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Original Research

Cerebrovascular and hypertensive diseases as multiple causes of death in Brazil from 2004 to 2013

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ABSTRACT

Objectives: The proportion of deaths attributed to hypertensive diseases (HYPDs) was only 50% of that registered for cerebrovascular diseases (CBVDs) in 2013 in Brazil. This article aims to evaluate mortality related to HYPDs and CBVDs as multiple causes of death, in Brazil from 2004 to 2013.

Study design: Analysis of historical series of secondary data obtained from Brazilian official registries.

Methods: Data about the deaths were obtained from the Mortality Information System of the Brazilian Ministry of Health, available on the DATASUS website. CBVDs and HYPDs were evaluated according to their mentions as the underlying cause of death or entry in any line of the death certificates (DCs), according to their International Statistical Classification of Diseases and Related Health Problems, 10th Revision codes.

Results: When CBVDs were the underlying causes of death, HYPDs were mentioned in 40.9% of the DCs. When HYPDs were the underlying causes of death, CBVDs were mentioned in only 5.0%. When CBVDs were mentioned without HYPDs, they were selected as the underlying cause of death 74.4% of the time. When HYPDs were mentioned in DCs without CBVDs, HYPDs were selected 30.0% of the time. In 2004, the frequency of any mention of HYPDs relative to the frequency of HYPDs cited as underlying causes increased fourfold and was followed by a plateau until 2013. In contrast, the frequency of any mention of CBVDs relative to the frequency of CBVDs as underlying causes decreased in the same period. Because this study was based on DC records, it was limited by the way these documents were completed, which may have included lack of record of the causes related to the sequence that culminated in death.

Conclusion: When deaths related to HYPDs were evaluated as multiple causes of death, they were mentioned up to four times more often than when they were selected as underlying causes of death. This reinforces the need for better control of hypertension to prevent deaths.

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Introduction

Cerebrovascular diseases (CBVDs) are among the leading causes of death worldwide.[1] In 2013, CBVDs accounted for 100,050 deaths in Brazil, second only to ischemic heart diseases (IHDs) with 106,788 deaths.[2] Although hypertension is considered a risk factor for circulatory diseases, hypertensive diseases (HYPDs) appeared as an underlying cause of death in only 46,832 death certificates (DCs) in that same year in the country.[2]

These numbers, especially those related to HYPDs, may not adequately represent the importance of this group of diseases at the time of death in mortality statistics. This is because official health statistics take into consideration the underlying cause of death as the primary information.[2] However, many individuals may have more than one chronic disease throughout life, and the selection of the underlying cause hinders a proper understanding of the associations between the diseases present at the moment of death[3,4] because it only considers one cause and disregards others.[5]

Multiple causes of death are relevant to estimate all the conditions recorded in the sequence that resulted in an individual's death,[6] as well as those conditions that were present but did not participate directly in the chain of events—the contributing causes.[3] Analyses of multiple causes of death help identify associations between diseases and injuries and estimate the frequency of mentions of all the causes reported on DCs,[3,7] which may be underestimated in vital statistics because of rules for selection of underlying causes of death.[5]

This study aimed to assess the mortality related to CBVDs and HYPDs as multiple causes of death in Brazil from 2004 to 2013. To accomplish this, we analyzed the frequencies of all mentions of CBVDs and HYPDs in all the fields of each DC filed during this period to identify possible associations among causes of death.

Methods

Data of deaths filed between 2004 and 2013 were obtained from the Mortality Information System of the Brazilian Ministry of Health (*Sistema de Informações sobre Mortalidade do Ministério da Saúde*, SIM-MS), available on the DATASUS website.[2] The system offers annual information on DCs filed in all federative units of the country.

We used the ICD-10 (International Statistical Classification of Diseases and Related Health Problems, 10th Revision) codes to classify the underlying causes of death.[8] Among circulatory diseases, we singled out four blocks of categories: CBVDs (codes I60–I69), HYPDs (codes I10–15), IHDs (codes I20-25), and other diseases of the circulatory system. Within the chapter on endocrine and metabolic diseases, we singled out diabetes mellitus (DM; codes E10–14) and the remaining diseases listed in that chapter. The subsets CBVDs and HYPDs were assessed distinctly, according to their entries as underlying or associated (non-underlying) causes.[9]

We estimated the proportions of CBVDs and HYPDs as underlying causes of death or entries as multiple causes of death according to the group of underlying cause, age group, and sex to prepare the tables. Any mention in the DC was considered, but in the DC for which more than one code for the same disease was found, we considered just one code that represented CBVDs or HYPDs to avoid overestimation. Because CBVDs and HYPDs may be reported concomitantly in the same DC, we also built a variable consisting of four categories: mentions of CBVDs without HYPDs, mentions of HYPDs without CBVDs, simultaneous mentions of both, and absence of both.

We estimated the mean number of causes mentioned in all DC lines to adjust the percentages of mentions of CBVDs and HYPDs. We also built graphs with percentages of mentions of CBVDs and HYPDs, in addition to percentages of these subsets as underlying causes of death in geographical regions of the country per year.

DC data were downloaded from the DATASUS website in .dbc format files, which were converted to .dbf with TabWin32, version 4.14 (DATASUS, Brazil), then converted to .xlsx with Calc from the LibreOffice Suite (The Document Foundation), and finally analyzed in Stata, 13.1 (StataCorp LP, College Station, TX).

Results

Table 1 shows the associations between underlying causes of death and mentions of CBVDs or HYPDs in any DC line, including deaths in which these conditions were selected as underlying causes of death. HYPDs were mentioned in 16.5% of DCs, which represents the sum of the proportions of DCs containing HYPDs (11.9%) plus DCs containing CBVDs and HYPDs (4.6%). CBVDs were mentioned in 11.6% of DCs, which represents the sum of the proportions of DCs containing CBVDs (7.0%) plus DCs containing CBVDs and HYPDs (4.6%). When DM was selected as the underlying cause of death, HYPDs were mentioned in 42.8% of the DCs and CBVDs in 15.4% of them. When IHDs were the underlying causes of death, HYPDs and CBVDs were mentioned in 36% and 3.6% of the DCs, respectively. When neither HYPDs nor CBVDs were mentioned, neoplasm was the most frequent underlying cause of death, followed by external causes and respiratory diseases.

When CBVDs were the underlying causes of death, HYPDs were mentioned in 40.9% of the DCs. In contrast, when HYPDs were the underlying causes, only 5.0% of the DCs mentioned CBVDs (Table 1). In all DCs that mentioned CBVDs without HYPDs, CBVDs were selected as the underlying cause of death 74.4% of the time, followed by other circulatory diseases (5.45%), and DM (4.3%). When HYPDs were mentioned without CBVDs, HYPDs were selected as the underlying cause of death 30.0% of the time, followed by DM 13.1% of the time (Table 1).

Fig. 1 shows the proportions of mention of HYPDs and CBVDs in any line of the DC or exclusively as underlying causes of death, distributed by regions of the country per year. HYPDs as the underlying causes of death showed a slight increase during the study period and stabilized in the last years. CBVDs as underlying causes of death increased slightly until 2006 in the North and Northeast regions and subsequently decreased moderately in all regions. The same occurred when the DC mentioned CBVDs. We also observed