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Veröffentlichungsversion / Published Version

Zeitschriftenartikel / journal article

Empfohlene Zitierung / Suggested Citation:

Tapety, F. I., Magalhães, J. V., Júnior, F. J. d. A. C., Cunha, L. d. V. T. C., Chaves, T. V., & Cavalcante, A. A. d. C. M. (2013). Risk factors associated with breast cancer patients in Teresina, Piauí, Brazil. *Revista de Pesquisa: Cuidado é Fundamental Online*, 5(6), 91-103. <https://doi.org/10.9789/2175-5361.2013.v5i6.91-103>

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RESEARCH

Risk factors associated with breast cancer patients in Teresina, Piauí, Brazil

Fatores de riscos associados com câncer de mama em pacientes de Teresina, Piauí, Brasil

Factores de riesgo asociados con el cáncer de mama en pacientes de Teresina, Piauí, Brasil

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ABSTRACT

Objective: To characterize the risk factors for breast cancer in patients seen in a referral center in the city of Teresina, Piauí (2010-2012). **Method:** A descriptive exploratory study with 197 patient records. A personal health questionnaire was administered to 20 patients and 20 women without breast cancer. The data were submitted to SPSS 13.0 for analysis of percentages, means and Spearman correlations. **Results:** The average age (55 years) was positively correlated with ductal carcinoma (83%) and 10% of metastases. The occupation of domestic, family history, medications, and exposure to ionizing radiation have been demonstrated as risk factors. Significant ($p < 0.001$) positive correlation ($r = 0.6642$, $p = 0.002$) were observed between breast cancer family history and occupation. **Conclusion:** Prevention strategies related to environmental, occupational and hereditary factors are necessary to minimize the risk of mutagenicity and carcinogenicity. **Descriptors:** Breast cancer, Risk factors, Mutagenicity.

RESUMO

Objetivo: Caracterizar os fatores de riscos do câncer de mama em pacientes atendidos em centro de referência da cidade de Teresina, Piauí (2010-2012). **Método:** Estudo exploratório descritivo com 197 prontuários de pacientes. Questionário de saúde pessoal foi aplicado a 20 pacientes e 20 mulheres sem câncer de mama. Os dados foram submetidos ao programa SPSS 13.0 para análises de percentuais, médias e correlações de Spearman. **Resultados:** A idade (55 anos) foi correlacionada positivamente com o carcinoma ductal (83%) e 10% das metástases. A ocupação de doméstica, a história familiar, medicamentos e exposição às radiações ionizantes foram evidenciadas como fatores de riscos. Significantes ($p < 0,001$) correlações positivas ($r = 0,6642$ e $p = 0,002$) foram observadas entre câncer de mama com história familiar e ocupação. **Conclusão:** Estratégias de prevenção associadas aos fatores ambientais, ocupacionais e hereditários são necessárias para minimizar os riscos de mutagenicidade e carcinogenicidade. **Descritores:** Câncer de mama, Fatores de riscos, Mutagenicidade.

RESUMEN

Objetivo: Caracterizar los factores de riesgos del cáncer de mama en los pacientes atendidos en un centro de referencia en la ciudad de Teresina, Piauí (2010-2012). **Método:** estudio exploratorio descriptivo de 197 registros de pacientes. Cuestionario de salud personal fue aplicado a 20 pacientes y 20 mujeres sin cáncer de mama. Los datos fueron sometidos al programa SPSS 13.0 para el análisis de los porcentajes, medias y correlaciones de Spearman. **Resultados:** La edad media (55 años) se correlacionó positivamente con el carcinoma ductal (83%) y 10% de las metástasis. El trabajo doméstico, la historia familiar, los medicamentos y la exposición a la radiación ionizante se han demostrado como factores de riesgo. Significativas ($p < 0,01$) correlaciones positivas ($r = 0,6642$, $p = 0,002$) fueron observadas entre la historia familiar de cáncer de mama y la ocupación. **Conclusión:** Las estrategias de prevención relacionadas con los factores ambientales, ocupacionales y hereditarios son necesarias para reducir al mínimo el riesgo de mutagenicidad y carcinogenicidad. **Descriptor:** Cáncer de mama, Factores de riesgo, Mutagenicidad.

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INTRODUCTION

The assessment of risk factors for cancer is important to the context of human health. Currently, it is known that at least one third of the new cases of cancer that occurs annually in the world could be prevented.¹ Cancer will be the first cause of mortality in the world in the coming decades. Linked to this is the fact that the cancer has a strong influence society, undermining productive individuals, both in the social and economic context, as well as to constitute a serious public health problem.

In Brazil, since 2003, malignant neoplasms are the second cause of death in the population, representing almost 17% of deaths of known causes, notified in 2007, in the Mortality Information System. It is estimated that, in 2020, the number of new cases per year in the world will be 15 million, of which approximately 60% occur in developing countries. The most prevalent types, with the exception of nonmelanoma skin cancer, will be prostate and lung cancer, in males; and breast and cervical cancer, in females.²⁻³

There are possibilities of prevention for a good part of the cancers, because approximately 80 to 90% of them are related to lifestyle and environmental factors, some of which as well known as the smoking, consumption of alcoholic beverages, excessive exposure to ionizing radiation and sunlight, chemical substances, present in food, as well as occupational exposure to carcinogenic agents.⁴

Risk factors associated with breast cancer...
Breast cancer is the second most frequent type of cancer in the world and the most common among women. Each year, about 20% of the new cases of cancer in women are breast, with age being one of the most important risk factors.^{5-7,3} The incidence rates will increase rapidly over the 50 years and, subsequently, this increase will occur more slowly. This change in the behavior of the rate is known as "Clemmesen's hook", and has been attributed to the onset of menopause. The risk factors are related to the woman's reproductive life (early menarche, nulliparity, age at first full-term pregnancies over 30 years, oral contraceptives, late menopause and hormone replacement therapy) and are well established in relation to the development of cancer breast.^{7,3}

Understanding the risk factors for breast cancer allows identifying women seeking interventions to modify the risks both in isolated cases, as also in larger populations; in epidemiological studies.⁸ Many factors are associated with breast cancer, such as age and gender, race, ethnicity, benign diseases, lifestyle and dietary factors, reproductive and hormonal factors, exposure to ionizing radiation, environmental factors and smoke.⁸⁻⁹ However, in 10% of cases it is associated with family history.⁹ The family history is common in patients with breast cancer, with a low percentage, but all are related to mutations in germinative strains.⁹⁻¹⁰

This research aimed to analyze the charts on Medical Service Statistics (SAME) a Reference Cancer Center in Teresina, Piauí, Brazil, during the period 2010/2012 to characterize the socio-economic and clinical profile of patients with breast cancer, but also

Tapety FI, Magalhães JV, Cruz Junior FJA *et al.* for the mapping of probable risk factors associated with the neoplasia in focus. This was based on information from patients undergoing chemotherapy and / or radiotherapy to foster better understanding of the epidemiology and risk factors for the genesis of process of carcinogenesis related to breast cancer as well as for the improvement of cancer prevention measures in Piauí.

METHODOLOGY

This was an exploratory descriptive research, since the facts were observed, recorded, analyzed, classified and interpreted, without interference from the researcher, including the gathering of information on the risk factors for breast cancer. As far as the procedures for data collection, the study was classified as survey data in medical records of patients with breast cancer, and by the application of a Public Health Questionnaire.

The questionnaire applied for the understanding of the risk factors and was adapted from the model recommended by the International Commission for Protection against Environmental Mutagens and Carcinogens (ICPEMC).¹¹ The survey was conducted through written authorization from the legal representative of the Hospital São Marcos (HSM), with the signing of the Custodian and in accordance with the Ordinance of the Ministry of Health, National Council on Ethics in Research, no. 466/ 12, which regulates the operational issues ethical and scientific work involving human beings. Having approval by the Research Ethics

Risk factors associated with breast cancer... Committee of the Faculty UNINOVAFAPI, protocol No. 0151.0.043.000 -11.

The Hospital Sao Marcos, Teresina, Piaui, a reference center in the diagnosis and treatment of cancer cares the population in several states of Brazil, especially of Maranhao, Para, Ceara and Tocantins. For analysis of the sample, 197 medical records were evaluated of patients with breast cancer. Subsequently, 20 patients agreed to participate in the second stage of the research, where the Public Health Questionnaires were applied.

For the control group were 20 women selected without a cancer diagnostic. It should be noted that the questionnaire was applied with the prior consent of the patients by means of the signature of the Free and Informed Consent. The patients in the study were not identified and those who were not in chemotherapy and/or radiotherapy treatment in Chemotherapy and Radiotherapy Service at Hospital São Marcos were excluded.

The data analysis process was carried out using the SPSS 13:0 for the correlations between the variables and the Program Graph Pad Prisma, for analysis of variance (ANOVA) with the use of the Dunnet's test, to know the existence of association between potential risk factors for breast cancer; the statistical Spearman's correlation was used.

RESULTS AND DISCUSSION

In the Outpatient Clinic of Piaui, the Cancer Combat Association (Hospital São Marcos), in the period from 01/01/2010 to 12/31/2010 there were 457 cases of breast

Tapety FI, Magalhães JV, Cruz Junior FJA *et al.* cancer registered. These data were extended with the registration of over 197 cases for breast cancer in the period from 01/01/2011 to 06/30/2012.

The patients with breast cancer were on average 55 years old, mostly married and ethnicity "brown / mixed race." Regarding the level of education, most of the women completed elementary school. It should be emphasized that 10% of patients with breast cancer had complete higher education; however, the illiteracy rate was greater than 10%. Regarding occupation, 34.50% of patients with breast cancer reported being house cleaners (Table 1). Breast cancer is the second leading cause of death in women between 40 to 59 years of age.^{10,12}

Table 1. Socioeconomic Profile of patients with breast cancer undergoing treatment at HSM, Teresina-Pi (2010/2012)

Characteristics	Patients with breast cancer (n=197)
Age ^a	54.76±13.36
Ethnic Group ^b	
• Brown/mixed race	61.40***
• White/Caucasian	9.60
• Black	15.70
• Not informed	13.20
Marital status ^b	
• Married	61.90***
• Single	18.60
• Divorced	6.10
• Widowed	22.00
• Not informed	4.00
Education Level ^b	
• Illiterate	7.60
• Elementary School incomplete	27.90
• Elementary School complete	13.70
• High School incomplete	2.00
• High School complete	17.80
• Higher Education incomplete	3.00
• Higher Education complete	10.20
• Post-graduation	1.50
• Not informed	34.00
Occupation ^b	
• Laborer	1.00
• House cleaner	34.50***
• Nursing assistant	2.00
• Retired	18.80
• Teacher	16.20

^a Mean ± Standard Deviation; ^b Percentage (%). ^{*} Significance for P<0.0001. Dunnett's Test

Risk factors associated with breast cancer...

Estrogens are recognized as risk factors for breast cancer. Inter-individual variations in the metabolism of estrogens may also influence breast cancer. Hydroxylation and methylation chains of catechol estrogens are associated with increased risk in postmenopausal women.¹³⁻¹⁴ Age and gender are strong risk factors; women are more likely, especially between 45-50 years of age. The age for the breast cancer reflects the impact of hormonal changes that occur in this period, such as a proposal to explain the age of greatest risk for the development of cancer.¹⁵ Thus, early menarche prevails as the most significant of the risk factors.¹⁶

It is also known that the incidence of cancer can vary according to the individual's gender.²⁻³ Age and gender are major risk factors for breast cancer, which occurs approximately 100 times more in women than in men.¹⁰

There are reports that many ethnic differences are attributed to lifestyle and the socio-economic profile, which also explains the differences of survivals, but other genetic and biological factors, may explain the fact that the breast cancer in black women is more aggressive and has a high mortality rate.^{15,18}

In relation to the location of the cancer, as well as their subtypes and indicative of metastasis there are no significant differences (p>0.05) in relation to the location in the breast right or left, but rather in relation to the appearance of cancer in both breasts. However, significant data (P< 0.001) were observed for a subtype of ductal carcinoma. Epidemiological Studies indicate that approximately 70% of subtypes of breast cancer have ductal invasion.¹⁷

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The percentage of metastasis was 10.2% for breast cancer (Table 2), suggesting the implementation of mechanisms for monitoring of treatment in relation to damage in normal cells induced by therapies, as also for the angiogenesis process, as a strategy for the prevention of new cases. Currently, it is known that at least one third of the new cases of cancer that occur annually in the world could be prevented.²⁻³

This possibility of prevention for a good part of the cancers is related to the fact that around 80 to 90% of them are related to lifestyle and environmental factors, some of which as well known as the smoking, consumption of alcoholic beverages, excessive exposure to ionizing radiation and sunlight, chemical substances, present in food, as well as occupational exposure to carcinogenic agents.^{4,19-20}

Table 2. Diagnosis of breast cancer in HSM, Teresina-Pi (2010-2012)

Clinical Aspects	Patients with breast cancer (n=197)
Location	
• Right Breast	42.1
• Left Breast	48.7
• Both breasts	1.5
• Not specified	7.6
• Prostate	-
Subtypes^a	
• Ductal Carcinoma	83.2 ^{***}
• Papillary Carcinoma	1.0
• Lobular Carcinoma	4.6
• Metaplastic Carcinoma	1.0
• Colloid Carcinoma	0.5
• Metastatic Carcinoma	0.5
• Malignant tumor phylloid	0.5
• Medullary Carcinoma	1.0
• Not specified	0.5
• Ductal + not specified	6.6
	0.5
Metastasis confirmed^a	
• Yes	10.2
• no	89.3 ^{***}
Cancer Treatment	
• Chemotherapy	5.00
• Chemotherapy and radiotherapy	10.00
• Surgery and radiotherapy	35.00
• Surgery and chemotherapy	10.00
• Surgery, chemotherapy and radiotherapy	40.00

^a Percentage (%); *** Data significant for $p < 0.0001$ compared to other subtypes of cancer, with the application of the Dunnett's Test, ANOVA.

Risk factors associated with breast cancer...

Patients with breast cancer (n= 20) and women without breast cancer (n= 20) showed similar characteristics in relation to age and ethnicity. But, as for schooling, the information are differentiated, because women of the control group reported having completed high school, however, also carry out domestic activities (Table 3).

The occupational and environmental exposure also has been studied in relation to the association to cancer. Agents such as pesticides, as well as trace minerals may be risk factors. The majority of cancer cases (80%) are related to the environment, in which we found a great number of factors chemical/physical and biological, potentially genotoxic. It is understood by environment in general (water, earth and air), the workplace (chemical industries and similar), consumption environment (food, medicine), social and cultural environment (lifestyle and habits).⁴

Table 3. Characteristics of patients with breast cancer and control group, HSM, Teresina, PI. (2010/20012)

Characteristics	Patients with breast cancer (N= 20)	Control Group (N=20)
Age^a	55.40±13.84 (36-83)	52.13±9.45 (20-69)
Ethnic Group^b		
• Brown/mixed race	65.0 ^{***}	55.0 ^{***}
• White/Caucasian	25.0	-
• Black	10.0	45.0
Marital status^b		
• Married	35.0	54.5
• Single	40.0	36.4
• Divorced	25.0	5.50
• Widowed	0.00	3.50
Education Level^b		
• Illiterate	20.00	
• Elementary School incomplete	50.00 ^{***}	
• Elementary School complete	15.00	
• High School incomplete	5.00	
• High School complete	10.00	
• Higher Education incomplete	-	30.00
• Higher Education complete	-	70.00
Occupation^b		
• Laborer	5.00	
• House cleaner	70.00 ^{***}	
• Nursing assistant	5.00	
• Retired	5.00	
• Administrative	10.00	100.00
Working Time^a	16.70±7.20	7.90±2.30

^a Mean ± Standard Deviation; ^b Percentage (%). (%); *** significant data for $p < 0.0001$, Dunnett Tests, ANOVA.

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Provoked changes in the environment caused by man himself, the lifestyle adopted by people can determine different types of cancer. It is estimated that up to 70% of cancer cases can be avoided simply by preventing exposure to environmental risk factors. The elimination of habitual smoking, changes in diet, with increased consumption of fruit, vegetables, legumes and cereals, the prevention of sexually transmitted diseases and the control in exposure to chemical agents, ionizing radiation and ultraviolet rays are practical measures that contribute to the maximum reduction in the risk of developing a cancer.²⁻³

With respect to occupation, the patients were interviewed in their majority (70%) only perform domestic work (Table 3). Positive Correlations, identified by application of the Spearman correlation with a factor of 0.569, and with a significance of 0.009 ($P < 0.001$) were observed between the type of work with breast cancer. It should be emphasized that in the occupation of house cleaner, the patients are exposed to numerous chemicals, potentially mutagenic, including chemicals used in household services (detergents, bleach, caustic soda and insecticides). The chemical agents that initiate the carcinogenesis of structure are extremely diverse and include both synthetic products as well as natural. The chemical carcinogens (particularly those present in tobacco and resulting from its combustion and metabolism), as well as certain agents, such as azo-dyes may provoke, aflatoxins, benzene and hypochlorites which were clearly involved in the induction of cancer in man and animals.²¹

Risk factors associated with breast cancer...

The majority of patients with breast cancer reported low consumption of vegetables, while for the control group the consumption was significant ($P < 0.001$) (Table 4). However, no correlations were observed between the consumption of vegetables with breast cancer. There are reports that a diet poor in the nutrients present in vegetables increases the risk of degenerative diseases, including cancer.²² The studies related to the influences of diet are still difficult to understand and interpretation due to failures in the data collection with the use of questionnaires, even with large evidence of influences of micro-nutrients with breast cancer.⁹

The vitamins and minerals present in vegetables are essential for the maintenance of the stability of the genome, as well as may influence in many aspects of metabolism, including DNA synthesis, repair, methylation and apoptosis. Many nutrients have been identified as effective reducers and/or protectors against DNA damage. Thus, supplementation with antioxidant vitamins cause substantial reduction in the frequency of genetic instability.²³ However, there are reports that the epidemiological vitamins (A, C, E), selenium, lycopenes, soybeans are protective of genetic instability, but in exaggerated use may present adverse effects, increased risk for cancer.²⁴ The evidence that the micro-nutrients are important for genomic stability have been reported in studies of intervention, with supplementation of vitamins A, C and E, due to their protective effects in chromosome breaks, hipometilacao of DNA and protection to oxidative damage.²⁵⁻²⁶

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Patients with breast cancer have reported exposure to various chemical agents potentially mutagenic and/or carcinogenic, such as pesticides, cleaning products, formaldehyde, ether, alcohol consumption, smoking, and prescription and non-prescription drugs, in addition to radiation exposure before and during cancer therapy (Table 4).

Table 4. Reports of patients with breast cancer and the control group for lifestyle and environmental exposure to chemical and/or physical agents (2010-2012)

Lifestyle	Patients with breast cancer (N= 20)	Patients in the control group (n=20)
Consumption of vegetables ^a		
Daily	10.00	60.00***
Weekly	25.00	35.00
Sporadically	65.00***	5.00
Tobacco ^a		
• Smokes		12.70
• Doesn't smoke	100	87.30
Alcohol ^a		
• Consumption of beer	40.00	74.50
• Other drinks	10.00	50.00
Chemicals ^a		
• Pesticides	20.00	7.30
• Cleaning Products	45.00	-
• Fire/smoke	15.00	-
• Formaldehyde	5.00	-
• Ether	5.00	-
• Paints	5.00	-
• Kitchen gas	6.20	12.00
• Products for civil construction	12.50	-
• Not exposed	-	81.80
Medicines		
• Prescription	100***	29.10
• Non-prescription	45.00	67.00
• Not informed	-	12.70
Radiation ^b		
• Yes	100	30.90
• no		60.00
• Not informed		

^aPercentage (%); ^bRadiation treatment. * Significance for P<0.0001. Dunnett's Test, ANOVA.

Factors such as diet, food supplementation and physical activities are important for disease prevention. Numerous evidences suggest association between lifestyle with risk for diseases.²⁷ Still prevention is not consistent, regarding physical activities, tomatoes, vegetable and soy and the consumption of dairy products and meat are included as risk factors.²⁸ Obesity, low

Risk factors associated with breast cancer... physical activity and low consumption of antioxidants, vitamin D and calcium, coffee are factors of risks.²⁹⁻³⁰

It is worth reporting that despite the many controversies intake of micronutrients is important for genetic material, especially for preventing mutations. Genetic instability has its origin from a cascade of mutations that cause many changes in the DNA structure, such as simple breaks or duals, deletions or modifications of bases, bridges of DNA-DNA or DNA-proteins and interchain bridges. These are some initial events by which chemical and physical genotoxic agents cause inherited diseases, cancers and lethalties.³¹

The World Health Organization (WHO) considers smoking as the main cause of death that can be prevented in the entire world and a risk factor for cancer According to the WHO, more than 5 million people die every year, all over the world, as a result of smoking, while the majority of these deaths concentrated in low and middle-income countries. If the current pattern of tobacco consumption is not reversed, the number of deaths may exceed the 574,320 to 8 million per year by around 2030 and one billion by the end of this century.

The data concerning to smoking in this research were not statistically significant (p> 0.05) in the study population. Smoke is an important variable for increases the risk of breast cancer, by inducing significant changes in genetic material, indicated by cytogenetic biomarkers.³² Numerous evidences indicate association between active and passive smokers with breast cancer, particularly in women post-menopause, however this correlation is inconclusive due to possible

Tapety FI, Magalhães JV, Cruz Junior FJA *et al.* interactions between smoking, alcohol and hormonal influences.^{13,33}

Alcoholic beverages have been commonly associated with cancer.³⁴ Still, ethanol is not a direct carcinogen, one of its metabolites, acetaldehyde, can act as a tumor promoter. Ethanol inhibits the detoxification of chemical carcinogens such as nitrosamines, which has been associated with tumors of the gastrointestinal tract. The abusive consumption of alcohol shows it is synergistic with chronic hepatitis type B or infection with the hepatitis C virus, thus predisposing the body for the development of hepatocellular carcinoma.⁴ The continuous use of alcoholic beverages is associated with an increase in the incidence of cancer of the oral cavity, pharynx, esophagus, liver, and possibly of the breast. The abusive consumption of alcohol shows is synergistic with the chronic hepatitis type B or infection with the hepatitis C virus, predisposing the body for the development of hepatocellular carcinoma.²⁸

The chemical agents that initiate the carcinogenesis are of an extremely diverse structure and include both synthetic products as well as natural.^{4,21,35} They are subdivided into two classes: direct action compounds that do not require chemical transformation for its carcinogenicity and indirect action compounds or pro-carcinogens, which require metabolic conversion to produce end carcinogens capable of transforming cells.^{4,35-36}

In relation to the consumption of prescribed medications, 100% of patients were using them, while the group of negative control, consumption was much lower. Among the types of prescription medicines, the data were significant for anticancer drugs and

Risk factors associated with breast cancer... hormones, suggesting that they are under treatment and possibly have hormonal therapy. Positive correlations were observed between medications for breast cancer with significance of $p < 0.001$ and $p < 0.05$, and with Spearman factors of 0.569 and 0.666. There are reports of carcinogenicity related to several pharmaceutical brands in animals and humans, with positive responses in various tests of genotoxicity, mutagenicity and carcinogenicity, with suggestions for better assessments of the risks and benefits of the drugs.³⁷ It is worth emphasizing that the patients also consume medicines not transcribed by doctors, with emphasis to the analgesics and antibiotics used without a medical prescription (Table 4). Studies report that the use of antibiotics may be associated with the development of cancer.³⁸

During the cancer radiotherapy, humans are exposed to high linear energy transfer, which cause various biological effects, including cell inactivation, genetic mutations, cataracts and cancer induction. However, the mechanisms by which the ionizing radiation induce chromosomal changes from DNA double strand breaks are not yet well understood.³⁹ The ionizing radiation, for example, that exists in X-rays, it can produce a series of lesions in DNA, including cross-links proteins, cross-links to bands of DNA (cross-linking), oxidation and degradation of bases, cleavage of connection sugar-phosphate, and breakage of single or double chains in DNA. These changes can be directly produced by particle radiation, X-rays or gamma or indirectly by oxygen-derived free radicals (derived ionizing radiation produces oxygen radicals by radiolytic cleavage of

Tapety FI, Magalhães JV, Cruz Junior FJA *et al.* water) or soluble products, derivatives of peroxidized lipids.^{4,35}

Data on the disease profile of patients with breast cancer and the control group are presented in Table 5. More than half of patients have reported cases of breast cancer in the family, being the aunts and grandparents are the most affected. In relation to this aspect, it is worth noting that more than 40% of patients with breast cancer have reported cases in the family. There were no reported cases of breast cancer in the control groups' families.

Table 5. Profile of diseases in patients with breast cancer and in the control group. HSM. Teresina, Piauí (2010-2012)

Disease Profile	Patients with breast cancer (N= 20)	Patients in the control group (n= 20)
Cancer in the family*		
• Yes	55.00***	NA
• no	35.00	
• Not informed	10.00	
Relatives with cancer		
• Mother and grandmother (father and grandfather)	10.00	NA
• Aunts and cousins	35.00***	
• Sisters	10.00	
• Not informed	10.00	
• No cases in the family	35.00	
Hepatitis*		
• Yes	5.00	5.50
• no	95.00	94.50
Meningitis*		
• Yes	-	1.80
• no	100.00	98.20
Diabetes*		
• Yes	10.00	1.80
• no	90.00	74.50
• Not informed		23.60
Bacterial or viral Infection*		
• Yes	100.00	30.90
• no		69.10
Cardiovascular Diseases*		
• Yes	30.00	3.60
• no	70.00	96.40
Hereditary Diseases*		
• Cancer	20.00	-
• Stroke	-	1.80
• Diabetes	-	3.60
• None	70.00	92.70
• Not informed	10.00	1.80

* Mean ± Standard Deviation; * Percentage (%); * Radiation treatment. NA - does not apply. *** Significant Data for $p < 0.0001$ in relation to other subtypes of cancer, with the application of the Dunnet's Test, ANOVA.

Significant ($p < 0.001$) positive Spearman correlations were observed between breast cancer ($r = 0.6642$, $p = 0.002$) with other diseases such as bacterial and viral etiologies (Table 5). In relation to cancer, the

Risk factors associated with breast cancer... percentages were higher for the relatives of patients. The data were not statistically significant ($P < 0.001$) for other diseases in both patients, as also in the control group (Table 5).. Many forms of cancer have higher incidence in relatives of patients than in the general population.²⁻³ however, 5-10% of cases of hereditary origin and with germ mutations to genes *BCRA1* and *BCRA2*, only 5% develop the neoplasm. However, they are not known as big risks for the general population.⁴⁰

Breast cancer affects a large proportion of the female population worldwide, with a high mortality rate. There is the estimation in Brazil that equate to approximately 50,000 new cases of breast cancer. Cancer is defined as a disease and genomic arises from the cumulative changes in the genetic material (DNA) of normal cells, which undergo transformation until becoming malignant. All processes from tumor initiation, transformation, invasion to the emergence of metastases in multiple stages and may involve dozens or even hundreds of genes. These processes are developed by means of different genetic mechanisms, such as: mutations intragenicas, breakages and losses, chromosomal gene amplifications, genomic instability and epigenetic mechanisms (such as methylation and acetylation).⁴¹

CONCLUSION

In relation to the epidemiological aspects identified in the medical records of 197 patients with breast cancer, undergoing treatment at HSM, age indicative of pre-

Tapety FI, Magalhães JV, Cruz Junior FJA *et al.* menopausal women, the ethnic group brown/mestizo, the low level of education, household occupation and the type of breast cancer ductal carcinoma (right and left) were predominant in the population data. These data point to several factors of laughter to breast cancer, as reported in several studies.

In comparative analyzes between patients with breast cancer and healthy women with similar age and ethnic group, was also evident the degree of instruction high for healthy women, as well as the consumption of vegetables and less viral and bacterial infections, low consumption of medicines, including the family history for cancer. Positive Correlations were observed between age of patients, occupation of household, exposure to chemical/physical, medication use transcripts and transcripts not for breast neoplasias.

Thus, this research emphasizes that the environmental aspects and associated occupational genetic susceptibility contemplates several risk factors for breast cancer, which in (their majority), are possible to be monitored, such as a strategy for the prevention of the effects of genotoxic and carcinogenic agents to the genome, as by means of genetic counseling.

REFERENCES

1. Almeida F. Câncer de Bexiga. Boletim NAU - Publicação do Núcleo Avançado de Urologia do Hospital Sírio - Libanês. 11^a ed. São Paulo (SP): NAU; 2009.

Risk factors associated with breast cancer...
2. Ministério da Saúde (BR). Secretaria de Atenção à Saúde. Instituto Nacional de Câncer. Coordenação de Prevenção e Vigilância de Câncer. Estimativas 2008: Incidência de Câncer no Brasil. Rio de Janeiro: INCA, 2007.

3. Ministério da Saúde (BR). Secretaria de Atenção à Saúde. Instituto Nacional do Câncer. Coordenação de Prevenção e Vigilância de Câncer. Estimativa 2010: incidência de câncer no Brasil. Rio de Janeiro: INCA, 2009.

4. Abbas AK, Kumar V, Fausto N, Aster JC. ROBBINS E COTRAN - Patologia: Bases Patológicas das Doenças. 7^a ed. Rio de Janeiro (RJ): Elsevier; 2005.

5. Thuler LC. Considerações sobre a prevenção do câncer de mama feminino. Rev Bras Cancerol. 2003; 49(4): 227-238.

6. Pinho VFS, Coutinho ESF. Variáveis associadas ao câncer de mama em usuárias de unidades básicas de saúde. Cad Saude Publica. 2007; 23(5): 1061-9.

7. Ministério da Saúde (BR). Secretaria de Atenção à Saúde. Instituto Nacional do Câncer. Coordenação de Prevenção e Vigilância de Câncer. Ações de enfermagem para o controle do câncer: uma proposta de integração ensino-serviço. Rio de Janeiro: INCA, 2008.

8. Kelsey JL, Fischer DB, Holford TR, LiVoisi VA, Mostow ED, Goldenberg IS *et al.* Exogenous estrogens and other factors in the epidemiology of breast cancer. J Natl Cancer Inst. 1981 Aug; 67(2):327-33.

Tapety FI, Magalhães JV, Cruz Junior FJA *et al.*

9. Stuckey A. Breast cancer: epidemiology and risk factors. *Clin Obstet Gynecol.* 2011 Mar;54(1):96-102.

10. Santis C, Siegel R, Bandi P, Jemal A. Breast cancer statistics. *CA Cancer J Clin.* 2011 Oct; 61(6): 408-18.

11. Carrano A, Natarajan AT. Considerations for population monitoring using cytogenetic techniques International Commission for protection against Environmental Mutagens and Carcinogens (ICPEMC publication 14). *Mutat Res.* 1988 Mar; 204(3):379-406.

12. Jemal A, Siegel R, Xu J, Ward E. Cancer statistics, 2010. *CA Cancer J Clin.* 2010 Sept-Oct; 60(5): 277-300.

13. Reynolds P. Smoking and breast cancer. *J. Mammary Gland Biol Neoplasia.* 2013 Mar; 18(1): 1094-6.

14. Band PR, Le ND, Fang R, Deschamps M. Carcinogenic and endocrine disrupting effects of cigarette smoke and risk of breast cancer. *Lancet.* 2002 Oct; 360(9339): 1044-9.

15. Palmer JR, Wise LA, Horton NJ, Adams-Campbell LL, Rosenberg L. Dual effect of parity on breast cancer risk in African-American women. *J Natl Cancer Inst.* 2003 Mar 19; 95(6): 478-83.

16. Fuhrman BJ, Schairer C, Gail MH, Boyd-Morin J, Xu X, Sue LY *et al.* Estrogen Metabolism and Risk of Breast Cancer in Postmenopausal Women. *J Natl Cancer Inst.* 2012 Feb; 104(4): 326-39.

Risk factors associated with breast cancer...
17. Li CI, Uribe DJ, Daling JR. Clinical characteristics of different histologic types of breast cancer. *Br J Cancer.* 2005 Oct 31; 93(9):1046 -1052.

18. Carey LA, Perou CM, Livasy CA, Dressler LG, Cowan D, Conway K *et al.* Race, breast cancer subtypes, and survival in the Carolina. Breast Cancer Study. *JAMA.* 2006 Jun; 295(21): 2492-502.

19. Mena S, Ortega A, Estrela JM. Oxidative stress in environmental-induced carcinogenesis. *Mutat Res.* 2009 Mar; 674(1-2): 36-44.

20. Borges-Osório MR. *Genética Humana.* 2º ed. Porto Alegre(RS): Artmed, 2001.

21. Guembarovski RL, CÔLUS IMS. Câncer: uma doença genética. *Genética Escola.* 2009; 3(1): 4-7.

22. Ames BN. DNA damage from micronutrient deficiencies is likely to be a major cause of cancer. *Mutat Res.* 2001 Apr; 475(1-2): 7-20.

23. Thomas P, Wu J, Dhillon V, Fenech M. Effect of dietary intervention on human micronucleus frequency in lymphocytes and buccal cells. *Mutagenesis.* 2011 Jan; 26(1): 69-76.

24. Wigle DT, Turner MC, Gomes J, Parent ME. Role of hormonal and other factors in human prostate cancer. *J Toxicol Environ Health.* 2008 Mar; 11(3-4): 242-59.

Tapety FI, Magalhães JV, Cruz Junior FJA *et al.*

25. Fenech M, Baghurst P, Luderer W, Turner J, Record S, Ceppi M *et al.* Low intake of calcium, folate, nicotinic acid, vitamin E, retinol, beta-carotene and high intake of pantothenic acid, biotin and riboflavin are significantly associated with increased genome instability - results from a dietary intake and micronucleus index survey in South Australia. *Carcinogenesis*. 2005 May; 26(5): 991-9.

26. Abramsson-Zetterberg L, Durling LJ, Yang-Wallentin F, Rytter E, Vessby B. The impact of folate status and folic acid supplementation on the micronucleus frequency in human erythrocytes. *Mutat Res*. 2006 Jan; 603(1):33-40.

27. Wolk A. Diet, lifestyle and risk of prostate cancer. *Acta Oncol*. 2005; 44(3): 277-81.

28. Leitzmann MF, Rohrmann S. Risk factors for the onset of prostatic cancer: age, location, and behavioral correlates. *Clin Epidemiol*. 2012; 4:1-11.

29. Wilson KM, Giovannucci EL, Mucci LA. Lifestyle and dietary factors in the prevention of lethal prostate cancer. *Asian J Androl*. 2012 May; 14(3): 365-74.

30. Fowke JH, Motley SS, Concepcion RS, Penson DF, Barocas DA. Obesity, body composition, and prostate cancer. *BMC Cancer*. 2012 Jan; 12:23.

31. Saffi J, Henriques JAP. Reparação de DNA em Células Eucarióticas. In: Silva J, Erdtmann B, Henriques JAP (organizadores).

J. res.: fundam. care. online 2013. dec. 5(6):91-103

Risk factors associated with breast cancer... Genética Toxicológica. Porto Alegre (RS): Alcance; 2003.

32. Celik A, Kanik A. Genotoxicity of occupational exposure to wood dust: Micronucleus frequency and nuclear changes in exfoliated buccal mucosa cells. *Environ Mol Mutagen*. 2006 Dec; 47(9): 693-8.

33. Chaturvedi P. Does smoking increase the risk of breast cancer? *Lancet Oncol*. 2003 Nov; 4(11): 657-8.

34. Committee on Carcinogenicity. Committees on: Toxicity, Mutagenicity, Carcinogenicity of chemicals in food, consumer products and the environment. Annual Report: Department of health. 1995.

35. Montenegro M, Franco M. Patologia: Processos Gerais. 4^a ed. São Paulo (SP): Atheneu; 2006.

36. Rundle A. Carcinogen-DNA adducts as a biomarker for cancer risk. *Mutat Res*. 2006 Aug; 600(1-2): 23-36.

37. Brambilla G, Mattioli F, Robbiano L, Martelli A. Update of carcinogenicity studies in animals and humans of 535 marketed pharmaceuticals. *Mutat Res*. 2012 Jan-Mar; 750(1): 1-51.

38. Velicer CM, Heckbert SR, Lampe JW, Potter JD, Robertson CA, Taplin SH. Antibiotic use in relation to the risk of breast cancer. *JAMA*. 2004 Feb; 291(7): 827-35.

Tapety FI, Magalhães JV, Cruz Junior FJA *et al.*
39. Hada M, Wu H, Cucinotta FA. mBAND
analysis for high-and low-LET radiation-
induced chromosome aberrations: A review.
Mutat Res. 2011 Jun; 711(1-2): 187-92.

Risk factors associated with breast cancer...

40. Dapic V, Carvalho MA, Monteiro AN.
Breast cancer susceptibility and the DNA
damage response. Cancer Control. 2005 Apr;
12(2): 127-36.

41. Rocha JCC, Silva SN, Pena SD.
Oncogenética e Oncogenômica. In: Manual de
Condutas Diagnósticas e Terapêuticas em
Oncologia. 2º ed. Hospital do Câncer A. C.
Camargo. São Paulo(SP): Âmbito Editores;
2001.

Received on: 17/07/2013

Required for review: no

Approved on: 25/10/2013

Published on: 27/12/2013