

# ASSOCIATION BETWEEN AGE, TUMOUR LOCALIZATION AND SURVIVAL OF PATIENTS IN MOROCCO

## ABSTRACT

**Aims:** Cancer is a major burden of disease worldwide. Each year, tens of millions of people are diagnosed with cancer around the world, and more than half of the patients eventually die from it. The present work aims to bring out the association between age, tumour localization and survival of patients.

**Methodology:** The present work consists in a retrospective study carried out in an oncology centre in Rabat and based on a sample of 1756 cases of cancer treated during the period January 2005 - December 2006.

**Results:** The mean age of patients is 53.49 (14.98) years and men are significantly older than women. The results of the first part of this study show that patients who are between 40 and 60 years old are affected by 47.4% of all cancers. As for the influence of age on the tumour localization, we noticed that testicles cancer, leukaemia and Hodgkin lymphoma affect particularly the youngest population whereas the oldest population suffer more from the cancers of prostate, bladder, liver and gall bladder. Furthermore, patients who are between 50 and 60 years old have a higher risk to die from cancer which would be due to lung and liver cancers that are known for their bad vital prognosis. Finally, we found that children and elderly people survive the least to cancer which would be attributable to their health that is rather fragile.

**Conclusion:** more efforts should be made by health authorities in Morocco to fight against cancer especially in age groups with bad vital prognosis.

*Key words: age, cancer, death, risk, survival, tumour localization.*

## 1. INTRODUCTION

Each year, tens of millions of people are diagnosed with cancer around the world, and more than half of the patients eventually die from it. In many countries, cancer ranks the second most common cause of death following cardiovascular diseases. With significant improvement in treatment and prevention of cardiovascular diseases, cancer has or will soon become the number one killer in many parts of the world.

In 2008, 12.7 million new cases were registered worldwide, 56% of whom are in developing countries (1). The most frequent cancers are those of lung (1.6 million, 12.7%), breast (1.38 million, 10.9%) and colorectum (1.23 million, 9.7%).

Cancer caused 7.6 deaths worldwide in 2008, that makes 13% of global mortality (1-3). It represents the second cause of death in the world after cardiovascular diseases (4). Moreover, lung cancer, stomach cancer and liver cancer are the first cause of cancer-induced mortality with 1.38, 0.74 and 0.69 million deaths respectively (1).

As elderly people are most susceptible to cancer and the world population has been experiencing significant ageing - the process that results in rising proportions of older persons in the total population - since the mid-twentieth century (5), cancer will remain a major health problem around the globe. From this point of view, the present work aims to bring out the association between age and tumour localization on the one hand and between age and survival of patients on the other hand.

## 2. METHODOLOGY

The present work consists in a retrospective study carried out in an oncology centre in Rabat, considered to be representative of the private sector in the northern region of Morocco, and based on a sample of 1756 cases of cancer treated during the period January 2005 - December 2006.

A folder is established for each new patient and contains gender, age, localization of the tumour, type of the tumour, therapy protocol.

The variables we were interested in are the age, the localization of the tumour, the evolution (death) and the date of death for dead patients.

The statistical methodology was based on two axes:

-Descriptive statistics: working out the frequencies and the characteristics of each variable. The results are expressed by crude values for the qualitative variables (localization, evolution, age group) and mean (standard deviation) for quantitative variables (age, survival after the beginning of treatment). To calculate the specific lethality for each age group, we divided the number of deaths in this group by the number of cases that belong to it, and we multiplied the quotient by 100.

- Analytic statistics: based on association tests such as Chi-square test ( $\chi^2$ ) which measures the difference between the observed distribution and the theoretical one. We used this test to compare the distribution cases between males and females. We also used the one factor analysis of variance (ANOVA), which estimates the intergroup variation according to the intragroup variation (Fisher ratio), in order to know if the localization of tumour and the survival depend on the age of patients. We considered the results as significant when p-value is lower than 0.05.

The calculation of the relative risk (RR) of death for each age group allowed us to investigate the degree of association between age and death. If the value 1 is included in the confidence interval (CI) of the RR, that means that the association is not significant, else it is considered as significant.

### 3. RESULTS

Among the 1756 studied cases, 1016 are females (58% of cases) and 740 are males (42% of cases). The difference is highly significant ( $\chi^2 = 43.38$ ;  $p < 0.001$ ), which implies that females are more affected by cancer than males.

The mean age of patients is 53.49 (14.98) years old. Men are significantly older than women with 57.06 (16.05) and 50.89 (13.59) years old respectively ( $F = 75.2$ ;  $p < 0.001$ ).

#### 3.1. Repartition of cases according to the age group:

The Figure 1, which represents the repartition of cancer cases according to the age group, shows that the age group [40-50[ is the most affected with 430 cases (24.5% of all cases), followed by the age groups [50-60[ and [60-70[ with 402 cases (22.9%) and 371 cases (21.1%) respectively. Furthermore, the highest lethality is observed in patients who are between 50 and 60 years old with 13.18%.

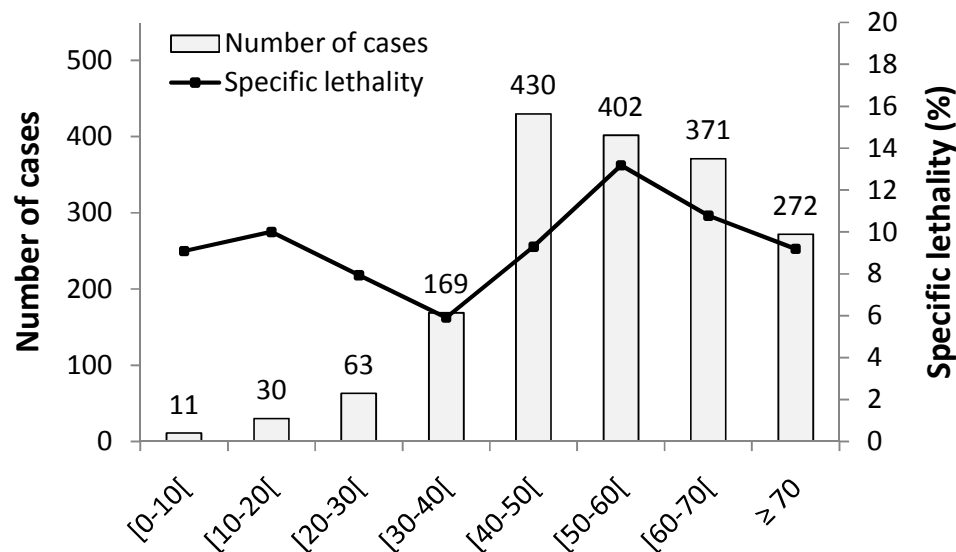


**Fig. 1:** Repartition of Cancer Cases According to Age Group, Rabat, Morocco, 2005-2006.

#### 3.2. Association between the age and the tumour localization:

In order to study the association between the age and the repartition of tumour localizations, we carried out a one factor analysis of variance which gave a highly significant Fisher ratio ( $F = 21.65$ ;  $p < 0.001$ ). This implies that the distribution of cancer localizations depends significantly on the age of patients. Then, we applied a means multiple comparison using the Duncan test and which revealed the existence of 10 groups according to the age (Figure 2).

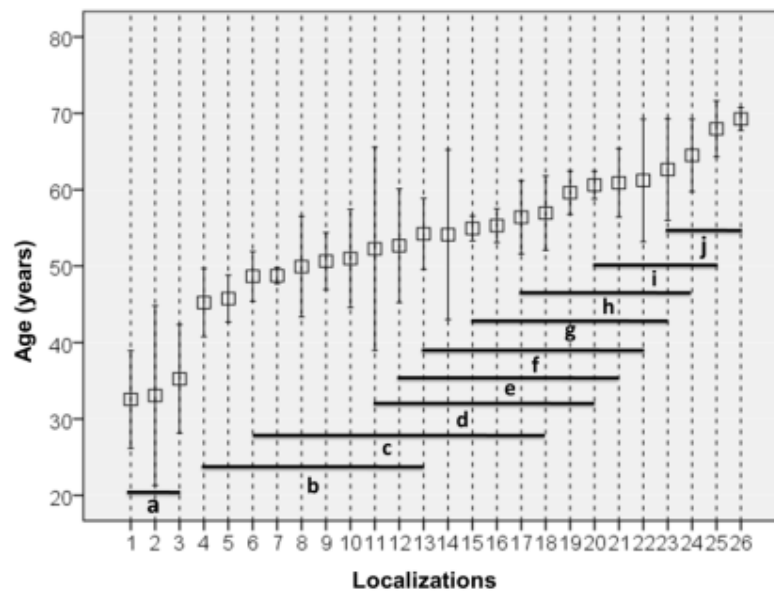


**Fig. 2:** Repartition of Means of Age According to Tumour Localization, Rabat, Morocco, 2005-2006. (1.Testicles , 2.Leukaemia, 3.Hodgkin, 4.Cerebral, 5.Thyroid, 6.Cavum, 7.Breast, 8.Others, 9.Non Hodgkin Lymphoma, 10.Soft Tissue, 11.Kidneys, 12.Bone, 13.Ovary, 14.Oesophagus, 15.Cervix, 16.Colorectum, 17.Pancreas, 18.Stomach, 19.Ear Nose Throat, 20.Lung, 21.Uterus, 22.Cutaneous, 23.Gall Bladder, 24.Liver, 25.Bladder, 26.Prostate).

The group (a) which includes cancer of testicles, leukaemia and Hodgkin lymphoma, displays the lowest mean of age (33.62 (16.79) years), which implies that these types of cancer affect preferentially the youngest people. Conversely, the group (j) which contains prostate, bladder, liver and gall bladder cancers, has the highest mean of age (66.1 (9.89) years), consequently these types of cancer occur preferentially in the oldest people. The other groups contain localizations with intermediate means of age.

### 3.3. Association between the age and the risk of death:

We calculated the relative risk of death for each age group in order to bring out the groups of age that are the most associated with death (Table 1). The results show that the death risk is significant in the age group [50-60[, which means that patients who are between 50 and 60 years old have a higher risk to die from cancer (RR= 1.47 ; CI<sub>95%</sub>= 1,044-2,077).

**Table 1:** Repartition of Relative Risks (RR) of Death According to Age Group, Rabat, Morocco, 2005-2006.

| Age groups (years) | (RR)   | 95% Confidence Interval |
|--------------------|--------|-------------------------|
| [0-10[             | 0.876  | 0.111 , 6.882           |
| [10-20[            | 1.775  | 0.671 , 4.695           |
| [20-30[            | 0.749  | 0.296 , 1.891           |
| [30-40[            | 0.525  | 0.272 , 1.014           |
| [40-50[            | 0.870  | 0.601 , 1.259           |
| [50-60[            | 1.470* | 1.044 , 2.070           |
| [60-70[            | 1.076  | 0.742 , 1.561           |
| 70 and more        | 0.869  | 0.557 , 1.354           |

(\*) RR statistically significant ( $P < 0.05\%$ )

### 3.4. Association between the age and the survival:

So as to investigate the association between the age and the survival of patients, we used the one factor analysis of variance which confirmed a close association between these two variables ( $F = 3.83$ ;  $P < 0.001$ ). we eventually applied a means multiple comparison using Duncan test which revealed the existence of two groups according to the mean survival length (Figure 3).

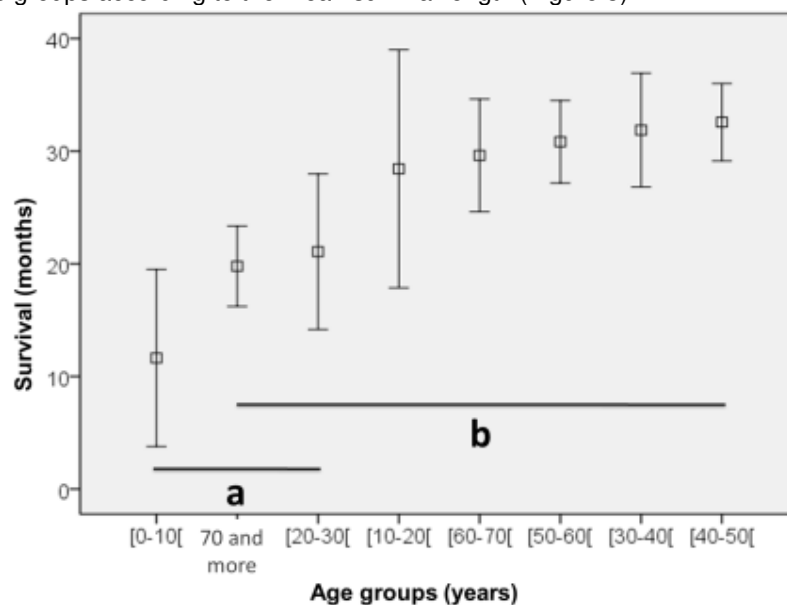


**Fig. 3:** Repartition of Mean Survival Lengths (Months) According to Age Groups, Rabat, Morocco, 2005-2006.

The first group (a), containing the age groups [0-10[, 70 and more, and [20-30[, displays the lowest mean of survival length which is 17.50 (22.87)months, which implies that these groups of patients have the worst vital prognosis. Conversely, the second group (b) which contains the other age groups, has a higher mean of survival length (27.75 (34.33)months).

## 4. DISCUSSION

The results of the first part of this study show that patients who are between 40 and 60 years old are concerned by 47.4% of all cancers, which differs from other countries such as France where almost 60% of cancers occur in the age group 65 years old and more (6), and USA where the median age of cancer patients is 68 years and the incidence is eleven times as high in 65 and more age group(7,8).

As for the association between the age and the tumour localization, we noticed that testicles cancer, leukaemia and Hodgkin lymphoma affect particularly the youngest population whereas the oldest population suffer more from the cancers of prostate, bladder, liver and gall bladder. This is consistent with the results of other studies carried out in France and USA. Indeed, in France more than 75% of bladder cancers and almost 85 % of prostate cancers affect people who are 65 years old or more (6). In the USA, the median age of patients is 69 years for prostate cancer, 70 years for lung cancer and 72 for colorectal cancer (7).

The analysis of the risk of death according to the age group showed that patients who are between 50 and 60 years old have a higher risk to die from cancer which would be due to lung and liver cancers that are known for their bad vital prognosis and that represent 32% of deaths in this age group in the present sample. We had indeed shown in a previous study on the same sample that lung and liver cancers are significantly associated with death (9). Furthermore, Several studies also demonstrated the bad vital prognosis of these two localizations. Indeed, they reported that the 5years survival rate is 9% in liver cancer (10) and does not exceed 15% in lung cancer. The principal causes of this bad prognosis are the fast evolution and the non specific nature of the early symptoms (11-13).

Finally, the result of the fourth part of this work which consists in the fact that children and elderly people survive the least to cancer would be attributable to their health that is rather fragile.

## 5. CONCLUSION

In conclusion, the present work brought out the influence of age on the tumour localization and we noticed that testicles cancer, leukaemia and Hodgkin lymphoma affect particularly the youngest population whereas the oldest population suffer more from the cancers of prostate, bladder, liver and gall bladder. Furthermore, children and elderly people survive the least to cancer

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