

Cutaneous melanoma: population-based study in Goiania, Brazil, from 1988 to 2000*

*Melanoma cutâneo: estudo de base populacional em Goiânia, Brasil, de 1988 a 2000**

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Abstract: BACKGROUND - The Goiania Population-Based Cancer Registry grants access to a 13-year temporal series on melanoma data, with a histopathologic confirmation of 96.6%.

OBJECTIVE - To compare the world incidence, mortality and trends with data of the first population-based study on cutaneous melanoma in Brazil.

METHODS - Two hundred and ninety new cases of melanoma diagnosed in city residents (incidence) and 54 deaths reported to the Goiania Cancer Registry (mortality) were analyzed between 1988 and 2000. The standardized coefficients of age and sex were calculated using the world population. The trends were analyzed by simple linear regression models.

RESULTS - One hundred and forty-four cases of melanoma in women and 146 in men. The mean standardized incidence rates were increasing in both men ($r^2=0.33$; $p=0.040$) and women ($r^2=0.41$; $p=0.019$), with a significant increase in men over 60 years old and women aged up to 59. The mean standardized mortality rates were increasing in men ($r^2=0.32$; $p=0.042$) and stable in women, with a significant increase in men aged over 60 years.

CONCLUSIONS - In Goiania, as well as around the world, cutaneous melanoma incidence rates are increasing in both sexes. Mortality rates tend to stabilize in women and increase in men.

Keywords: Brazil; Melanoma; Melanoma/epidemiology; Melanoma/mortality; Skin

Resumo: FUNDAMENTOS – O Registro de Câncer de Base Populacional de Goiânia disponibiliza dados de melanoma de uma série temporal de 13 anos, com 96,6% de confirmação histopatológica.

OBJETIVO – Comparar incidência, mortalidade e tendências mundiais com os dados do primeiro estudo de base populacional de melanoma cutâneo do Brasil.

MÉTODOS – Foram analisados 290 casos novos diagnosticados em residentes do município (incidência) e 54 óbitos reportados ao Registro de Câncer de Goiânia (mortalidade), entre 1988 e 2000. Os coeficientes padronizados por idade e sexo foram calculados pela população mundial. Para análise das tendências, um modelo de regressão linear simples foi utilizado.

RESULTADOS – Cento e quarenta e quatro casos de melanoma em mulheres e 146 em homens. Os coeficientes padronizados médios de incidência foram crescentes tanto para homens ($r^2=0,33$; $p=0,040$) como para mulheres ($r^2=0,41$; $p=0,019$), com tendência crescente nos homens acima de 60 anos e mulheres até 59 anos. Os coeficientes padronizados médios de mortalidade foram crescentes nos homens ($r^2=0,32$; $p=0,042$) e estáveis nas mulheres, com tendência crescente para homens acima de 60 anos.

CONCLUSÃO – Tanto em Goiânia como no mundo, a incidência de melanoma cutâneo é crescente para ambos os sexos. A mortalidade tende à estabilidade nas mulheres e é crescente para homens.

Palavras-chave: Brasil; Melanoma; Melanoma/epidemiologia; Melanoma/mortalidade; Pele

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INTRODUCTION

In the Brazilian population, skin types are greatly heterogeneous, due to the significant miscegenation of ethnic groups. Because the country climate is predominantly tropical and equatorial, the population is highly exposed to the sun, especially in the Northern, Northeastern and Central regions and along the coast.

This study analyzes the incidence, mortality, as well as the trends of cutaneous melanoma (CM) in the City of Goiania, State of Goias, and compares them to data in the literature. The objective of the study is to identify the characteristics of a population of a central region of Brazil.

PATIENTS AND METHODS

New cases of CM diagnosed between 1988 and 2000 reported in the Goiania Population-Based Cancer Registry (PBCR), according to the International Classification of Diseases for Oncology (ICD-O). The cases coded as C44 (skin) with CM morphology were analyzed. This category does not encompass skin cancers of the vulva, penis and scrotum, which were excluded from the analysis. To determine the mortality, deaths due to CM reported by the Municipal Health Department between 1988 and 2000 and revised by the PBCR were considered.

The raw incidence and mortality rates were calculated, yearly, for both sex, and the number of new cases or the number of deaths due to CM were divided by the mid-year population and this ratio was multiplied by 100,000. The standardized incidence and mortality coefficients were calculated directly, and the standard population used was the Segi world population of 1960. Coefficient standardization is recommended if one wishes to make comparisons between places with different age composition or to analyze temporal series.

Specific age coefficients in two age groups - 0-59 years and 60 years or more were calculated, considering this is the cut-off point for defining the elderly in developing countries.

The analysis of trends was done by using the simple linear regression model. A statistically significant linear trend was that with estimated model with $p < 0.05$. The goodness-of-fit to normal distribution was verified by the Kolmogorov-Smirnov test.

For this study, a secondary database made available by the Goiania PBCR was used, in which the patients are not identified. The raw standardized coefficients were calculated with the Excel spreadsheet (version Office 2000). The trend analyses and the charts with historical series were done using SPSS for Windows (version 10.0).

RESULTS

Between 1988 and 2000, 290 new CM cases in people residing in the city of Goiania were reported, 146 (50.4%) men and 144 (49.6%) women. Sex distribution was similar in the two age groups analyzed, the male to female ratio of 1.02. The age at the CM diagnosis ranged from 5 to 98 years, with median age of 54 years. Most of those individuals belong to the 0-59 group (60.7%).

In this analysis, 241 cases (81.3%) did not have morphological classification. Regarding tumor extension, 165 cases were of invasive CM (56.9%), 52 of metastatic CM (17.9%), eight of in situ CM (2.8%) and in 65 cases (22.4%), the information was not available. The distribution of CM cases according to anatomical site, per age group, in Goiania, during the study period, is depicted in table 1.

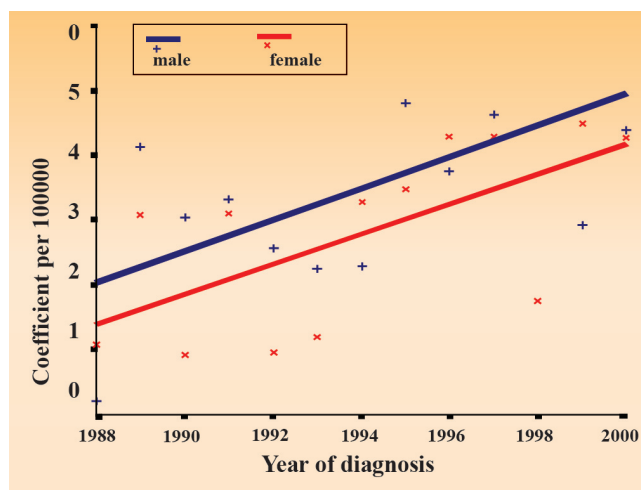
A growing incidence, both for women (+0.232 per year; $p = 0.019$) and men (+0.244 per year; $p = 0.04$) of all ages is observed, with mean standardized incidence coefficient of 2.78 women and 3.49 men per 100,000 inhabitants, increasing 8.3% and 6.9% per year, respectively (Graph 1). By analyzing the specific coefficients, women had a growing trend in the 0-59 years age group ($p < 0.001$), with 15.9% per year increase and men in the age group of 60 years or more ($p = 0.026$) with 9.9% per year increase.

From 1988 to 2000, 54 people died of CM in

TABLE 1: Number de cases of cutaneous melanoma per anatomical site and age group, in Goiania, 1988-2000

Anatomical site	No. of cases per age group		Total	
	0-59	60 or more	N	%
Hips and legs	41	34	75	25.9
Head and neck	32	43	75	25.9
Trunk	43	16	59	20.3
Shoulders and arms	27	10	37	12.8
Not specified	33	11	44	15.1
Total	176	114	290	100

GRAPH 1: Trend of standardized incidence coefficients of cutaneous melanoma (per 100000 inhabitants), per sex, in Goiania, 1988-2000



Goiania, 34 (63%) men and 20 (37%) women. Deaths were higher in men, the male to female ratio of 1.7. The age of death ranged from 26 to 88 years, with median of 59 years. Of the total deaths of the analysis, approximately half occurred between 0 and 59 years of age (53.7% of cases).

Morphological classification was not available in 49 cases (90.8%). Regarding tumor extension, 27 were metastatic CM (50.0%), 10 reported as invasive CM (18.5%) and in 17 cases (31.5%) the information was not available. The distribution of deaths according to CM anatomical site, in the age groups, in Goiania, in the studied period, is the depicted in table 2.

Mortality was stable for women and growing for men (+0.094 per year; $p=0.042$), with mean standardized mortality rate of 0.46 per 100000 women and 0.85 per 100000 men, an increase by 11.1% per year for males (Graph 2). By analyzing the specific coefficients, a growing trend was observed for men aged 60 years or more ($p=0.004$), a 22.1% per year increase.

DISCUSSION

Goiania is located at 16° 40' S latitude, alike the northern region of Australia (10-25°S). The large difference in CM incidence rates, in places at similar latitude, corroborates the current premise that cancers are complex diseases which express endogenous metabolic changes, imbalances associated to ageing and genetic changes, partly caused by exogenous factors, such as in the case of CM, lifestyle and exposure to ultraviolet radiation.¹⁻³

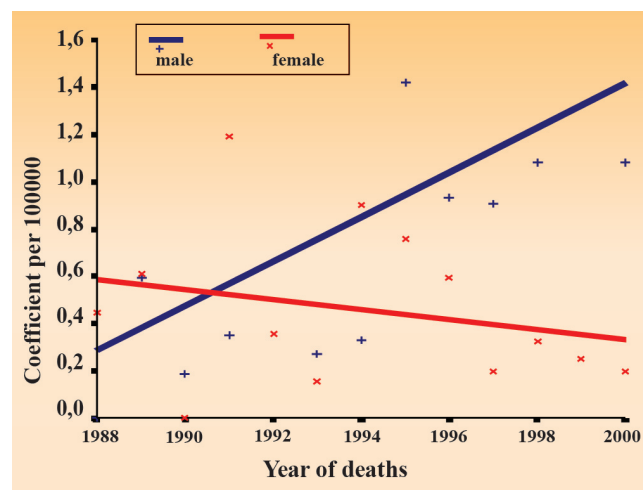
Between 1988 and 2000, the mean incidence of CM in the City of Goiania (2.78 women and 3.49 men per 100000) was similar to that of the cities of Latina, in Italy (2.9 women and 3.3 men per 100000) and of Tarragon, in Spain (3.2 women and 3.5 men per 100000), data from 1988 to 1992;⁴ however, it was much lower than the incidence of 38.1 women and 51.1 men per 100000 inhabitants, recorded from 1993 to 1997, in the Queensland region, northeast Australia.⁵

Human population miscegenation in Brazil is historically unique, because for five centuries, there were many interracial marriages, and today the characteristics of Brazilians are greatly varied.⁶ Hawaii is another place with great population diversity, and the incidence of CM in white residents is of 12.4 women and 19.5 men per 100000, far superior to the incidence of CM in native Hawaiians (1.2 women and 0.9 man per 100000) and in the first generation of Japanese descendents born in the state (0.3 woman and man per 100000).⁴ A recent Hawaiian population-based study disclosed 256 cases of CM (156 men and 101 women) during eight years (1994-2002), and only 17% occurred in non-white individuals. The median age of the white patients (53 years) was lower than that of non-white ones (64 years). Tumor thickness was almost one millimeter thinner in the white population, which may be partially explained by greater delay in diagnosis of CM in non-whites. Superficial extensive melanoma was the most frequent type in non-white patients, despite the significantly higher incidence of lentiginous acral melanoma in this group relative to the white one.⁷ In the Goiania population

TABLE 2: Number of deaths due to cutaneous melanoma per anatomical site of primary tumor and age group, in Goiania, 1988-2000

Anatomical Site	No. of Deaths Per Age Group		Total	
	0-59	60 or more	N	%
Hips and legs	5	7	12	22.2
Head and neck	4	7	11	20.4
Trunk	6	5	11	20.4
Shoulders and arms	2	1	3	5.5
Not specified	12	5	17	31.5
Total	29	25	54	100

GRAPH 2: Trend of standardized mortality coefficients of cutaneous melanoma (per 100000 inhabitants), per sex, in Goiania, 1988-2000



analysis, skin color classification was not performed. The patients' median age (54 years) was similar to that of white Hawaiians. Most of the cases did not have morphological classification or defined tumor thickness. The anatomical sites of greater CM incidence were hips/lags and head/neck (25.9% of cases, each), followed by trunk (20.3% of cases).

In Goiania, a trend of growing CM incidence for both sexes was found. However, when the age groups were analyzed, significantly growing incidence rates were observed for women under 60 years and men with 60 years or more.

The incidence trends of CM in Oceania, Europe and America, are summarized in Table 3, and the results of the present study are similar to those found in developed countries, where a growing incidence trend was seen for both sexes.⁸⁻¹⁵

In Australia, the data analysis from the New South Wales State Population Based Cancer Registry, in the period from 1983 to 1996, identified a growing incidence trend of CM for both sexes, due to a 4.5% annual increase in men aged 65 to 74 years and 7.2% in those aged 75 years or more, despite the annual distribution of 3% in women aged 15-34 years and of 0.9% in those 35-49 years. A trend to melanoma incidence stabilization in women at that region is thus observed. The authors state that Australian women underwent important social changes and, like in several countries in the world, became part of the labor force and therefore, have less time for recreational activities with sun exposure, along with changes in the dressing habits, such as the use of pants.⁹ Questions on the reduction in the incidence of melanoma in Australian young women exist, because no

adjustments were made to consider the changes in racial composition of the population. In the last 25 years, a large young immigrant influx, especially women from the Pacific islands and from the Middle East has occurred, and they have lower risks of CM.¹⁶

Regarding mortality, in the early years of activity of the Goiania PBCR, only a small number of CM was recorded as *causa mortis* in the death certificates issued. It is likely that, among the patients who died due to metastases in general, there are some cases of undiagnosed CM. Also, because of old age, they might have had co-morbidities considered as the primary cause of death.

Between 1988 and 2000, the mean mortality due to CM in the City of Goiania was lower than the mortality encompassing three large regions (Southern, Southeastern and Mid-Western) of Brazil (0.6 woman and one man per 100000) and closer to the mean world mortality due to CM, which is of 0.56 woman and 0.75 man per 100000. The mortality rate among women of Goiania (0.46 per 100000) is similar to that of Costa Rica (0.49 per 100000) and of Argentina (0.51 per 100000), while that among men (0.85 per 100000) is close to the ones of Argentina (0.88 per 100000) and Portugal (0.76 per 100000). These rates are lower than those of mortality of 2.4 women and five men per 100000 inhabitants recorded in Australia. The data utilized for this comparison were from the period between 1988 and 1995.¹⁷

The median age of death was 59 years, and the anatomical sites associated with higher mortality due to CM were hips/legs (22.2% of deaths) followed by head/neck and trunk (20.4% of deaths each).

In Goiania, a statistically stable mortality trend was seen for women and a growing one, for men of all ages. The deaths due to CM in individuals aged 0-59 years accounted for 53.7%, although with stable trends, for both sexes in this age group. A significant growing mortality trend among men aged 60 years or more was observed, which is in accordance with data from the literature, showing that an increase in mortality rates occurs in the 60-79 year age group, especially among men, in the white population of Australia, United States and Nordic countries.^{17,18}

The mortality trends due to CM in Oceania, Europe and America are summarized in table 4, and the results found in the present study are similar to the increase found in Australia regarding men over 60 years and to the stability for women in Europe.^{8,10,11,13,15,18,19}

La Vecchia et al. discussed that in the 20-44 year age group, there is a reduction in the mortality rate, in developed countries and northern Europe, probably due to improved access to health care and to CM prevention programs.²⁰ According to Giles et al.,

TABLE 3: Trends in the incidence of cutaneous melanoma in the world and in Goiania

Place	Period	mean coefficient *	Trend incidence
OCEANIA			
New Zeland (non-Maori)	1969-93	26 men and 26 women	Mean annual increase by 6.7% in men and 3.1% in women
Australia (New South Wales)	1983-96	45 men and 30 women	Mean annual increase by 3.17% in men and 0.45% in women
EUROPE			
Scotland	1979-98	10.6 men and 13.1 women	Increase by 303% in men and 87% in women, in this period
Netherlands	1989-98	11.5 men and 14.8 women	Mean annual increase by 3.3% in men and 2.2% in women
England	1960-98	7.1 men and 7.8 women	A five-fold increase in the male incidence and three-fold in female incidence
Norway	1953-97	30.7 men and 31.1 women	A ten-fold increase in the period
AMERICA			
EUA	1973-80	10.1 men and 8.5 women	Mean annual increase by 7.2% in men and 6.7% in women
	1980-97	19.3 men and 13.8 women	Mean annual increase by 3.6% in men and 2.2% in women
Brazil (Goiania)	1988-2000	3.49 men and 2.78 women	Mean annual increase by 6.9% in men and 8.3% in women

* per 100000 inhabitants

the Australia population reached maximal mortality due to CM, for both sexes and all ages, in 1985, and it stabilized thereafter; however, the most significant reduction in mortality occurred in women under 55 years of age.²¹

In the United States, a decreasing mortality trend among women exists since 1981; the authors state that it can be attributed, in part, to the greater attention of women to the CM orientation campaigns, to greater care at sun exposure and to the fact of earlier health seeking behavior whenever skin changes and abnormalities are noticed.¹⁹

The worldwide growing incidence of melanoma with stabilizing mortality trends and progressively higher survival rates is due, in part, to improved diagnostic techniques, enabling early surgical intervention and greater detection of thin tumors, that is, with Breslow thickness scores lower or equal to one millimeter, which, in general, are of better prognosis.^{10,22}

In most CM cases in Goiania, this malignancy was diagnosed in patients aged under 60 years, which agrees with the statement that CM may occur in fairly young individuals compared to the most common solid tumors.²³ The increased incidence of CM in Goiania points to better reporting along the years to

the PBCR and improved diagnosis as well. Nonetheless, the diagnosis of CM *in situ* is only a very small fraction among the cases diagnosed in Goiania. More detailed characterization of the anatomical site of CM is needed because it will allow comparative studies among different national and international registries and trend analysis regarding sex, age group and anatomical site.²⁴

In a German study, 29.2% of patients, even when recognizing the pigmented lesion changes, delayed seeking medical assistance for over 12 months. The delay was explained by 63.5% of individuals as due to the fact that they had the impression that the lesion was benign or not important,²⁵ and this could have happened with the male population over 60 years in Goiania.

In the prevention campaigns, it is mandatory to emphasize the clinical features of skin tumors and the importance of immediate surgical care, so that the prognosis can be more favorable. CM, although less frequent, occurs in non-white population, and thus, the preventive measures must be extended to Latinos, Blacks, and Asians, in order to make early diagnosis in these ethnic groups, with improved prognosis.⁷

TABLE 4: Trends in mortality due to cutaneous melanoma in the world and in Goiania

Place	Period	mean coeficient*	Trend
OCEANIA			
New Zealand (non-Maori)	1969-93	5.5 men and 3.2 women	Mean annual increase by 2.8% in men and 2.2% in women
Australia	1960-90	-	Mean annual increase by 2% in men aged 30-59 years and 12% in men aged 60-79 years; stable in women aged 30-59 years and annual increase by 4% in women aged 60-79 years
EUROPE			
Scotland	1979-98	1.9 men and 1.85 women	Stable for both sexes
Netherlands	1989-98	3.1 men and 2.2 women	Mean annual increase by 2.9% in men and stable in women
Norway	1958-96	7.3 men and 4.7 women	Mean annual increase by 1.3% in men aged 25-49 years and 3.9% in men aged 50-69 years Mean annual increase by 1.5% in women aged 25-49 years and 3.3% in women aged 50-69 years
AMERICA			
EUA	1950-94	3.49 men and 1.69 women	Mean annual increase by 3.5% in men and 2.2% in women
Brazil (Goiania)	1988-2000	0.85 men and 0.46 women	Mean annual increase by 11% in men and stable in women

* per 100000 inhabitants

Developing countries have younger populations and cancer afflicts economically active age groups, causing serious family impact.²⁶ In Australia, in 2003, CM was the most common cancer diagnosed among men aged 25-54 years and among women aged 15-29 years. In 30-54-year-old women, CM was second only to breast cancer.⁵

In the present study, the temporal series analyzed also showed the initial effect of reporting new cases of cancer to the Goiania PBCR and the problems with correct filling of *causa mortis* in death certificates; however, it already approaches stabilization, which is usually reached after 15 to 20 years of

reporting. Hence, the analysis of incidence and mortality trends of CM in Goiania will go on in the coming decade and the future analysis of survival of reported cases will be essential for guiding health policies for the prevention and early detection of this malignancy in the city.

CONCLUSIONS

CM in Goiania has similar patterns to those reported in the world literature, with growing incidences in both sexes and mortality rate with a trend towards stability in women and growth in men. □

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