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Standardization of rates for sudden cardiovascular death in Mexico, 2010

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SD: sudden death

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ABSTRACT

Introduction: The sudden cardiovascular death represents a major health problem.

Objective: The main objective of the study was to apply the standardization technique of rates to the cause of sudden cardiovascular death.

Method: Information was gathered through the National Institute of Statistics, Geography and Informatics, regarding the number of sudden cardiovascular deaths that occurred during the years 2005 and 2010, for each state of the Mexican Republic, and crude rates were calculated, which were ordered by ranges; subsequently, the standardization technique was applied, using the direct method, where the number of expected deaths was obtained in order to calculate the standardized rate, before which the results obtained were rearranged, by means of ranges, and maps with priority regions were generated in both cases.

Results: With the data obtained, the states of the Mexican Republic were mapped, through the use of crude rates, and it was relevant that the states of the northern border strip were located with low and medium-low rates, and only one of them with a high rate, the Federal District. After the standardization, the entire northern border strip was located between medium-high and high; the rest of the country was also at a higher level in its rate, except from two states located to the south, Quintana Roo and Chiapas.

Conclusions: The standardization technique of rates allowed to establish a different level of prioritization regarding the occurrence of sudden cardiovascular deaths by states of the Mexican Republic.

Key words: Sudden cardiovascular death; Rates, ratios and proportions; Standardization

Estandarización de tasas por muerte súbita cardiovascular en México, 2010

RESUMEN

Introducción: La muerte súbita cardiovascular representa un importante problema de salud.

Objetivo: El objetivo principal del estudio fue aplicar la técnica de estandarización

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de tasas a la causa de muerte súbita cardiovascular.
Método: Se recabó información a través del Instituto Nacional de Estadística, Geografía e Informática, relativa al número de muertes súbitas cardiovasculares ocurridas durante los años 2005 y 2010, por cada estado de la República mexicana, y se calcularon las tasas crudas, que se ordenaron por rangos; posteriormente se procedió a la aplicación de la técnica de estandarización, mediante el método directo, donde se obtuvo el número de muertes esperadas para poder calcular la tasa estandarizada, ante lo cual se volvió a ordenar, por medio de rangos, los resultados obtenidos, y se generaron –en ambos casos– mapas con regiones prioritarias.
Resultados: Con los datos obtenidos se mapearon los estados de la República mexicana, mediante el uso de tasas crudas, y resultó relevante que los estados de la franja fronteriza norte se ubicaron con tasas bajas y media-baja, y sólo uno de ellos con tasa alta, el Distrito Federal. Posterior a la estandarización, toda la franja fronteriza norte se ubicó entre tasa media-alta y alta, el resto del país también pasó a un nivel más alto en su tasa, excepto dos estados localizados al sur, Quintana Roo y Chiapas.
Conclusiones: La técnica de estandarización de tasas permitió establecer un nivel de priorización distinto en cuanto a la ocurrencia, por estados de la República mexicana, de muertes súbitas cardiovasculares.
Palabras clave: Muerte súbita cardiovascular; Tasas, razones y proporciones; Estandarización

INTRODUCTION

The *Fundación Española del Corazón* has defined the sudden death (SD) as "the sudden and unexpected appearance of a cardiac arrest in a person apparently healthy and in good condition"[1].

The main cause of SD is represented by malignant cardiac arrhythmias, mainly, ventricular fibrillation. The loss of the heart's pump function, which will have as a consequence the fall to zero of blood pressure, cancels the blood supply to the brain, the main organ that suffers from hypoxia[1].

The sudden cardiovascular death represents, nowadays, a public health problem in a great part of the countries worldwide, mainly in those where infectious-contagious diseases have taken a back seat[2], as a result of the epidemiological transition.

This event is mostly presented at the residence. It is an unexpected episode, more frequent in men older than 45 years[3]. Its history of endothelial dysfunction precedes the myocardial infarction, the alteration of the cardiac rhythm, and ventricular dysfunction[3].

The sudden cardiovascular death's frequency and determination depends on the political and economic model of each country, as well as the care model for granting health services to the population[4]. Several studies have stratified the population according to risk factors, as the determination of cholesterol, blood glucose level, the high blood pressure without being detected, and at least one electrocardiogram early diagnosed[5]. Likewise, some authors have considered others such as age, gender, smoking history, alcoholism, diabetes mellitus, and electrocardiographic changes[6].

The stratification by geographical areas of greatest risk would involve to anticipate medical care, with adequate infrastructure and highly qualified staff, very necessary to address cardiac diseases and to detect, in advance, their risk factors[7,8].

The standardization method of rates is a mathematical technique that allows the comparison and control of confusion biases, especially when it was detected that a different variable from which is studied, influences it, in this case, the different population structure[9]. There are two methods for this purpose: the first, called direct, used as a standard distribution of a population, while the indirect method is based on a set of specific rates[10,11]. However, in both methods, adjusted rates only serve for comparison with others obtained under similar conditions[12].

The main objective of the study was to apply the standardization technique of rates to the cause of sudden cardiovascular death among different states of the Mexican Republic.

METHOD

An observational, descriptive, comparative, cross-sectional study was carried out. Information was gathered on the number of sudden cardiovascular deaths occurred during the years 2005 and 2010, for each state of the Mexican Republic, through the consultation of the database of the National Institute of Statistics, Geography and Informatics (INEGI, by its acronym in Spanish) which is the official instance of the federal government for validating statistical data.

The variable defined as confusion factor was the population structure presented for each corresponding year in the states of the Mexican Republic.

There was accomplished the calculation of the crude rates for each federative entity and the results of rates, for both years that worked as a comparison, were organized by ranges, allowing to produce the corresponding maps.

Subsequently, the implementation of the standardization technique was applied, using the direct method, where the number of expected deaths for the years 2005 and 2010 was obtained, in order to calculate the standardized rate, where the results obtained were organized, by means of ranges, and there were generated, in both cases, the maps with the priority regions.

The data was processed in the Excel 2007 program, version 12.0, and the maps were obtained from Internet (http://www.mapasparacolorear.com), on which a color was applied to highlight the geographical areas, according to their inclusion in the standardized rates ranges obtained through the application of the method.

RESULTS

In 2005, 41526 deaths were reported, classified as acute myocardial infarction (CIE 1219). The Federal District contributed with the largest number of deaths, a total of 6182; but it must be taken into account that it is the geographical area with the largest population, currently more than 20 million inhabitants.

In 2010, 61241 cases were reported for the same cause; that is, 47% more than in 2005, and it was again the Federal District which contributed with most cases, 8301 in total.

The states of the Mexican Republic where map mapped by using crude rates. It was relevant, for the year 2005, that the states of the northern border strip were located with low and medium-low rates, and only one of them, the Federal District, with a high rate; but by standardizing these rates, the northern border states denoted medium-high and high rates (**Figures 1 & 2**).

Figure 1. Crude rates for sudden cardiovascular death. Mexican Republic, 2005.

Figure 2. Standardized rates for sudden cardiovascular deaths. Mexican Republic, 2005.

The same procedure was developed for the year 2010, where it was pointed out the repetition of several states of the Republic with medium-high and high rates. It is important to notice that some of those that in 2005 had a medium-low rate, became medium-high, which evidences the increasing problem (**Figures 3 & 4**).

It is important to note that two states of the Mexican Republic, Chiapas and Quintana Roo, in the standardization process conducted for two years, remained within the same medium-low rate range, the first belonging to the south of the Republic, border with the country of Guatemala, and the second, located in the Yucatan Peninsula.

Figure 3. Crude rates for sudden cardiovascular death. Mexican Republic, 2010.

Figure 4. Standardized rates for sudden cardiovascular deaths. Mexican Republic, 2010.

DISCUSSION

The sudden cardiovascular death represents a problem for the public health of the Mexican Republic, as in other latitudes of the planet[2]. The decisive economic and political model, and socio-demographic lifestyles were important aspects for its frequency[4]; as the results show that the northern border maintains a social dynamic that may influence the occurrence of this disease that, once standardized the rates, this geographic region remained as a high incidence area. Therefore, this one deserves specific attention as the geographical area of major importance, which would mean the beginning of specific programs to prioritize medical care and early detection of risk factors[7,8], in order to detect people with the possibility of presenting a potential episode of this nature.

When applying the standardization method of rates, it was evident the need for controlling the confusion variable[9], which in this case, was the different population structure of states of the Mexican Republic, which made the comparative effect possible[12].

CONCLUSIONS

The standardization technique of rates allowed establishing a different level of prioritization, regarding the occurrence of sudden cardiovascular deaths, by states, of the Mexican Republic. This can be an important reference for prioritizing anticipated medical-preventive care services, through the detection of risk groups, identification of determining factors, and the implementation of strategies defined in advance. The standardization technique of rates is a current method, possibly fallen into disuse due to the ignorance of the wide application of its results.

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