

RISK FACTORS LEADING TO PULMONARY CANCER DEVELOPMENT IN WOMEN

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Abstract: *This study is trying to identify from a numerous factors involved in the development of the pulmonary cancer in women those which have a greater impact and the ones that can be influenced through prophylaxis and those who cannot be influenced depending on each individual genetic charge. Factors like environmental factors (atmospheric pollution, work related pollution and the presences of chemical substances, inhaled dust, radioactive waist and toxins), smoking, hormonal factors especially in women and the presence of the preexisting pulmonary or non pulmonary conditions have been determined to have a greater importance in the development of the pulmonary cancer in women. Hormonal factors less came in attention have been proved to be very important being in direct relationship with the rate of incidence of pulmonary cancer among pre and postmenopausal women.*

Key words: *pulmonary cancer, risk factors, women, smoking, environmental factors.*

1. Introduction

The leading cause of cancer related deaths is lung cancer among women from Europe and USA. The rate of deaths has increased in many countries in the last 50 years: in 1930, lung cancer was the seventh cause, but in 1987 become the principal cause of cancer deaths in women in the USA, surpassing that of breast cancer [3].

Small and non-small-cell lung cancers (NSCLCs) are affecting the patient by gender, but in last years, histology features or a patient's response to therapies may be influenced by gender as some research has suggested [4-7].

In 2000 were diagnosed worldwide approximately 1239000 new cases of lung

cancer: 337000 were women and 1103000 died from the disease (293000 women) [1]. There were 101709 new cases of lung cancer in 2007 in women in the USA, and approximately 70226 deaths related to this type of cancer [8]. In 2006, have developed in women, 94100 new cases of lung cancer, with 81500 related deaths, in Europe [9]. In USA there are 28% lung cancer related deaths among women towards 10% in Europe [10]. In Denmark, which has the highest female national mortality rates in the world, as in northern Europe has been encountered a rapid increase among lung cancer mortality rates [9, 5, 12, 15]. In western Europe, in the UK and Ireland, high mortality rates were observed and they reached a peak which is

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now decreasing towards the Netherlands, where women lung cancer mortality is rapidly increasing and is exceeding UK and Ireland rates. In central Europe, a in Hungary has been observed a dramatic increase and it is set to further increase in a short period of time. Lung cancer rates are still relatively low in Central and Southern Europe, but they are increasing in countries such as Poland, the Czech Republic and France [13-17].

Lung cancer mortality rates through Asian women are lower than in the USA and Europe. In these countries, the percentage of female lung cancer cases who are never-smokers is 61-83% [17-22]. The smoking prevalence in US females is 22 towards 10% in Filipino and Japanese females, but most of the women in other Asiatic countries don't smoke. Other factors, such as environmental tobacco smoke and indoor pollutants, including cooking oil fumes and burning coal, play an important role in increasing risks of lung cancer in non-smoking Asian women [11-20].

2. Problem Formulation

The incidence of pulmonary cancer is continuously increasing among most world countries, especially the industrialized ones, being on the first place in male and third place in female after breast cancer and uterine cervix cancer.

The purpose of this study was to evaluate the risk factors involved in leading to pulmonary cancer development in women as a consequence of the fact that there is a difference between sexes regarding the toxic exposure and histological type of the cancer and the mechanisms of the carcinogenesis, so that numerous epidemiological studies demonstrated that the women with pulmonary cancer have a greater probability than men of not ever being a smoker. Also the dose – response

odds ratio of cancer development through cumulative exposure to smoking was 1.5 times greater among women than men for all the histological types [2].

The most important role regarding the pulmonary cancer prophylaxis is occupied by the tracking and removal of the risk factors among whom smoking spread in women and women's involvement in the polluted environment of the industry makes the incidence of pulmonary cancer among women to increase disturbingly lately because the necessary time of exposure and dose of toxic substances to develop cancer is smaller in women than men.

This study included 100 patients who were admitted to „Leon Daniello” Clinical Hospital of Pneumology from Cluj, Romania pulmonary cancer diagnosed among whom 50 female patients were admitted between 2006 and 2007 and 50 patients were admitted in 2007.

Based on the medical charts the following parameters were included: age, environment (urban, country), profession, pulmonary cancer related risk factors presence (smoking, professional toxins), family history of pulmonary cancer (as it was possible one has had centered on a genetic susceptibility among studied women), personal pathologic history centered on risk factors for pulmonary cancer, personal complains (symptoms): dyspnoea, cough, sputum (mucus, mucopurulent, hemoptysis), chest pain, fever, fatigue, weight loss, asthenia, vegetative signs such as sweat, headache, nausea, dysphonia, paraclinic examination such as inflammatory syndrome – increased ESR, leucocyte – plain chest radiograph, bronchoscopy, cytology, PFT, CT, bone scintigraphy, histological type related to risk factors that are being present, TNM stage.

This study refers to the risk factors involved in the pulmonary oncogenesis

like exogen factors such as smoking, atmosphere and professional pollution, which are strongly related to endogen factors such as genetic susceptibility hormonal and immune factors and preexisting pulmonary conditions.

3. Problem Solution

The study performed by Elizabeth Healey Baldini and Gary M. Strauss on 64300 patients has shown an increases rate of pulmonary cancer in women between 60 and 65 years old and in men between 55 and 60 years old [11]. In our study the peak incidence is between 51 and 70 years old in women and 61 and 70 years old in men.

Table 1
Pulmonary cancer age related differentiation in men and women

Age	No. of cases		Percentage	
	Female	Male	Female	Male
41-50	10	5	20%	10%
51-60	14	15	28%	30%
61-70	14	22	28%	44%
71-80	12	8	24%	16%

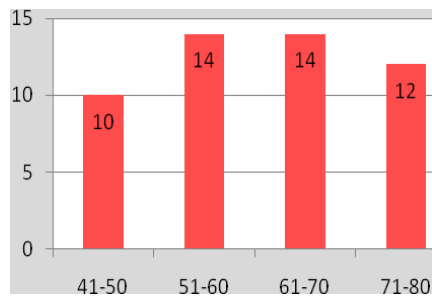


Fig. 1. *Pulmonary cancer age related differentiation in women*

Also one may note that the incidence of pulmonary cancer is increased 5 to 10 years later from the arrival of menopause. Estrogen deficit from the menopause period may be a precipitate factor of

pulmonary cancer as it is cited among some studies. Prolonged exposure to professional toxins and quotidian stress as well as the aging of the immune system, responsible of the removal of eventual mutant cells, which becomes inefficient, does not explain why beyond 70 years old the incidence is waning. One of the reasons might be the egressness from the toxic environment of the working place or the isolation in a closed environment, fend by atmosphere pollution.

In our study we have identified a greater rate of pulmonary cancer among urban women than the country ones fact which is explained by the increased pollution and industrialization of the urban region.

Otherwise, in men weighting is greater among those from the country side explained by the rapid spread of the habit of smoking and also unfavourable economic status, lack of medical education, low access to public healthcare services and the addressability to a doctor in a late stage of the disease. Same results were underline also by Anthony I. Alberg and Jonathan M. Samet in their study [5, 11, 15, 21, 22].

Table 2
Pulmonary cancer environment related differentiation in men and women

Sex	Urban		Country side	
	No. of cases	%	No. of cases	%
Male	18	36%	32	64%
Female	27	54%	23	46%

One may observe an increased incidence of pulmonary cancer among non-smoking females between 51 and 60 years old while among smoking females the incidence is increased between 41 and 50 years old accordingly with the literature. Because of the greater percentage of pulmonary cancer among non-smoker females one may be able to say that a greater role may be attributed to some factors other than smoking.

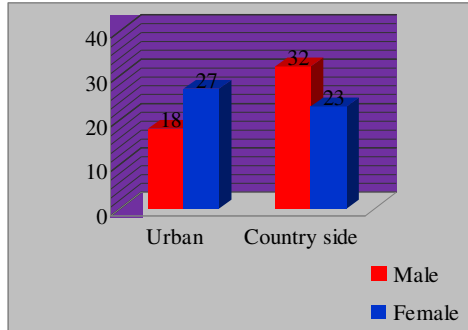


Fig. 2. Pulmonary cancer environment related differentiation in women

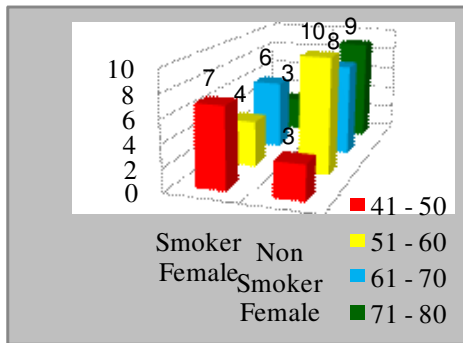


Fig. 3. Age and smoking ratio

One of these factors may be the hormonal factor the argument being the fact that there is an increased incidence of pulmonary cancer among women 51 – 60 of age, the time of menopause development, when women's body lacks in estrogens.

Table 3

Pulmonary cancer and smoking relation differentiation in men and women

Age	Smoker Female	Non Smoker Female
41-50	7	3
51-60	4	10
61-70	6	8
71-80	3	9

Epidemiological data suggests that females have a risk of developing

pulmonary cancer even at a lower number of cigarette consumption and a smaller period of time of smoking compared to males this because of the involvement of hormonal, metabolic and genetic factors different for the two sexes. The risk of developing pulmonary cancer among smoker women is greater than smoker men and the non smoker women who underwent estrogenic therapy have no risk of cancer while smoker women who underwent estrogenic therapy have a greater risk of developing adenocarcinoma.

Table 4

Pulmonary cancer and no. of cigarrs relation differentiation in men and women

No of cigarrs	No of cases		Percentage	
	Male	Female	Male	Female
<11/day	8	8	21%	50%
11-20/day	19	6	50%	37%
21-30/day	6	2	16%	13%
>30/day	5	0	13%	0%

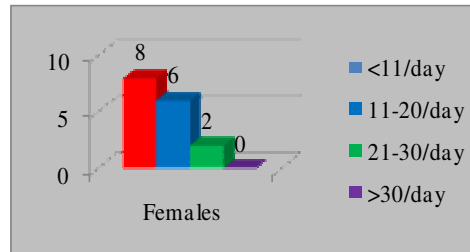


Fig. 4. Pulmonary cancer and no. of cigarrs relation differentiation in women

Table 5

Pulmonary cancer and no. of years of smoking relation differentiation in men and women

No of years	No of cases		Percentage	
	Male	Female	Male	Female
<11	1	0	3%	0%
11-20	6	4	16%	20%
21-30	12	8	32%	40%
>40	4	5	10%	25%

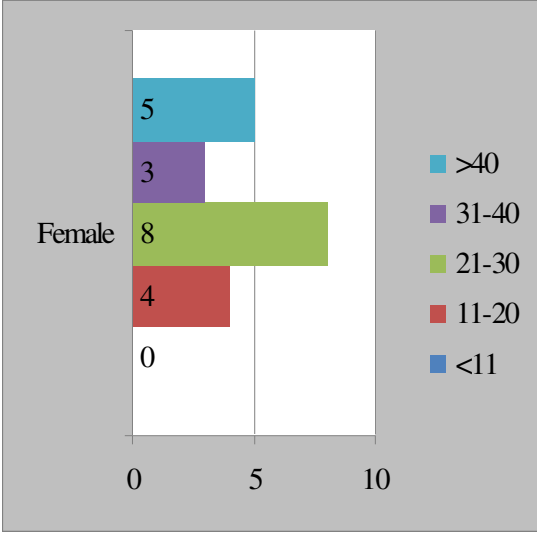


Fig. 5. Pulmonary cancer and no. of years of smoking relation differentiation in women

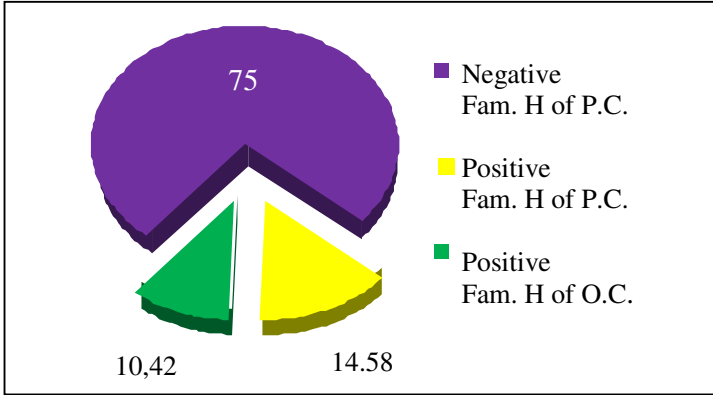


Fig. 6. Repartition of pulmonary cancer cases with a genetic component in women

In one study performed in the U.S.A., Elizabeth Healey Baldini and Gary M. Strauss have analyzed the connection between the family history of pulmonary cancer and other types of cancers and the development of pulmonary cancer among the 64300 patients which implies the presence and importance of the genetic factor. In our study, 7 women have had pulmonary cancer

in the family history and 5 cases of other types of cancers and in men were 5 cases with family history of pulmonary cancer and 5 cases of other types of cancers which implies the presence and importance of the genetic factor. Family history of other types of cancers suggests that there is a predisposition of developing cellular anomalies which have oncogenic potential.

Table 6

Pulmonary cancer and the genetic factor relation differentiation in men and women

Genetic Factor	No. of Cases		%	
	F	M	F	M
Positive Fam. H of P. C.	7	5	14,58	9,62
Positive Fam. H of O. C.	5	5	10,42	9,62
Negative Fam. H of P. C.	36	42	75,00	80,77

Fam. H of P. C. = family history of pulmonary cancer;

Fam. H of O. C = family history of other cancer type.

Table 7

Pulmonary cancer and the genetic factor and smoker relation differentiation in men and women

Genetics and smoking	No. of cases		%	
	M	F	M	F
Positive history and smoker	5	2	100	28,57
Positive history and nonsmoker	0	5	0	71,43

Analyzing the existence of genetic factor and the presence of smoking in both men and women from this study one may observe the importance of the genetic factor and less importance of the smoking presence in women while in men the situation is inverted.

Regarding the relationship between pulmonary cancer and professional toxins we are able to say that industrial pollution

plays an important role in the development of pulmonary carcinogenesis through chemical substances, toxic gases, irritative dust, radioactive substances and other oncogenic potential related toxins. Because, generally, this kind of work places are taken by men, the share of pulmonary cancer due to work conditions is lower in women than in men.

Table 8

Pulmonary cancer and the professional toxins relation differentiation in men and women

Professional toxins	No. of cases		%	
	F	M	F	M
Insecticide/pesticide	2	4	9,09	12,12
Irritative dust	5	11	22,73	33,33
Chemical substances	6	4	27,27	12,12
Azbestus, chromium, nikel, uranium	3	3	13,64	9,09
Toxic gases	6	11	27,27	33,33

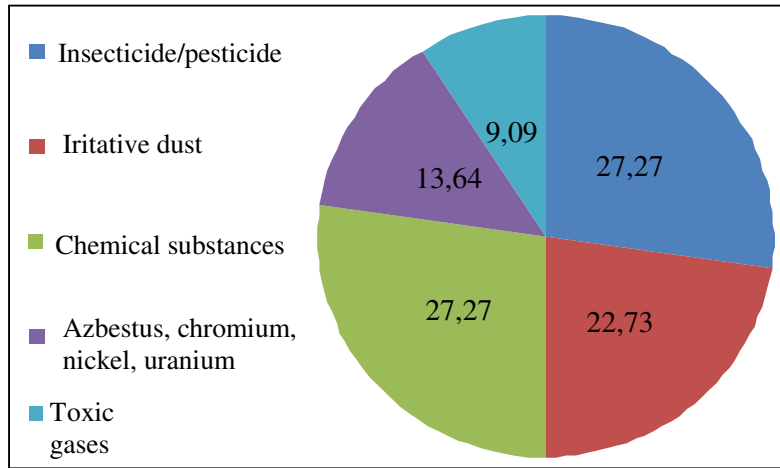


Fig. 7. *Pulmonary cancer and the professional toxins relation differentiation in women*

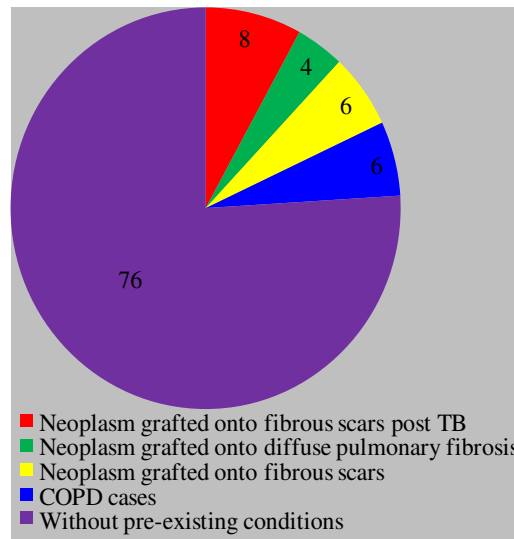


Fig. 8. *Pulmonary cancer and the preexisting pulmonary conditions relation differentiation in women*

Regarding this matter our results are congruent with the one published in January 2003 by Anthony I. Alberg and Jonathan M. Samet [2, 11, 14, 19, 20]. Pulmonary cancer may develop on a touched ground by other chronic pulmonary diseases such as pulmonary

tuberculosis, COPD, pulmonary rankles, being possible of neoplasia grafting onto preexisting conditions on both sexes. This conclusion has been reached also by Katharine R. Boucot and Helen Perey after analyzing a 102 batch of patients from Philadelphia [6, 11, 13].

Table 9

Pulmonary cancer and the preexisting pulmonary conditions relation differentiation in men and women

PREEXISTING PULMONARY CONDITIONS	No of cases		%	
	F	M	F	M
Neoplasm grafted onto fibrous scars post TB	4	2	8	4
Neoplasm grafted onto diffuse pulmonary fibrosis	2	2	4	4
Neoplasm grafted onto fibrous scars	3	2	6	4
COPD cases	3	6	6	17
Without pre-existing conditions	38	38	76	76

Our study has revealed an equal number of cases with preexisting conditions in men and women, but pulmonary cancer COPD related has had a greater number of cases in men.

4. Conclusions

1. In the this study, regarding women there was a greater involvement of the genetic factors (14.58% positive family history of pulmonary cancer, 10.42% positive family history of other cancer type) compared to men (9.62% positive family history of pulmonary cancer, 9.62% positive family history of other cancer type). While regarding the smoking, 76% of men were smokers and only 44% of women were smokers.
2. Females have a greater susceptibility to exogen risk factors than men, because these develop pulmonary cancer after a smaller period of time from the exposure to toxins and to a lower number of smoked ciggars per day compared to men. Most of the smoker women have smoked less than 11 ciggars/day (50%) for a period of time of 21-30 years (40%), while men have smoked between 11 and 20 ciggars per day (50%) for a period of time between 31 and 40 years (39%).
3. The number of cases of pulmonary cancer duet o work conditions is smaller among women than men

generally because the workplaces where these causing factors are present in are occupied in most cases by men. From the studied cases, 44% of women were exposed to work related toxins and 66% of men were exposed to work related toxins.

4. An important rol, although less studied, is the hormonal factor. In this study, the maximum incidence of pulmonary cancer is between 51 and 70 years of age in women (56%) and between 61 and 70 years of age in men (44%). Estrogenic defficit from the menopause period is probably a precipitant factor of the developement of pulmonary cancer in women. One may observe an increased incidence of pulmonary cancer among unsmoker women between 51 and 60 years of age, while the incidence is increased among smoker women between 41 and 50 years of age which implies a strong connection between exogen and endogen factors involved in the developement of pulmonary cancer.
5. Our study has underlined an equal number of cases of preexisting conditions pulmonary cancer related in men and women, but the number of COPD pulmonary cancer related was greater in men (17%) and in women there was a greater number of pulmonary cancer grafted onto fibrous scars post pulmonary tuberculosis (8%).

6. Primary prophylaxis conducted throughout efficient medical education to combat smoking and the exposure to toxins and also the establishment of diagnosis of the disease in an early stage throughout recurrent screening methods among risk related population are the only actual possibilities to reduce the incidence of pulmonary cancer and to efficient increase the therapeutic yield.

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