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Cancer Mortality in Older Mexican Individuals (2000 – 2010)

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Abstract

Objective: Given the trends in aging worldwide, in Mexico, we determined trends in adjusted mortality rates due to cancer and 11 cancer subtypes in older individuals (>65 years) from 2000 to 2010.

Methods: For this retrospective study, we collected data on mortality due to cancer from the registries of the National Institute of Statistics and Geography. Adjusted rates were calculated with a direct method based on the world standard population. Trend analysis was performed with a linear regression of the natural logarithm of the adjusted rate, and trends were evaluated with the Student´s t test.

Results: During the studied period, the cancer mortality rates significantly declined from 630.21 to 573.03 (per 100,000 inhabitants) in the overall population. Similar declines were observed in women (from 548.81 to 490.09) and men (from 726.03 to 672.94). Significant declines in mortality rates were observed across several cancer subtypes, including esophageal, gastric, colorectal-anal, liver-biliary, pancreatic, and tracheal-bronchial-lung cancers. Significant increases in mortality rates were observed in colorectal and breast cancer, but no changes were observed in mortality rates due to prostate, ovarian, bladder, and non-Hodgkin lymphoma cancers.

Conclusion: Mortality due to cancer in older Mexicans was lower than that observed in developed countries, and it significantly declined over the study period. Men had higher mortality rates than women. The highest mortality rates were due to breast and prostate cancer subtypes in older individuals.

Introduction

After cardiovascular disorders, cancer is the second leading cause of death in the world [1]. It affects both genders, and its economic impact is greater than any other cause of death in the world. The total economic impact of premature death and disability from cancer worldwide was $895 billion in 2008. This data represents 1.5% of the world's gross domestic product [2]. Among the risk factors for cancer, age is one of the most important; cancer incidence and cancer-related mortality rises exponentially after 50 years of age [3].

Due to increases in birth rate and life expectancy, the number of older individuals is currently increasing around the world. With this trend, the prevalence of cancer is likely to rise. This fact has important implications for the implementation of preventive strategies and treatment for cancer in older age groups. In older individuals, some cancers may be more aggressive or more indolent than in younger adult age groups [3].

On the other hand, Mexico is considered a country of young people. However, like other countries, Mexico has experienced considerable growth in its population, both in life expectancy and in the number of individuals. Thus, we might expect modifications in the incidence and mortality of some diseases, such as cancer, in the future. Hence, surveillance is important to ensure correct allocations of economic and human resources. Given the importance of cancer in public health, and due to the few studies that have focused on this older segment of the population, the present study aimed to determine recent trends in cancer among older individuals in Mexico from 2000 to 2010.

Methods

In this observational, retrospective study, we collected information on death due to cancer in individuals ≥ 65 years old from the database of the National Institute of Statistics and Geography (INEGI in Spanish) [4]. In this database, deaths that occurred from the years 2000 to 2010 were grouped according to the International Classification of Disease, version 10 (ICD-10). For the current analysis, we stratified deaths by gender, age group, and 11 cancer subtypes. The age groups were: 65 – 69, 70 – 74, 75 – 79, 80 – 84, and > 85 years. The cancer subtypes were: esophageal, stomach, colorectal, liver, pancreatic, tracheobronchial, bladder, non-Hodgkin lymphoma, prostate, cervical, and ovarian cancers.

Analyses

Standardized rates of mortality (per 100,000 inhabitants) were calculated with the direct method, using the world standard population. The populations used in the denominators of the 2000, 2005, and 2010 mortality rates were taken from the corresponding census estimates. For the other years, the denominators were estimated by linear interpolation. Trend analysis was performed with a linear regression of the natural logarithm of the adjusted rate, and the trends were evaluated with the Student´s t test. For the annual

percentage change (APC), we used the following formula: APC = (em-1)*100, where em was the antilogarithm of the slope previously calculated with linear regression. MINITAB 16 and EXCEL were used to perform the analyses.

Ethical considerations

This study was based on freely available data at www.inegi.org.mx. In this public domain database, the identity, preferences, and other data of deceased individuals are maintained strictly confidential.

Results

During the period studied, a total of 392,081 deaths due to cancer occurred in individuals aged >65 years in Mexico. This represented 13.5% of all deaths in this particular age group. According to gender, cancer was responsible for 14.6% and 12.4% of all deaths in elderly man and women respectively.

The average mortality due to cancer was 603.92/100,000 inhabitants. This rate significantly decreased over the study period, from 630.21 to 573.03 (per 100,000 inhabitants), with an APC of -1.05. Men had the higher mortality rates than women; the male female ratio was 1.35. Despite the different magnitudes, both gender exhibited a significant decrease in mortality rates over time. In men, mortality decreased from 726.03 to 672.94 (per 1000,000 inhabitants), with an APC of -0.91%; in women, it decreased from 548.81 to 490.09 (per 100,000 inhabitants), with an APC of -1.18% (Table 1). With the exception of individuals >85 years old, all age groups studied exhibited a significant decrease in mortality rates over time. The highest APC was -1.46% in the 65-69 year-old age group; the lowest APC was -0.377 in the 75 – 79 year-old age group.

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	APC	P
Gender													
Overall	630.21	623.70	624.76	624.49	613.53	612.53	596.77	588.00	582.10	573.94	573.03	-1.050	0.000
Male	726.03	717.31	730.86	727.69	714.70	718.21	694.57	685.88	684.60	670.07	672.94	-0.910	0.000
Female	548.81	543.60	534.22	537.30	528.09	523.76	514.67	506.10	496.72	494.08	490.09	-1.180	0.000
Age													
*65-69 yrs	413.30	398.20	403.55	401.87	387.60	377.21	379.57	369.98	362.40	365.99	353.95	-1.459	0.000
*70-74 yrs	574.15	575.75	564.23	562.28	550.02	556.96	525.46	517.12	506.55	487.74	488.92	-1.804	0.000
*75-79 yrs	750.29	756.09	761.33	748.85	736.78	743.48	728.20	726.50	740.52	734.63	728.79	-0.378	0.003
*80-84 yrs	971.12	945.61	983.67	1000.24	984.76	979.28	946.75	926.19	912.73	880.02	889.93	-1.035	0.004
*> 85 yrs	1060.43	1063.47	1025.35	1042.61	1060.74	1063.87	1041.19	1034.82	1016.16	1020.05	1060.01	-0.209	0.233

*= Crude rates

APC = Annual percentage change

The cancer subtypes that caused the highest mortality rates during the studied period were tracheobronchial, followed by stomach and liver cancers. The mortality rates due to these subtypes significantly decreased over time, with APCs of −5.35%, −3.16%, and −0.86%, respectively. On the other hand, only the mortality rate due to colorectal cancer showed a significant increase over the study period, with an APC of 0.67%. Mortality rates due to bladder cancer and non-Hodgkin lymphoma did not change over the study period (Table 2).

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	APC	P
Overall													
Esophagus	10.11	9.40	9.54	10.82	8.85	9.22	9.47	9.44	8.81	8.19	8.67	-1.59	0.016
Stomach	61.58	58.41	57.83	57.28	54.55	53.41	51.99	48.04	47.19	45.77	45.19	-3.16	0.000
colon, rectum, anus	29.96	30.67	29.07	30.84	31.00	32.18	31.69	32.45	33.19	30.71	31.26	0.67	0.052
Liver, bile duct	54.57	53.40	54.56	56.32	56.39	54.08	54.60	49.98	50.89	51.96	50.85	-0.86	0.020
Pancreas	35.14	35.02	34.98	33.02	34.82	34.49	33.53	33.47	34.12	32.95	31.86	-0.74	0.005

Lung, brochi trachea.	86.93	85.21	86.19	83.61	83.38	82.28	76.02	72.27	69.95	66.55	64.94	-3.09	0.000
Bladder	9.60	9.84	9.31	8.82	9.21	9.05	10.05	11.42	10.81	9.53	9.10	0.59	0.456
Non Hodgkin Lymphoma	13.84	13.51	15.52	14.33	14.41	15.53	15.29	14.71	14.34	15.15	14.97	0.66	0.140
Male													
Esophagus	15.20	14.10	14.32	16.43	13.78	14.50	15.25	14.51	14.10	13.10	13.03	-1.13	0.071
Stomach	72.85	68.38	68.11	67.34	63.68	61.27	61.63	56.65	55.86	55.38	54.96	-2.88	0.000
Colon, rectum, anus	31.91	31.47	29.98	30.64	31.97	34.23	33.92	33.77	35.69	34.05	35.46	1.48	0.001
Liver, bile duct	55.28	53.56	57.53	57.53	57.68	55.85	55.72	52.18	52.01	53.57	52.51	-0.72	0.054
Pancreas	34.79	34.67	34.74	32.38	34.58	33.66	32.71	33.13	34.61	32.30	30.19	-0.92	0.020
Lung, bronchi , trachea	129.09	127.85	129.57	124.57	124.06	123.97	113.19	106.37	103.12	96.67	94.06	-3.39	0.000
Prostate	149.22	151.29	152.57	160.54	150.97	155.65	145.66	149.01	147.61	144.87	147.24	-0.48	0.097
Bladder	13.56	14.54	12.73	12.87	12.74	13.42	14.63	14.70	14.91	13.45	13.80	0.59	0.321
Non Hodgkin Lynphoma	15.62	14.41	17.17	14.93	17.38	17.52	16.88	16.65	16.69	17.55	16.92	1.18	0.059
Female													
Esophagus	5.73	5.35	5.40	5.97	4.62	4.72	4.51	5.04	4.28	3.97	4.95	-2.67	0.013
Stomach	51.79	49.66	48.82	48.46	46.62	46.69	43.68	40.64	39.69	37.48	36.80	-3.46	0.000
colon, rectum, anus	28.11	29.88	28.14	30.89	30.04	30.38	29.74	31.23	31.01	27.80	27.58	-0.07	0.879
Liver, bile duct	54.04	53.16	52.00	55.33	55.26	52.57	53.58	48.11	50.05	50.65	49.48	-0.96	0.018
Pancreas	35.40	35.25	35.16	33.56	34.94	35.17	34.25	33.75	33.67	33.41	33.28	-0.60	0.002
Lung, bronchi, trachea.	50.29	48.23	48.58	48.20	48.26	46.26	44.08	43.08	41.70	40.91	40.10	-2.30	0.000
Breast	40.58	40.74	42.09	43.17	42.69	42.08	43.15	43.38	43.71	44.08	45.67	0.94	0.000
Cervical	65.34	61.19	57.26	56.58	53.74	51.81	47.10	46.34	44.58	43.45	39.40	-4.60	0.000
ovary	17.54	17.61	18.68	18.27	18.75	18.69	19.35	19.67	18.40	18.60	18.26	0.50	0.130
Bladder	6.20	5.82	6.37	5.38	6.19	5.37	6.21	8.69	7.34	6.21	5.20	0.69	0.648
Non Hodgkin Lynphoma	12.27	12.73	14.06	13.84	11.83	13.85	13.94	12.97	12.35	13.10	13.32	0.15	0.802

Table 2: Cancer mortality trends in older Mexican (> 65 years) according cancer subtype (rates are per 100,000 inhabitants)

APC = Annual percentage change

In men, the highest mortality was due to tracheobronchial cancer, followed by prostate and stomach cancers. Of these, only deaths due to tracheobronchial and stomach cancers showed a significant decreases over time, with APCs of -3.39% and 2.88%, respectively. Mortality due to colorectal cancer showed a significant increase over time, with an APC of 1.48%. No changes over time were observed in mortality due to esophageal, prostate, bladder, and non-Hodgkin lymphoma cancers (Table 2).

In women, the highest mortality rates were due to cervical, liver, and tracheobronchial cancers. Only mortality due to breast cancer showed a significant increase over time, with an APC of 0.94%. No changes over time were observed in mortality rates due to colorectal, ovarian, bladder, and non-Hodgkin lymphoma cancers (Table 2).

Discussion

This study determined the recent trends in mortality due to cancer in older Mexican individuals, which included individuals >65 years of age. Our results indicated that mortality rates were much lower than

those reported in other countries, including the United States, Japan, and Italy [5-7]. A relatively low rate has been also observed in younger Mexican individuals [8]. The reasons for these world differences, to date, remain unclear, but genetic and environmental factors may be involved. The male predominance we observed was consistent with other studies [9]. This predominance may be explained by hormonal factors and the prevalence of unhealthy behaviors among men, such as smoking and drinking alcohol [10].

We observed decreased cancer-related mortality rates over time in four out of five of the age groups studied, but not in people > 85 years old (Table 1). With respect to this last age group, an Italian study [7] has reported significant decreases in their mortality rates while an USA [11] study has reported significant increases in the proportion of cancer deaths (cancer deaths in oldest old/cancer deaths in all ages). The decrease in mortality rates of those 65 – 84 years might be explained by increased adoption of preventative practices, like early detection of precancerous lesions, and by improvements in treating some cancer subtypes in Mexico. Although the mortality rates due to tracheobronchial-lung cancer were highest in the overall population, the mortality due to these cancer subtypes also showed the greatest decrease over time. This might be explained, in part, by an increasing number of individuals that quit smoking in the general population. On the other hand, the significant increase over time in mortality rates due to colorectal-anal cancer suggested a Westernization of nutritional habits and life style among Mexicans [12].

As in others countries, the highest mortality in Mexico among the older population men was due to prostate cancer. Furthermore, mortality due to this subtype did not show any change in over time. Previously, it has been observed increases in crude rates of mortality in overall Mexican men [13], but studies in 65 years-old men are lacking in México. The study design did not allow us to determine whether the incidence in prostate cancer might have increased over time. In that case, the lack of change in mortality may have been due to the improvements in preventive strategies, such as monitoring PSA. The mortality rate due to tracheobronchial-lung cancer showed a major decline over time; nevertheless, it remained the second leading cause of death in this study. In general, smoking is the primary cause of lung cancer; thus, our results indicated that smoking probably continued to be an important public health problem in Mexico. In addition, smoking, together with a fat-rich diet, a sedentary lifestyle, and an overweight status, may have also contributed to the significant increase over time in mortality due to colorectal cancer among men.

The decrease over time in mortality due to cervical cancer in overall women has been also reported previously in others Mexican studies [14] but not in woman ≥ 65 years. Programs for early detection of precancerous lesions and improvements in treatment could explain these results. Recently, HPV vaccinations have been included in national vaccination campaigns [15]; therefore, this favorable tendency towards decreasing mortality due to cervical cancer is likely to continue in the future. Although different to our results, the recent increase in breast cancer mortality of Mexican woman has been also observed previously in woman ≥65 year-old [16]. These data indicated that much effort is needed to reverse the significant increase in mortality due to breast cancer. These efforts must include promoting self-examination and providing mammography at an accessible cost.

Conclusions

Compared to more developed countries, in Mexico, the mortality due to cancer in older individuals is low, and it has exhibited a significant decline over recent years. Men had a higher mortality rate than women. Mortality due to colorectal-anal and breast cancer subtypes significantly increased over time. In addition, mortality rates due to breast and prostate cancer subtypes remain high in Mexico. More studies in older individuals are needed in Mexico.

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Conflict of Interests

The authors declare no conflict of interests

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