.
- Breastfeeding practices should be encouraged.
- When possible women should have their babies earlier than later.

References

1. Nkondjock A, Ghadirian P. Risk factors and risk reduction of breast cancer. *Med Sci (Paris)* 2005 Feb; 21(2): 175-80
2. Huges CK, Higuchi P. Ka Lokahi Wahine: a culturally based training for Health professionals. *Pac Health Dialog* 2004 Sept; 11(2): 166-9
3. Wong-Kim E, Wang CC. Breast self-examination among Chinese immigrant women. *Health Educ Behav* 2006 Oct; 33(5): 580-90. Epub 2006 Aug.
4. Curtis E, Wright C, Wall M. The epidemiology of breast cancer in Maori women in Aotearoa New Zealand: Implications for screening and treatment. *N Z Med J* 2005 Feb 11; 118(1209): U1297
5. McTiernan A. Behavioral risk factor in breast cancer: can risk be modified? *Oncologist* 2003; 8(4): 326-34
6. Tsugane S. Dietary factor and cancer risk- evidence from epidemiological studies. *Gan To kagaku Ryoho* 2004 Jun; 31(6): 847-52
7. McMichael C, Kirk M, Manderson L et al. Indigenous women's perceptions of breast cancer diagnosis and treatment in Queensland. *Aust NZ J Public Health* 2000 Oct; 24(5): 515-9
8. Huang XE, Hirose K, Wakai K et al. Comparison of lifestyle risk factors by family history for gastric, breast, lung and colorectal cancer. *Asian Pac J Cancer Prev* 2004 Oct-Dec; 5(4): 419-27
9. Riboli E, Norat T. Epidemiologic evidence of the protective effect of fruit and vegetable and cancer risk. *Am J Clin Nutr* 2003 Sep; 78(3 Suppl): 559S-569S.
10. Chen G, Heilbrun LK, Venkatramanamoorthy R. Effect of low-fat and / or high-fruit-and-vegetable diet on plasma levels of 8-isoprostane-F2 alpha in the Nutrition and Breast Health Study. *Nutr Cancer* 2004; 50(2): 155-60
11. Anna HW, Frank ZS, Carmen M et al. A controlled 2-mo dietary fat reduction and soy food supplementation study in postmenopausal women. *Am J Clin Nutr* 2005; 81: 1133-41
12. Chen J, Wang L., Thompson LU. Flaxseed and its components reduce metastasis after surgical excision of solid human breast tumor in nude mice. *Lett* 2005 May 20; (Epub ahead of print)
13. Dave B, Eason RR, Till SR et al. The soy isoflavone genistein promotes apoptosis in mammary epithelial cells by inducing the tumor suppressor PTEN. *Carcinogenesis* 2005 May 19; (Epub ahead of print)
14. Li CI, Malone KE, Daling JR. Differences in breast cancer hormone receptor status and histology by race and ethnicity among women 50 years of age and older. *Cancer Epidemiol Biomarkers Prev* 2002 Jul; 11(7): 601-7.
15. Braun KL, Fong M, Goty CC et al. Ethnic differences in breast cancer in Hawaii: age, stage, hormone receptor status and survival. *Pac Health Dialog* 2004 Sept; 11(2): 146-53.
16. Ishida DN, Toomata-Mayer TF, Braginsky NS. Beliefs and attitudes of Samoan women towards early detection of breast cancer and mammography utilization. *Cancer* 2001 Jan 1; 91(1Suppl): 262-6.
17. Tsubura A, Uebara N, Kiyozuka Y et al. Dietary factors modifying breast cancer risk and relation to time of intake. *J mammary Gland Biol Neoplasia* 2005 Jan; 10(1): 87-100
18. Beck V, Rohr U, Jungbauer A. Phytoestrogen derived from red clover: An alternative to oestrogen replacement therapy? *J steroid biochem Mol Biol* 2005 Apr; 94(5): 499-518.

19. Thompson LU, Chen JM, Li T et al. Dietary flaxseed alters tumor biological markers in postmenopausal breast cancer. *Clin Cancer Res* 2005 May 15; 11(10): 3828-35
20. Wang L, Chen J, Thompson LU. The inhibitory effect of flaxseed on the growth and metastasis of oestrogen receptor negative breast cancer xenografts is attributed to both its lignan and oil component. *Int J Cancer* 2005 Apr 22nd; (Epub ahead of print).
21. Louise R. Wellness recommendations for breast cancer. URL: http://healing.about.com/od/cancer/a/breastcancer_RL_2.htm.
22. Yoshimoto Y, Muto S, Fujikura J et al. Obesity, bone status and dietary intake of Palauan elderly congregating in a senior citizens centre. *Pac Health Dialog* 2005 Mar; 12(1): 22-32.
23. Olivo SE, Hilakivi-Clarke L. Opposing effect of prepubertal low and high fat n-3 polyunsaturated fatty acids diet on rat mammary tumorigenesis. *Carcinogenesis* 2005 May 11; (Epub ahead of print)
24. Weisinger H. Omega-3 fatty acids: yes, but how much and when? *La Trobe University bulletin*. URL <http://www.latrobe.edu.au/bulletin>. May 2005
25. Thomson CA, Giuliano AR, Shaw JW et al. Diet and biomarkers of oxidative damage in women previously treated for breast cancer. *Nutr Cancer* 2005; 51(2): 146-54
26. Furberg AS, Veierod MB, Wilsgaard T et al. Serum high-density lipoprotein cholesterol, metabolic profile and breast cancer risk. *J Natl Cancer Inst* 2004 Aug 4; 96(15): 1152-60.
27. Reynolds P, Hurley SE, Hoggat K et al. Correlates of active and passive smoking in the California teachers study cohort. *J women's health (Larchmt)* 2004 Sept; 13(7): 778-90
28. Lee EO, Ahn SH, You C et al. Determining the main risk factors and high-risk groups of breast cancer using a predictive model for breast cancer risk assessment in South Korea. *Cancer Nurs* 2004 Sept-Oct; 27(5): 400-6.
29. Gram IT, Braaten T, Terry PD et al. Breast cancer risk among women who start smoking as teenagers. *Cancer Epidemiol Biomarkers Prev* 2005 Jan; 14(0): 61-6
30. Mainjer J, Johansson R, Lenner P. Smoking is associated with post menopausal breast cancer in women with high levels of eostrogen. *Int J Cancer* 2004 Nov 1; 112(2): 324-8
31. Hanaoka T, Yamamoto S, Sobue T et al. Active and passive smoking and breast cancer risk in middle-aged Japanese women. *Int J Cancer* 2005 Mar 20; 114(2): 317-22.
32. Gammon MD, Eng SM, Teitelbaun SL et al. Environmental tobacco smoke and breast cancer incidence. *Environ Res* 2004 Oct; 96(2): 176-85.
33. Shrubsole MJ, Gao YT, Dai Q et al. Passive smoking and breast cancer risk among non-smoking Chinese women. *Int J Cancer* 2004 Jun 1; 110(4): 605-9.
34. Lew R, Tanjasiri SP. Slowing the epidemic of tobacco use among Asian Americans and Pacific Islanders. *Am J Public Health* 2003 May; 93(5): 764-8.
35. Atoum MF, Al Hourani HL. Life-style related risk factors for breast cancers in Jordanian females. *Saudi Med J* 2004 Sept; 25(9): 1245-8.
36. Jernstrom H, Lubinski J, Lynch HT et al. Breast feeding and the risk of breast cancer in BRCA 1 and BRCA 2 mutation carriers. *J Natl Cancer Inst* 2004 Jul 21; 96(14): 1094-8.

“If you pick up a starving dog and make him prosperous, he will not bite you. This is the principle difference between a man and a dog.” - Mark Twain