

TRENDS IN MORTALITY FOR HYPERTENSIVE DISEASES AND DIABETES MELLITUS IN TAMIL NADU 2000 - 2021

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Abstract

INTRODUCTION : The global burden of hypertension was estimated to be around 1.4 billion in 2010, likely to surpass 1.6 billion by 2025. Diabetes Mellitus has quadrupled in the last three decades and ranks as the ninth major cause of death. The objective of the study is to analyze the trends in mortality for Hypertensive Heart Disease and Diabetes Mellitus in Tamil Nadu from 2000 to 2021.

METHODOLOGY : The study design was a descriptive analysis of the Medical Certification of Cause of Death (MCCD) annual reports of Tamil Nadu State for the period 2000 to 2021. The MCCD annual reports from 2000 to 2021 and the required data were collected as soft copy from the Department of SBHI for Tamil Nadu and from 2008 to 2020 for India. The data for 2013 was not available. Data were analyzed by calculating proportions by subgroups for each year overall, by age, and by gender from 2000 to 2021.

RESULTS : The percentage of deaths due to Hypertensive Diseases decreased in Tamil Nadu during 2021 overall by 2.2%, and in both genders (Male: 2.1%, Female: 2.4%). The trend was not stable, with continuous increases and decreases through the years. Female mortality due to Hypertensive Diseases has been high since 2002 till 2021, except for 2014 & 2016. The percentage of cases due to Hypertensive Diseases in the age group 15 to 44 years was higher in males from 2000 to 2021 in Tamil Nadu. The percentage of deaths due to diabetes mellitus started to decline by 1.8% in 2021 compared to the previous year. Overall, female mortality due to diabetes mellitus has been high since 2000 till 2021 in Tamil Nadu. The percentage of cases in the age group 15 to 44 years was higher in males from 2000 to 2021 in Tamil Nadu.

CONCLUSION : The percentage of deaths due to Hypertensive Diseases and Diabetes Mellitus has started to decrease in Tamil Nadu during 2021, in both genders compared to previous years, although the percentage was higher for Diabetes Mellitus compared to 2000. Female mortality was higher due to Hypertensive Diseases and Diabetes Mellitus overall and in the age group 45 years and above.

KEYWORDS : Hypertensive Diseases, Diabetes Mellitus, Tamil Nadu, Mortality

INTRODUCTION

Non-communicable diseases result from a combination of genetic, physiological, environmental, and behavioral factors.¹ Hypertension and Diabetes Mellitus are major non-communicable diseases worldwide. Hypertension causes 7.5 million deaths worldwide, accounting for around 12.8% of total deaths.² Hypertensive diseases encompass a constellation of cardiac modifications induced by hypertension.³ The high prevalence of hypertension leads to the rise of hypertensive diseases.⁴ The global burden of hypertension was estimated to be around 1.4 billion in 2010 and is likely to surpass 1.6 billion by 2025.⁵ Worldwide, 1.5 million deaths are directly attributed to diabetes each year, and the prevalence and cases are steadily increasing over the past few decades.⁶ It has been noted that the number of people with Diabetes Mellitus has quadrupled in the last three decades, ranking it as the ninth major cause of death.⁷

The current epidemiological characteristics of Hypertensive Diseases and Diabetes Mellitus need to be studied in the state for a successful response to them, in comparison

with past years. Studies comparing the mortality trends of Hypertensive Diseases and Diabetes Mellitus by overall, gender, and specific age groups for the state of Tamil Nadu are not available. This study can help policymakers and decision-makers by providing an idea of the current status and assisting them in making informed, evidence-based decisions to allocate resources for preventing and managing Hypertensive diseases and Diabetes Mellitus.

OBJECTIVE

The objective of the study is to study the trends in mortality for Hypertensive Diseases and Diabetes Mellitus in Tamil Nadu from 2000 to 2021.



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METHODOLOGY

STUDY DESIGN :

The deaths considered for the study are those medically certified by doctors. These deaths represent only a proportion of the total deaths in the state, as only a specific percentage of deaths are reported as medically certified. Most of the reported deaths come from urban areas, with coverage percentages ranging from 19% to 45%. The number of medically certified deaths decreases as age increases.

The study design was a descriptive analysis of the Medical Certification of Cause of Death (MCCD) annual reports of Tamil Nadu State for the period 2000 to 2021. The MCCD data received from doctors was coded according to the International Classification of Diseases (ICD) – 10 version. The MCCD data is collated by collecting it in a specific format from the districts by the State Bureau of Health Intelligence (SBHI) in the annual report format provided by the Registrar General of India and submitted to them annually.

DATA COLLECTION :

The MCCD annual reports were collected as soft copies from the Department of SBHI for Tamil Nadu from 2000 to 2021 and for India from 2008 to 2020 from the CRS website. The data for India was taken to compare the trend of Tamil Nadu with the country. The MCCD data was available for India only from 2008. The mortality data for Hypertensive Diseases and Diabetes Mellitus was collected based on subchapters available from ICD-10 codes (Hypertensive Diseases [I10-I15], Diabetes Mellitus [E-10 –E14]) for all 21 years by age and gender from the MCCD reports available, which was collated into a single Excel sheet by the principal investigator. The data for India was available from 2008 to 2020, except for the overall status for Diabetes Mellitus, which was available from 2000. The data for the year 2013 was not available as it could not be extracted from the available source for Tamil Nadu and hence was not considered for analysis.

DATA ANALYSIS :

Data was analyzed by calculating percentage for Hypertensive Diseases & Diabetes Mellitus each year by overall, gender and specific age groups for Tamil Nadu from 2000 to 2021.

HUMAN SUBJECT PROTECTION :

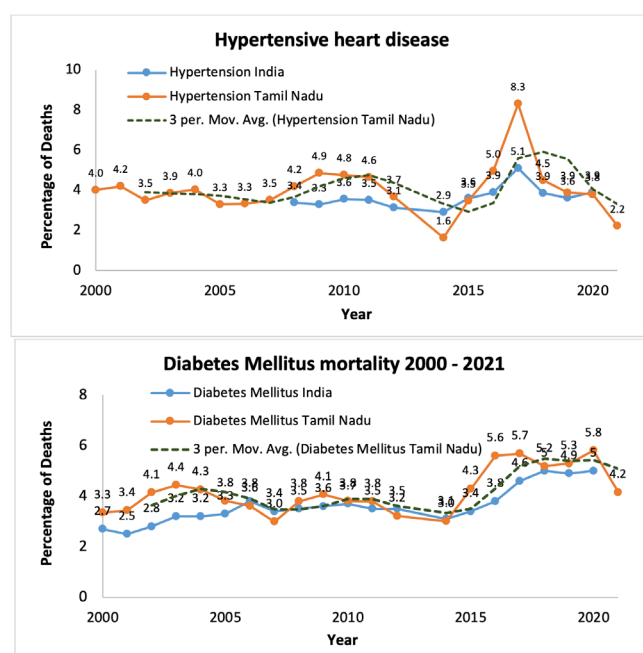
The study was approved by the Institutional Ethics Committee of Tamil Nadu Public Health Department. Privacy and confidentiality were maintained so that no personal data was used or revealed during analysis, report preparation, or presentation. The institution or district names were not revealed for privacy and confidentiality purposes.

RESULTS

The percentage of mortality due to Hypertensive Diseases in the state was 4% in 2000, which slightly increased and decreased within the range of 3.3% to 4.9% until 2012. Following this, there was a decrease in the state (1.6%) and in the country (2.9%) in 2014, which was the lowest mortality recorded in the available dataset. The percentage of mortality then started to rise from 2015 to 2017, from 3.5% to 8.3%, which was the highest percentage recorded in all 21 years of data, and then started to decrease to 2.2% in 2021. The percentage of mortality in the state, compared with the country, has been decreasing currently as of the 2020 data, which was higher in all years since 2008 except for 2014 and 2015.

The percentage of deaths due to diabetes mellitus in the state was 3.3% in 2000, which rose to 4.4% until 2003 and then started to decrease to 3% in 2007. The percentage again increased for two years to 4.1% and then started to decline to 3.0% by 2014. The percentage of deaths gradually increased until 2017 to 5.7% and then declined in the following year, after which it again started to increase to 5.8% in 2020. The percentage started to decline by 1.7% in 2021 compared to the previous year. The percentage of deaths, when compared with the country, has been higher in all years from 2000 to 2020 except for 2006-2007, 2012, and 2014. (Chart 1).

Chart 1: Trend of mortality of Hypertensive Diseases & Diabetes Mellitus 2000 – 2021

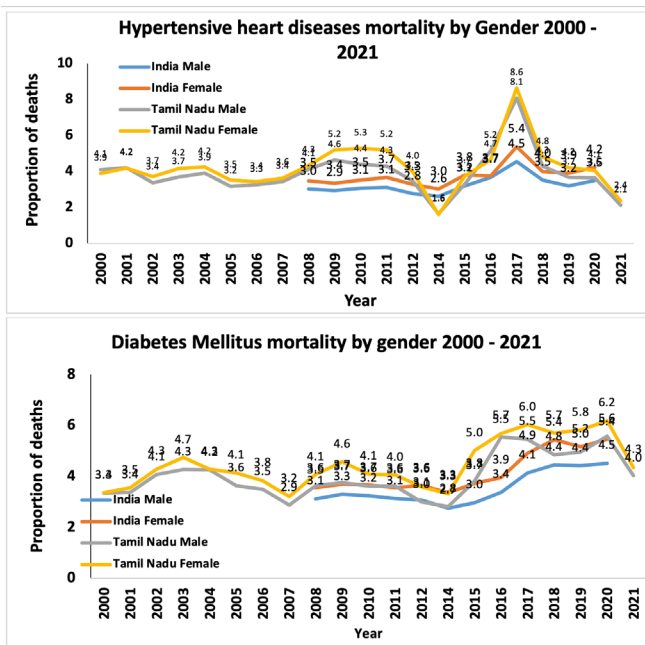


Overall, male mortality due to hypertension has been lower compared to females since 2002 until 2021, except for 2014 where it was equal and 2016 where it was higher than

females by 0.5%. When comparing male mortality with the country's data, it was noted that the percentage was higher in the state compared to the country from 2008 to 2020, except for 2014 where the country's percentage was higher than the state's proportion by 1%. Female mortality, when compared with the country's data, was higher in the state compared to the country from 2008 to 2020, except for 2014, 2015, and 2020 where the country's percentage was higher than the state's percentage by 1.4%, 0.1%, and 0.1%, respectively.

Overall, female mortality due to diabetes mellitus has been higher compared to males since 2000 until 2021. The highest difference between both genders was higher during 2015 (1.2% higher among females). When comparing male mortality with the country's data, it was noted that the percentage was higher in the state compared to the country from 2008 to 2020, except for 2012 where the country's percentage was higher than the state's proportion by 0.1%. Female mortality, when compared with the country's data, was higher in the state compared to the country from 2008 to 2020, except for 2012 and 2014 where the country's percentage was equal to the state's percentage. (Chart 2)

Chart 2 : Trend of mortality of Hypertensive Diseases & Diabetes Mellitus by gender 2000 – 2021



The percentage of mortality due to Hypertensive Diseases in the age group 0-14 years was lower in Tamil Nadu from 2008 to 2020 compared to India, except for 2012, 2014, and 2015, where it was the same in 2014 and 2015 (0.2%) and higher in Tamil Nadu by 1.7% in 2012, with the male gender having the higher percentage (1.9%) in 2012. The percentage of cases in the age group 15 to 44 years was lower overall and

by gender when compared to the overall state percentage from 2000. The percentage of cases in the age group 15 to 44 years was higher in males compared to females from 2000 to 2021, except for 2014, 2019, and 2021 where it was equal in 2014 and 2019 in both genders while it was higher in females in 2021 with a difference of 0.2%. The percentage of cases in the age group 15 to 44 years was higher during 2017 in the entire 21 years of data (2000 – 2021) with 5.1% and less than 2% from 2002-2007, 2014-2015, and 2021. The percentage of cases was higher in Tamil Nadu when compared with India from 2008 to 2020 except in 2019 where it was equal overall and 0.1% higher in the country compared to the state percentage. The percentage of cases in the age group 45 years & above was higher in Tamil Nadu when compared with India from 2008 to 2020 except in 2014, 2015, and 2020 where it was higher in the country compared to the state percentage overall and by gender and only in females in 2019 by 0.3%. The percentage of cases in the age group 45 years & above was lower in 2021 (Overall: 2.4%, Male: 2.3%, Female: 2.5%) compared with 2000 (Overall: 5.5%, Male: 5.3%, Female: 5.8%) in Tamil Nadu. The percentage of cases in the age group 45 years & above was higher in females compared to males except in 2014 and 2016 where it was higher in males by 0.1% and 0.5%, respectively, in Tamil Nadu from 2000 to 2021. The percentage of cases in the age group 45 years & above was higher during 2017 in the entire 21 years with 9.3% and least in 2014 with 1.9% followed by 2.4% in 2021. (Table 1).

Table 1 : Mortality proportion of Hypertensive Diseases by age group and gender 2000 – 2021

| Year | Tamil Nadu | | | | | | India | | | | | |
|------|------------|--------|----------------|--------|--------------------|--------|------------|--------|----------------|--------|--------------------|--------|
| | 0-14 years | | 15 to 44 years | | 45 years and above | | 0-14 years | | 15 to 44 years | | 45 years and above | |
| | Male | Female | Male | Female | Male | Female | Male | Female | Male | Female | Male | Female |
| 2000 | 0.0 | 0.0 | 0.0 | 3.1 | 2.4 | 2.8 | 5.3 | 5.8 | NA | NA | NA | NA |
| 2001 | 0.0 | 0.0 | 0.0 | 3.6 | 2.2 | 3.0 | 5.1 | 6.3 | 5.5 | NA | NA | NA |
| 2002 | 0.0 | 0.0 | 0.0 | 1.6 | 1.2 | 1.5 | 4.5 | 5.6 | 4.9 | NA | NA | NA |
| 2003 | 0.0 | 0.0 | 0.0 | 1.6 | 1.2 | 1.4 | 4.8 | 6.1 | 5.3 | NA | NA | NA |
| 2004 | 0.0 | 0.0 | 0.0 | 1.7 | 1.3 | 1.5 | 5.1 | 6.1 | 5.4 | NA | NA | NA |
| 2005 | 0.0 | 0.0 | 0.0 | 1.4 | 1.2 | 1.3 | 4.0 | 4.8 | 4.3 | NA | NA | NA |
| 2006 | 0.0 | 0.0 | 0.0 | 1.4 | 1.1 | 1.3 | 4.1 | 4.7 | 4.3 | NA | NA | NA |
| 2007 | 0.0 | 0.0 | 0.0 | 1.5 | 1.4 | 1.4 | 4.4 | 5.1 | 4.7 | NA | NA | NA |
| 2008 | 0.0 | 0.0 | 0.0 | 2.3 | 1.6 | 2.1 | 5.0 | 5.7 | 5.3 | 0.2 | 0.2 | 1.2 |
| 2009 | 0.0 | 0.0 | 0.0 | 2.9 | 2.4 | 2.7 | 5.4 | 6.4 | 5.8 | 0.1 | 0.1 | 1.1 |
| 2010 | 0.0 | 0.0 | 0.0 | 2.3 | 2.1 | 2.2 | 5.3 | 6.6 | 5.8 | 0.1 | 0.1 | 1.4 |
| 2011 | 0.0 | 0.1 | 0.0 | 2.2 | 2.0 | 2.1 | 5.2 | 6.5 | 5.8 | 0.1 | 0.1 | 1.2 |
| 2012 | 1.9 | 1.5 | 1.7 | 2.2 | 2.0 | 2.1 | 4.0 | 4.8 | 4.3 | 0.2 | 0.2 | 1.1 |
| 2013 | 0.1 | 0.1 | 0.1 | 1.2 | 1.2 | 1.2 | 1.9 | 1.8 | 1.9 | 0.1 | 0.1 | 1.0 |
| 2014 | 0.1 | 0.1 | 0.1 | 1.2 | 1.2 | 1.2 | 1.9 | 1.8 | 1.9 | 0.1 | 0.1 | 1.0 |
| 2015 | 0.2 | 0.2 | 0.2 | 2.0 | 1.8 | 1.9 | 3.7 | 4.2 | 4.0 | 0.2 | 0.2 | 1.5 |
| 2016 | 0.0 | 0.0 | 0.0 | 2.9 | 1.9 | 2.6 | 5.9 | 5.4 | 5.7 | 0.3 | 0.3 | 1.7 |
| 2017 | 0.0 | 0.0 | 0.0 | 5.5 | 4.4 | 5.1 | 9.0 | 9.7 | 9.3 | 0.1 | 0.1 | 2.6 |
| 2018 | 0.0 | 0.0 | 0.0 | 2.6 | 2.4 | 2.5 | 4.8 | 5.4 | 5.0 | 0.1 | 0.1 | 2.3 |
| 2019 | 0.0 | 0.0 | 0.0 | 2.1 | 2.1 | 2.1 | 4.1 | 4.6 | 4.3 | 0.1 | 0.1 | 2.0 |
| 2020 | 0.0 | 0.0 | 0.0 | 2.4 | 2.2 | 2.3 | 3.9 | 4.4 | 4.1 | 0.2 | 0.2 | 2.1 |
| 2021 | 0.0 | 0.0 | 0.0 | 1.3 | 1.5 | 1.4 | 2.3 | 2.5 | 2.4 | NA | NA | NA |

NA - Not Available

The percentage of mortality due to diabetes mellitus in the age group 0-14 years, both overall and by gender, was lower in Tamil Nadu from 2008 to 2011 and in 2017, and higher for the remaining years compared to India when compared from 2008 to 2020. The percentage of cases in the age group 15 to 44 years is lower overall and by gender when compared to the state average overall from 2000 to 2021 and the country average for the age group from 2008 to 2020.

The percentage of cases in the age group 15 to 44 years was higher in males compared to females from 2000 to 2021 in Tamil Nadu. The percentage of cases in the age group 15 to 44 years was higher during 2020 in the entire 21 years of data (2000 – 2021) with 3.2% and least during 2006 with 0.9%. The percentage of cases was lower in Tamil Nadu when compared with India from 2008 to 2020, except for five years in which it was equal in 2008 and higher in Tamil Nadu in the remaining four years (2015-2017 & 2020). The percentage of cases in the age group 45 years & above was higher overall and by gender when compared to the state average from 2000 to 2021. The percentage of cases in the age group 45 years & above was higher in females compared to males in Tamil Nadu during 2000 to 2021. The percentage of cases in the age group 45 years & above was higher during 2016 & 2017 in the entire 21 years with 6.4% and least in 2014 with 3.5%. The percentage of cases was higher in Tamil Nadu when compared with India from 2008 to 2020, was equal in 2008, and higher overall and by gender in Tamil Nadu during 2015 -2017, while it was higher by overall and male gender during 2020 and higher in the female gender in 2009 by 0.1% when compared to the country's percentage. (Table 2).

Table 2 : Mortality percentage of Diabetes Mellitus by age group and gender 2000 – 2021

| Year | Mortality % of Diabetes Mellitus by age group | | | | | | | | | | | | | | | | |
|------|---|-------|------|----------------|-------|------|--------------------|-------|------|------------|-------|------|----------------|-------|------|--------------------|-------|
| | Tamil Nadu | | | | | | India | | | | | | | | | | |
| | 0-14 years | | | 15 to 44 years | | | 45 years and above | | | 0-14 years | | | 15 to 44 years | | | 45 years and above | |
| Male | Female | Total | Male | Female | Total | Male | Female | Total | Male | Female | Total | Male | Female | Total | Male | Female | Total |
| 2000 | 0.0 | 0.0 | 0.0 | 1.8 | 1.3 | 1.6 | 4.6 | 5.5 | 4.9 | NA | NA | NA | NA | NA | NA | NA | NA |
| 2001 | 0.0 | 0.0 | 0.0 | 1.2 | 0.9 | 1.1 | 4.7 | 5.8 | 5.1 | NA | NA | NA | NA | NA | NA | NA | NA |
| 2002 | 0.0 | 0.0 | 0.0 | 1.2 | 1.0 | 1.1 | 5.7 | 6.6 | 6.0 | NA | NA | NA | NA | NA | NA | NA | NA |
| 2003 | 0.0 | 0.0 | 0.0 | 1.5 | 1.3 | 1.4 | 5.7 | 7.0 | 6.1 | NA | NA | NA | NA | NA | NA | NA | NA |
| 2004 | 0.0 | 0.0 | 0.0 | 1.3 | 1.2 | 1.3 | 5.7 | 6.2 | 5.9 | NA | NA | NA | NA | NA | NA | NA | NA |
| 2005 | 0.0 | 0.0 | 0.0 | 1.0 | 1.2 | 1.1 | 4.8 | 5.7 | 5.1 | NA | NA | NA | NA | NA | NA | NA | NA |
| 2006 | 0.0 | 0.0 | 0.0 | 1.2 | 0.9 | 1.1 | 4.5 | 5.3 | 4.8 | NA | NA | NA | NA | NA | NA | NA | NA |
| 2007 | 0.0 | 0.0 | 0.0 | 1.0 | 0.8 | 0.9 | 3.8 | 4.6 | 4.1 | NA | NA | NA | NA | NA | NA | NA | NA |
| 2008 | 0.0 | 0.0 | 0.0 | 1.3 | 1.2 | 1.3 | 4.6 | 5.4 | 4.9 | 0.4 | 0.5 | 1.2 | 1.3 | 1.2 | 4.6 | 5.4 | 4.9 |
| 2009 | 0.0 | 0.0 | 0.0 | 1.6 | 1.4 | 1.5 | 4.6 | 5.8 | 5.1 | 0.4 | 0.4 | 1.3 | 1.3 | 1.3 | 4.8 | 5.6 | 5.1 |
| 2010 | 0.0 | 0.0 | 0.0 | 1.6 | 1.5 | 1.6 | 4.4 | 5.2 | 4.7 | 0.3 | 0.3 | 1.0 | 1.1 | 1.0 | 4.8 | 5.7 | 5.1 |
| 2011 | 0.0 | 0.1 | 0.1 | 1.7 | 1.6 | 1.7 | 4.5 | 5.1 | 4.7 | 0.1 | 0.1 | 1.0 | 1.0 | 1.0 | 4.6 | 5.5 | 4.9 |
| 2012 | 1.0 | 1.3 | 1.2 | 1.5 | 1.3 | 1.4 | 3.6 | 4.5 | 3.9 | 0.2 | 0.3 | 0.2 | 1.1 | 1.1 | 4.4 | 5.4 | 4.8 |
| 2014 | 0.2 | 0.2 | 0.2 | 2.1 | 2.2 | 2.1 | 3.2 | 3.9 | 3.5 | 0.1 | 0.1 | 1.2 | 1.3 | 1.2 | 3.8 | 4.8 | 4.2 |
| 2015 | 0.1 | 0.2 | 0.2 | 1.8 | 2.7 | 2.1 | 4.4 | 5.7 | 4.9 | 0.1 | 0.2 | 0.1 | 1.2 | 1.5 | 1.3 | 4.1 | 5.1 |
| 2016 | 0.0 | 0.0 | 0.0 | 3.0 | 2.9 | 3.0 | 6.3 | 6.4 | 6.4 | 0.1 | 0.2 | 0.1 | 1.4 | 1.5 | 4.6 | 5.5 | 5.0 |
| 2017 | 0.6 | 0.6 | 0.6 | 3.2 | 3.0 | 3.1 | 6.1 | 6.7 | 6.4 | 0.2 | 0.3 | 0.2 | 1.7 | 1.9 | 1.7 | 5.5 | 6.6 |
| 2018 | 0.3 | 0.5 | 0.3 | 2.6 | 3.0 | 2.7 | 5.4 | 6.3 | 5.8 | 0.2 | 0.3 | 0.2 | 1.7 | 1.9 | 1.7 | 5.9 | 7.2 |
| 2019 | 0.2 | 0.2 | 0.2 | 2.7 | 3.1 | 2.8 | 5.6 | 6.4 | 5.9 | 0.1 | 0.2 | 0.2 | 1.7 | 1.9 | 1.8 | 5.8 | 6.8 |
| 2020 | 0.4 | 0.3 | 0.4 | 3.1 | 3.4 | 3.2 | 6.0 | 6.7 | 6.3 | 0.2 | 0.2 | 0.2 | 2.1 | 1.9 | 2.0 | 5.6 | 6.9 |
| 2021 | 0.0 | 0.0 | 0.0 | 2.9 | 3.1 | 3.0 | 4.3 | 4.6 | 4.4 | NA | NA | NA | NA | NA | NA | NA | NA |

NA -Not Available

DISCUSSION

A study conducted by Dai et al. revealed that deaths due to Hypertensive Diseases globally have increased drastically when compared from 1990 to 2017. It was noted that the deaths due to Hypertensive Diseases were higher in males younger than 70 years than in females in the same age group, whereas the numbers were lower among males than among females in age groups of ≥70 years (8). In our study, we compared the mortality of Hypertensive Diseases and Diabetes Mellitus using percentages for 21 years from 2000 to 2021 for the state with the country by overall mortality, gender, and age group. It was noted that the percentage of deaths due to Hypertensive Diseases has started to decrease

in Tamil Nadu during 2021 (2.2%) when compared to 2000 (4.0%). The current decrease in Hypertension and Diabetes Mellitus may be due to the MTM (Makkalai Thedi Maruthuvam) scheme implemented in Tamil Nadu. The MTM scheme involves screening and delivering medications for NCDs at people's doorsteps. The percentage of mortality due to Hypertensive Diseases in Tamil Nadu, when compared to India, was consistently higher from 2008 to 2019 except in 2012 and started to decrease since 2020. Female mortality is high due to Hypertensive Diseases when compared to male mortality since 2002 till 2021, except for two particular years, 2014 & 2016. Female mortality of the state has also been high when compared with the country in almost all the years from 2008 to 2020. The percentage in both genders has decreased notably in 2021 to almost half of the percentage in 2000 (Male: 2.1%, Female: 2.4%) when compared with 2000 (Male: 4.1%, Female: 3.9%) in Tamil Nadu. The mortality of Hypertensive Diseases by age group was higher from age group 15 years and above in almost all the years in Tamil Nadu compared to country mortality, but there is a decrease since 2020 in the age group 45 years and above. The percentage of cases in the age group 15 to 44 years was higher in males compared to females, and vice versa in the age group 45 years and above in almost all the years from 2000 to 2021 in Tamil Nadu. It was noted in a study that by 2016, diabetes-related mortality declined by 7% in 49 countries. In High-Income Countries, it declined by 12%, while in Middle-Income Countries, it increased by 11%, which could be due to a higher prevalence (9). In another study, it was noted that the global mean mortality rate due to Diabetes Mellitus followed an upward trend in developing countries until 2005, and then a downward trend (10). In another study, it was noted that the age effect on the mortality of diabetes has increased with advancing age for both males and females (11). The percentage of deaths due to diabetes mellitus in the state was 3.3% in 2000 and had ups and downs fluctuating till 2021, but the percentage started to decline by 1.8% in 2021 compared to the previous year but was almost higher in all the years when compared to the country's percentage from 2000 to 2020. Overall, female mortality due to diabetes mellitus has been high compared to males since 2000 till 2021 in Tamil Nadu, and the same pattern is noted for the country. The percentage of mortality of diabetes mellitus in the age group 0-14 years by overall and gender was lower in Tamil Nadu from 2008 to 2011 and in 2017 and higher for the remaining years compared to India when compared from 2008 to 2020. The percentage of cases in the age group 15 to 44 years was lower when compared to the country's percentage from 2008 to 2020. The percentage

of cases was higher in Tamil Nadu when compared with India from 2008 to 2020, was higher overall and by gender in Tamil Nadu during 2015 -2017, while it was higher by overall and male gender during 2020 and higher in the female gender in 2009 by 0.1% when the country compared to the state percentage. The percentage of cases in the age group 15 to 44 years was higher in males when compared to females, and vice versa in the age group 45 years and above from 2000 to 2021 in Tamil Nadu.

CONCLUSION

The percentage of deaths due to Hypertensive Diseases has started to decrease in Tamil Nadu during 2021 and in both gender and the trend was fluctuating with continuous increase and decrease through the years. The mortality percentage among female gender was high due to Hypertensive Diseases since 2002 till 2021 except 2014 & 2016. The mortality percentage due to Hypertensive Diseases in the age group 15 to 44 years was higher in males and vice versa in age group 45 years and above in almost all the years from 2000 to 2021 in Tamil Nadu. The percentage of cases seen the age group 45 years and above for both Hypertensive Diseases and Diabetes Mellitus. The percentage of deaths by diabetes mellitus in the state started decreasing compared to previous year. Overall the female mortality due to diabetes mellitus has been high compared to males since 2000 till 2021 in Tamil Nadu. The percentage of cases in the age group 15 to 44 years was higher in males when compared to females and vice versa in age group 45 years and above from 2000 to 2021 in Tamil Nadu.

RECOMMENDATIONS

The high mortality percentage among females overall and in specific age group 45 years and above for Hypertensive Diseases and Diabetes Mellitus must be studied. The higher mortality among males for Hypertensive Diseases and Diabetes Mellitus in the age group 15 – 44 years also must be studied.

LIMITATIONS

The entire picture of the state is not presented as only a part of deaths are medically certified.

CONFLICT OF INTEREST

 None

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