

THE ROLE OF SMOKING IN LUNG CANCER AETIOLOGY

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Abstract: Worldwide, lung cancer has been a matter of public health, being alarmingly increasing in the last 50-60 years. Smoking has been known for a long time, as the main avoidable cause of lung cancer. Cigarette smoke comprises 4000 harmful substances, of which over 40 are carcinogens. I have analysed a batch of 1684 patients, who are in the oncologic records of Tg-Jiu County Emergency Hospital, with the diagnosis of lung carcinoma between 2005 and 2010, trying to determine the role of smoking in lung cancer aetiology. Smoking has been the most frequent risk factor in comparison to the other studied risk factors, a percentage of 90% of the men diagnosed with lung carcinoma being smokers and 67% of women, a percentage also quoted in literature.(1,2) There is a direct proportionality relation between the risk of lung carcinoma and smoking, which has been known in literature for a long time (3,4,5,6,7,8,9), a correlation existing in this study, as well.

Cuvinte cheie: fumat, cancer bronho-pulmonar, etiologie

Rezumat: În întreaga lume cancerul bronho-pulmonar reprezintă o problemă de sănătate publică, fiind în creștere alarmantă în ultimii 50-60 de ani. Fumatul este cunoscut de mult timp, ca principală cauză evitabilă a cancerului bronho-pulmonar. Fumul de țigară conține 4000 de substanțe nocive, dintre care peste 40 sunt cancerigene. Am analizat un lot de 1684 pacienți, aflați în evidența oncologică a Spitalului Județean de Urgență Tg-Jiu, cu diagnosticul de carcinom bronho-pulmonar între anii 2005-2010, încercând să apreciem rolul fumatului în etiologia cancerului bronho-pulmonar. Fumatul a reprezentat cel mai întâlnit factor de risc comparativ cu ceilalți factori de risc studiați, un procent de 90% dintre bărbații diagnosticați cu carcinom bronho-pulmonar fiind fumători și 67% dintre femei, procent citat și în literatură.(1,2) Între riscul de carcinom bronho-pulmonar și fumat există o relație de directă proporționalitate, fapt cunoscut de mult timp în literatură (3,4,5,6,7,8,9), corelație existentă și în studiu.

INTRODUCTION

Worldwide, lung cancer has been a matter of public health, being alarmingly increasing in the last 50-60 years.

The incidence is increasing worldwide, this localization being the 1st in men after 1984, outgoing gastric cancer, and reaching third place in women, after breast cancer and uterine cervix cancer.(1,2)

In Romania, this malign tumour has an increasing trend in both sexes, with an 8% prevalence and 17% incidence;(4) From the point of view of the number of deaths due to cancer, it ranks the first place in males and fourth place in women.(4,10)

Smoking is known as a risk factor in the occurrence of lung cancer as well, determining alterations of vascular endothelia and favouring the oxidative stress at the level of lungs.(11)

The smoke from a cigarette brings 0,042 mg iron and the iron stock increases after the age of 20.

In the case of smokers, iron can be found in increased amounts in alveolar macrophages. In normal conditions, iron is annihilated through its affinity for some transport or storage proteins (ferritin, transferrin, hepcidin). Smoking and oxidizers formed of cigarette smoke cause the release of iron by these molecules with the increase of the oxidative stress.(11,12,5,6)

PURPOSE

The purpose of this study is to determine the weight of smoking in the aetiology of lung cancer. Analysing the role of smoking in lung cancer aetiology, the following were taken into consideration:

- The age of starting smoking;
- The duration of smoking;
- The number and types of smoked cigarettes;
- Inhalation method;
- The existence and duration of the ex-smoker status.

METHODS

We have analysed a batch of 1684 patients, who are in the oncologic records of Tg-Jiu County Emergency Hospital, with the diagnosis of lung carcinoma between 2005 and 2010, and their observation sheets.

It is a transversal epidemiologic study extended for a period of 5 years.

The main issues were:

- share of smokers of all patients diagnosed with lung cancer;
- monitoring of smoking onset age;
- distribution of patients according to the number of cigarettes smoked and the number of years of smoking;
- distribution of patients according to the mode of inhalation and the existence of the ex-smoker status.

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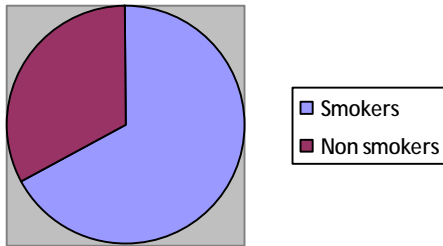
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RESULTS

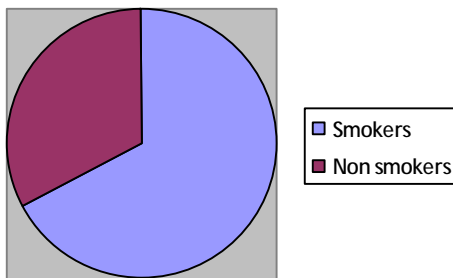
Smoking has been the most frequent risk factor in comparison to the other studied risk factors: atmospheric pollution, professional factors, the presence of pre-existing diseases, genetic factors.

Therefore, smokers were 90% of the men diagnosed with lung cancer, a percentage also quoted in literature (1) and 67 % of women.

Figure no. 1. The percentage of smoking patients with lung cancer: men and women



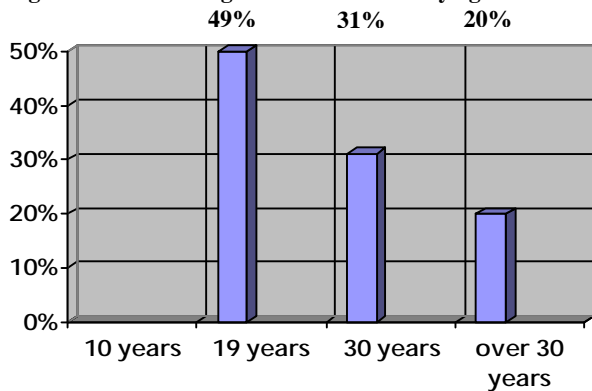
Women



Between the risk of lung cancer and smoking, there is a direct proportionality, the risk being correlated with the age of beginning to smoke, its duration, the number and types of smoked cigarettes, inhalation method (3,4,5,6,7,8,9), a correlation existing in our study as well.

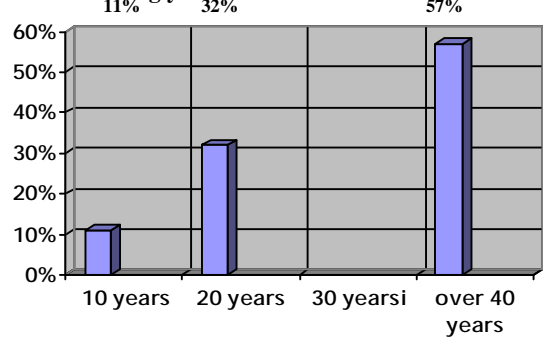
Therefore, 49% of the patients began smoking at the age between 10 and 19 years, 31% between 20-30 years, and 20% over 30 years.

Figure no. 2. Smoking onset distribution by ages



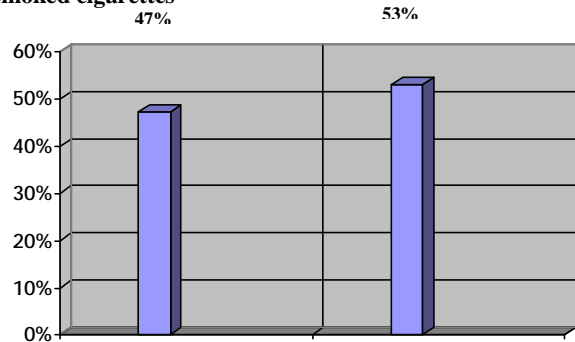
Over half of the patients (57%) smoked for more than 40 years, 32% smoked for more than 20 years and 11% smoked for 10 years.

Picture no. 3. Patients' distribution depending on the number of smoking years



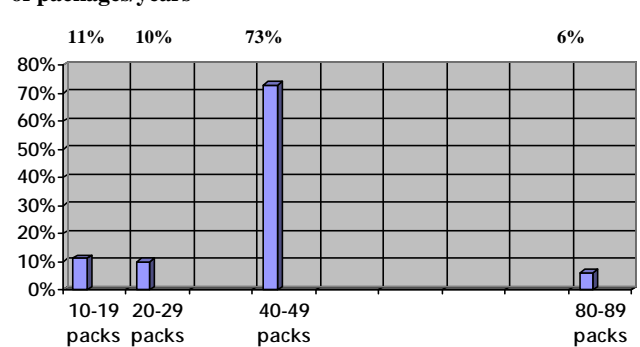
The percentage of smoking patients less than 25 cigarettes/day was of 47%, as compared to the percentage of those smoking over 25 cigarettes/day which was of 53%.

Figure no. 4. Patients' distribution depending on the number of smoked cigarettes



The percentage of those smoking 40-49 packages/years was of 73%, 20-29 packages/years was of 10%, those who smoked 10-19 packages/years was of 11%, and those smoking 80-89 packages/years was of 6%.

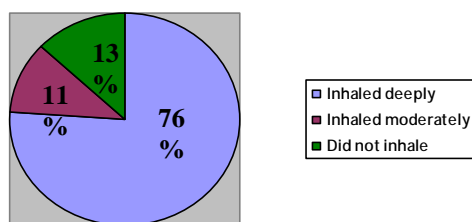
Figure no. 5. Patients' distribution depending on the number of packages/years



Three quarters of the patients considered having inhaled deeply, therefore the risk is even greater the deeper is the inhalation, which is also indicated in literature (13), the number of those inhaling and developing lung cancer being similar to those that did not inhale.

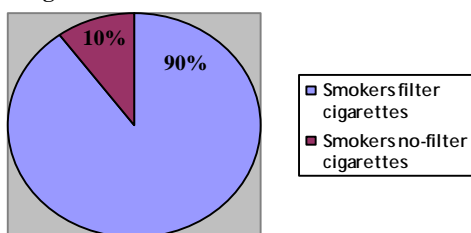
76% inhaled deeply, 11% inhaled moderately 13% did not inhale.

Figure no. 6. Patients' distribution depending on the inhalation method



Approximately 90% of the smokers smoked filter cigarettes, 10% smoked cigarettes without a filter, being a difference between filter smokers and no-filter smokers. Pipe smokers were very few-2, without statistic meaning.

Figure no. 7. Patients' distribution depending on filter and no-filter cigarettes smoked

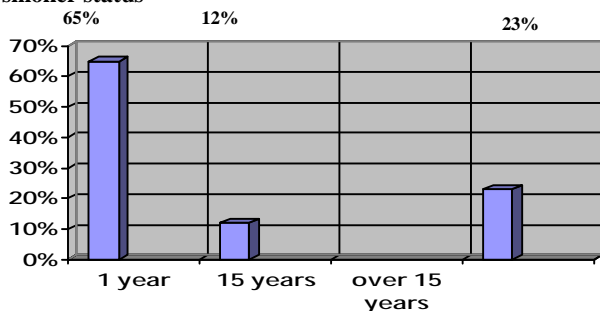


It is known that the risk of lung cancer decreases progressively after quitting smoking, becoming almost identical to that of non-smokers after 15 years of abstinence; in the case of those smoking for more than 20 years, although it decreases after quitting smoking, the risk of lung cancer remains higher than in the case of non-smokers.(3,1,9) In the study developed, 30% of the patients with lung cancer were former smokers.

Depending on the duration of the former smoker status, we noticed that:

- in approximately 65% of the patients with lung cancer, the duration of the former smoker status was smaller than 1 year (although they had a lung cancer risk 11-15 times higher according to the data from the literature);(3,1)
- in 12% of the patients with lung cancer, the duration of the former smoker status was between 1-15 years, when the risk of lung cancer was 6-7 higher than those of non-smokers according to the data from the literature.(3)
- in approximately 23% of the patients, the duration of the former smoker status was higher than 15 years, the risk of lung cancer being higher than the status of non-smokers by 1,2 - 2 times according to the data from literature; in lung cancer aetiology, this group also comprising other associated etiologic factors.(3,1)

Figure no. 8. Patients' distribution depending on the former smoker status



Passive smoking was present in lung cancer aetiology in 3% of the patients, the risk of these persons passively exposed to cigarette smoke being of 30% of lung cancer than in the persons that are not exposed;(14,15,16) passive smoking being a factor which is more and more involved in the aetiology of lung neoplasm.

DISCUSSIONS

Smoking is the main cause of lung cancer and of deaths caused by cancer in general, being responsible for 90% of the cases of lung cancer in men and 67% in women.

Smokers are 10 - 25 times more exposed to the risk of lung cancer than non-smokers according to the data from literature. The risk depends on the age of starting to smoke, the duration and the number of cigarettes per day, the inhalation method, the type of smoked cigarette.

The risk for developing lung cancer is 15 times higher in smokers who smoke less than 25 cigarettes/day as compared to a risk of 25 times higher in those smoking more than 25 cigarettes/day.(3)

The risk of lung cancer is of maximum 40-49 packages/years, which could be explained through the long duration of smoking > than 40 years, the large number of cigarettes per day > 20, a young age to start smoking. The risk of lung cancer regarding 20-29 packages/years could be explained by the intervention of the genetic factors, the decrease of immunity due to other diseases (for instance tuberculosis) or the low social status. For 80-89 packages/years, the long period of smoking occurs, along with increasing longevity, decreased immunity due to the old age or to the related diseases.

The risk of lung cancer decreases progressively after quitting smoking, becoming almost identical to that of non-smokers after 15 years of abstinence; in those smoking for more than 20 years, although it decreases after quitting smoking, the risk of lung cancer is still higher than for non-smokers.(3,1,9)

Although the filter was present in most of the patients (being considered a protective factor) (3,4), the incidence of lung cancer was increasing. This could be explained by the predominance of these cigarettes on the Romanian market after 1989, by increasing the sanitary education in relation to smoking, the protective role of filter being cancelled by the increased number of packages/years, the small age of starting smoking, the intervention of other etiologic factors (professional, genetic, predisposing diseases).

The statement from literature that lung cancer is more and more a disease of former smokers (3,1) is supported by the conclusion that all former smokers studied were diagnosed with severe forms, their visit to the doctor being too late. For a duration of 1 year of former smoker the risk of lung cancer is 11-15 times higher than in the case of non-smokers, this risk is 6-7 times higher for those with a duration of former smoker status between 1 and 15 years and 1,5-2 times for those with a duration higher than 15 years.

Passive smoking was present in lung cancer aetiology in 3% of the patients, the risk of these persons exposed passively to cigarette smoke being 30% higher to develop lung cancer than in the persons that are not exposed (14,15,16), passive smoking being a factor which is more and more involved today in the aetiology of lung neoplasm.

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