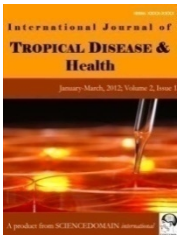

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Epidemiological Profile of Cancer and Investigation of Some Risk Factors in Morocco

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Authors' contributions

This work was carried out in collaboration between all authors. Author AS collected data from the Azhar Oncology Centre and designed the study. Author AA carried out the statistical analysis and translated the manuscript into English. Author NAO managed the literature searches. Author FH wrote the first draft of the manuscript. Author AQ wrote the protocol. All authors read and approved the final manuscript.

Original Research Article

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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 epidemiological profile of cancer and to find out the association that would exist between the gender of patients, the tumor localization and the vital prognosis.

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.

Results: Among the 1756 studied cases, 58% are females and 42% are males. The mean age of patients is 53±15 years old.

The repartition of patients according to the localization shows that breast cancer is the most frequent with 24% of cases, followed by cervix cancer with 11% and lung cancer with 8%.

The study shows that the higher number of deaths occurred in lung cancer patients with

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21% of all deaths in our sample. Nevertheless, the highest lethality is observed for the liver cancer with 37.5%.
The results also show that males display a significantly higher risk for bladder, lung and stomach cancers, whereas females have significantly higher risk for thyroid, skin and gall bladder cancers.
The calculation of death risk by localization shows that liver and lung cancers present the worst vital prognosis.
Finally, we demonstrated that the survival length after beginning of treatment depends on cancer localization.
Conclusion: More efforts should be made by health authorities in Morocco to fight against cancer in especially those with bad vital prognosis.

Keywords: Cancer; epidemiological profile; gender; localization; risk; death.

1. INTRODUCTION

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. 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. As elderly people are most susceptible to cancer and population aging continues in many countries, cancer will remain a major health problem around the globe.

In 2008 12,7million new cases were registered worldwide, 56% of whom are in developing countries [1]. The most frequent cancers are those of lung (1.6million, 12.7%), breast (1.38million, 10.9%) and colorectum (1.23million, 9.7%).

Cancer caused 7.6million 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 0.69million deaths respectively [1].

The present work aims to bring out the epidemiological profile of cancer and to find out the association that would exist between the gender of patients, the tumor localization and the vital prognosis.

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 tumor, type of the tumor, therapy protocol.

The variables we were interested in are the gender, the localization, 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 (gender, localization, evolution) and mean±standard deviation for quantitative variables (survival length after the beginning of treatment). To calculate the specific lethality of each localization divided the number of deaths because of this localization by the number of cases having this localization and we multiplied the quotient by 100.

-Analytic statistics: based n association tests such as Chi-squared test which measures the difference between the observed distribution and the theoretical one. We used this test to compare the distribution of localizations between males and females. We also used the one factor analysis of variance (ANOVA), which estimates the intergroup variation according to the intragroup variation (F ratio), in order to know if the survival length after the beginning of treatment depends on the localization of the tumor. We considered the results as significant when P-value is lower than 0.05.

The calculation of the relative risk (RR) for each localization allowed us to investigate the degree of association between gender and localization and between death and localization. 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 (χ^2=43.38; P<.001), which implies that females are more affected by cancer than males.

The mean age of patients is 53±15 years old. It is 57±16 years old in males and 50.89±13.59 years old in females.

3.1 Repartition According to Gender and Localization

The repartition of patients according to the localization shows that breast cancer is the most frequent with 417 cases (24% of cases), followed by cervix cancer with 194 cases (11%) and lung cancer with 140 cases (8%).

Moreover, the repartition of localizations according to the gender of patients shows that the cancers of breast, cervix and lung are the most frequent in females whereas the lung cancer, the prostate cancer and non-hodgkin lymphoma (NHL) are the most frequent in males (Table 1).

3.2 Repartition According to Mortality and Lethality

The study shows that the higher number of deaths occurred in lung cancer patients with 38 deaths, that makes 21% of all deaths in our sample (Fig. 1). The breast cancer comes in second place with 30 deaths (17%) and colorectal cancer in the third place with 17 deaths (9%).

Table 1. Repartition of cancer cases according to gender and localization

Localization	Women	% Women	Men	% Men	Total
Breast	410	98	7	2	417
Cervix	194	100	0	0	194
Lung	18	13	123	87	141
Colorectal	58	43	77	57	135
Prostate	0	0	101	100	101
Cavum	34	39	54	61	88
Non-hodgkin lymphoma (NHL)	32	36	56	64	88
Thyroid	55	71	22	29	77
Ear-Nose-Throat (ENT)	20	27	53	73	73
Cerebral	21	36	37	64	58
Bladder	4	10	37	90	41
Stomach	6	17	29	83	35
Hodgkin lymphoma	14	42	19	58	33
Ovary	31	100	0	0	31
Uterus	30	100	0	0	30
Bone	8	30	19	70	27
Pancreas	12	44	15	56	27
Soft tissue	11	41	16	59	27
Cutaneous	12	67	6	33	18
Liver	4	25	12	75	16
Leukaemia	5	31	11	69	16
Gall bladder	9	64	5	36	14
Renal	4	36	7	64	11
Oesophagus	3	33	6	67	9
Testicles	0	0	9	100	9
Other	21	53	19	48	40
Total	1016	58	740	42	1756

Nevertheless, in terms of lethality the profile is remarkably different. Indeed, the (Fig. 1) shows that the highest lethality is observed for the liver cancer with 37.5%, ahead of lung cancer (27%) and cutaneous cancer (22.2%).

3.3 Association between Gender and Tumor Localization

In order to apply the independence Chi-squared test (χ^2) and the relative risk test (RR), we included only localizations which are common to males and females.

The calculation of χ^2 gave a value of 118.17 (P<.001) which is highly significant. That means that the cancer localization depends closely on gender.

On the other hand we calculated the RR for each cancer localization. In (Table 2), we exposed males (RR males/females) but in (Table 3), we exposed females (RR females/males). The results show that males display a significantly higher risk for bladder, lung and stomach cancers, with RR of 5.48, 4.55 and 2.81 respectively, whereas females have significantly higher risk for thyroid, skin and gall bladder cancers, with 5.08, 3.64 and 3.25 respectively.

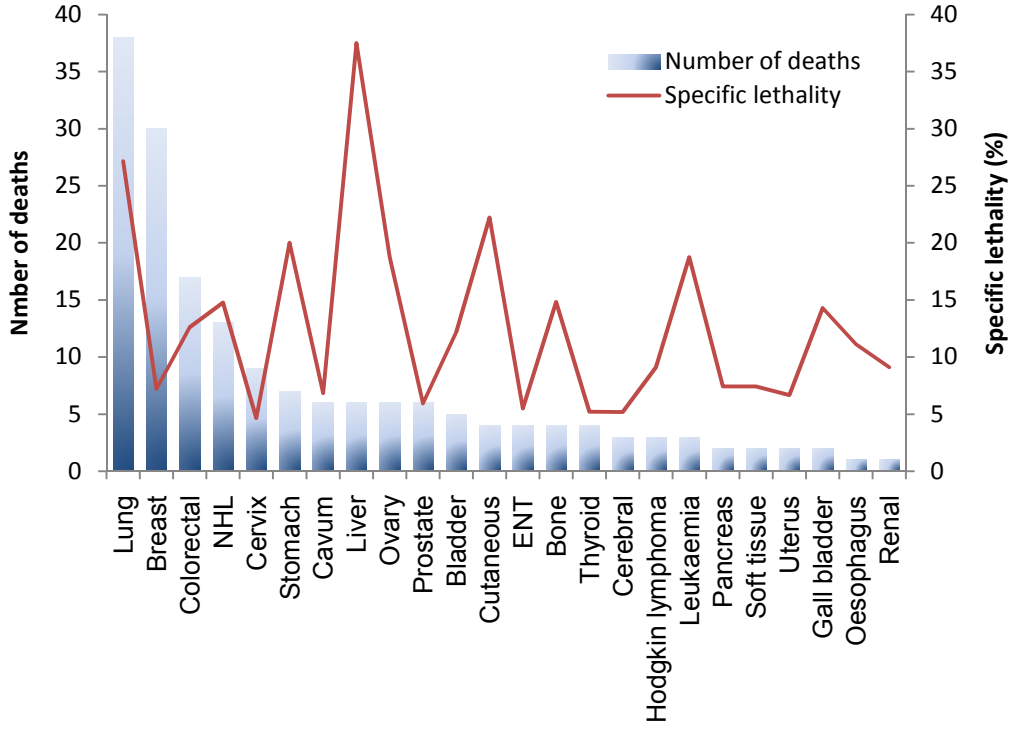

Fig. 1. Repartition of patients according to the number of deaths and the specific lethality

Table 2. Repartition of localization relative risks (RR) according to gender (males exposed), represented in descending order

Localization	RR/masculin	95% confidence interval	
		min	max
Bladder	5.48*	1.94	15.49
Lung	4.55*	2.72	7.61
Stomach	2.81*	1.15	6.83
Bone	1.35	0.58	3.11
ORL	1.54	0.90	2.62
Oesophagus	1.13	0.28	4.54
Leukaemia	1.24	0.43	3.61
Liver	1.70	0.55	5.32

(*) RR statistically significant (P<.05%)

3.4 Association between Death and Tumor Localization

We calculated the relative risk of death for each localization in order to bring out the cancer localization that are the most associated with death (Table 4). The results show that the death risk is significant in liver and lung cancers with RR values of 5.33 and 3.77 respectively. Consequently these two localization present the worst vital prognosis.

Table 3. Repartition of localization relative risks (RR) according to gender (females exposed), represented in descending order

Localization	RR/féminin	95% confidence interval	
		min	max
Thyroid	5.08*	3.04	8.48
Cutaneous	3.64*	1.35	9.79
Gall bladder	3.25*	1.08	9.78
Pancreas	1.44	.66	3.10
Colorectal	1.40	.97	2.03
Hodgkin lymphoma	1.32	.65	2.67
Soft tissue	1.23	.56	2.68
Cavum	1.13	.72	1.77
Renal	1.01	.29	3.49
Cerebral	1.01	.58	1.75

(*) RR statistically significant (P<.05%)

3.5 Association between Survival Length and Tumor Localization

So as to investigate the influence of cancer localization on survival lenght after treatment beginning, we used the one factor analysis of variance which confirmed a close association between these two variables (F=7.64; P<.001). We eventually applied a means comparison using Duncan test which revealed the existence of five groups according to the mean survival length (Fig. 2).

Table 4. Repartition of relative risks (RR) of death cancer localizations, represented in descending order

Localizations	RR	95% confidence interval	
		min	max
Liver	5.33*	1.92	14.85
Lung	3.77*	2.50	5.68
Cutaneous	2.50	0.82	2.17
Stoamch	2.21	0.95	5.13
Ovary	2.11	0.86	5.22
Leukaemia	2.01	0.57	7.13
NHL	1.54	0.84	2.83
Bone	1.52	0.52	4.43
Gall bladder	1.45	0.32	6.51
Bladder	1.21	0.47	3.12
Colorectal	1.27	0.75	7.69
Oesophagus	1.08	0.13	8.69

(*) RR statistically significant (P<.05%)

The group (a) presents the lowest mean survival length (17.37±20.68 months), which implies that the localization belonging to this group have the worst vital prognosis. Conversely, the group (e) which has the highest mean survival length (32.55±37.27 months) contains the localizations with the best vital prognosis. The other groups contain localizations with intermediate survival lengths.

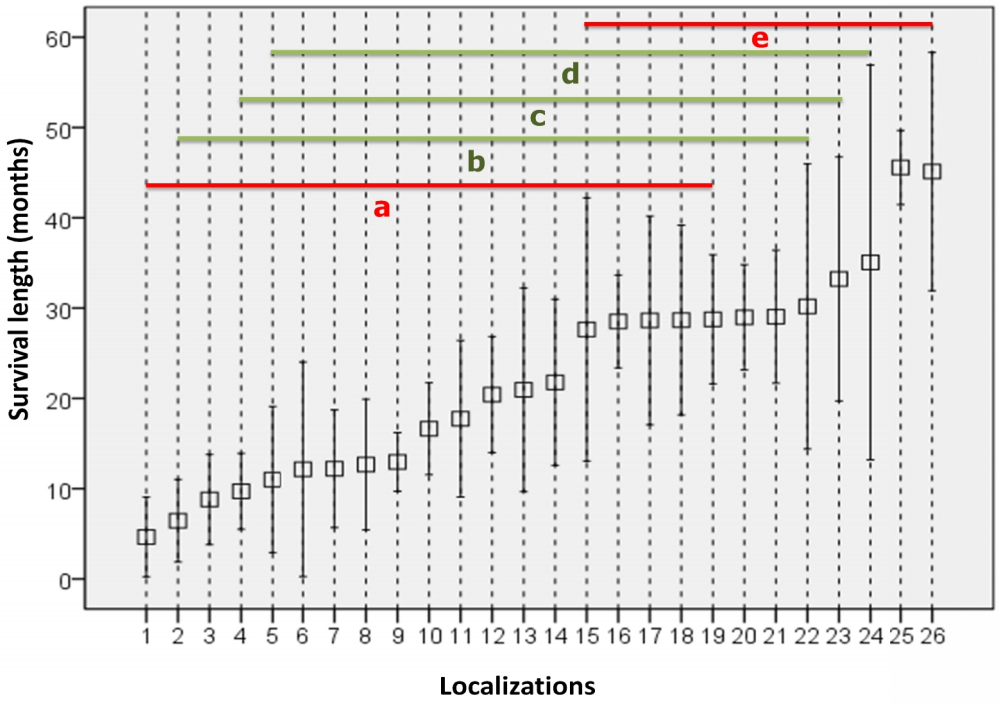

Fig. 2. Repartition of mean survival lengths (months) according to the cancer localization

(1.Liver, 2.œsophagus, 3.Leukaemia, 4.Cerebral, 5.Testicles, 6.Gall bladder, 7.Stomach, 8.Pancras, 9.Lung, 10.ENT, 11.Soft tissue, 12.Thyroid, 13.Bladder, 14. Other, 15.Bone, 16.Cervix, 17.Uterus, 18.Hodgkin lymphoma, 19.NHL, 20.Colorectal, 21.Cavum, 22.Renal, 23.Prostate, 24.Cutaneous, 25. Breast, 26.Ovary)

4. DISCUSSION

The results of the present work showed that the most frequent cancers are breast, cervix and lung cancers, which differs from the global statistics where the lung cancer is the most common ahead of breast and colorectal cancers [1,4]. Moreover, we found that lung and prostate cancers are the most common in men, which converges with data in France [5], Canada [6], USA [7] and the world [4]. In women, we showed that breast and cervix cancers are the most frequent, this does not differ from other Arabic countries [8]. Nevertheless, lung and breast cancers are respectively the most common in women in the USA and Canada [6,7], whereas breast and colorectal cancers predominate in France [5].

In terms of mortality, lung cancer remains the first cause of death in our study which is the case in other parts of the world [1,4].

As far as gender is concerned, we showed that men are more affected by lung cancer than women in terms of frequency and deaths, this is consistent with the results of other studies carried out in north Africa [9], in Europe and the USA [10,11].

This higher risk in men for lung cancer has been largely explained by the fact that men are more exposed to tobacco products and professional carcinogenic products than women [12].

This gender difference is more pronounced in developing countries where tobacco consumption and outdoor activities are considerably higher in men [12-14].

Furthermore, this work displayed a bladder cancer risk 5.4 times higher in men. Previous studies brought out smaller gender difference in bladder cancer risk which varies from 2.5 to 4 [9,15-17]. This difference is mainly due to tobacco consumption [12].

Several studies establish unequivocally that tobacco use, particularly manufactured cigarette smoking, causes most cancers of the lung, oropharynx, larynx, and esophagus in the USA, and approximately one-third of all cancers of the pancreas, kidney, urinary bladder and uterine cervix. More recent evidence also implicates smoking with cancers of the stomach, liver and colorectum [18].

Conversely, women displayed a risk 5 times higher for the thyroid cancer than men, which is consistent with the literature [5,7,9].

Finally, we showed that lung cancer and liver cancer are significantly associated with death. 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 [19] and does not exceed 15% in lung cancer [20-22]. The principal causes of this bad prognosis are the fast evolution and the non specific nature of the early symptoms.

5. CONCLUSION

In conclusion, the present work brought out the significantly higher risk in men for lung and bladder cancers, the significantly higher risk in women for thyroid cancer and the significantly higher risk of death from lung and liver cancers in both men and women. Consequently, health authorities in Morocco should make more efforts to fit their anti-cancer strategy to the risk gender difference and to give priority to lung and liver cancers that are more associated with death.

CONSENT

Not applicable.

ETHICAL APPROVAL

Not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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