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Regional, chronologic and international comparisons of relative morbidity and mortality caused by tuberculosis and some other diseases: Age-related patterns and gender differences

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Abstract

The present article describes epidemiologic indices for tuberculosis and some other infectious and cardiometabolic disorders, performing regional and chronologic comparisons in Southern region of Brazil, as well as international comparisons with Chile. The data obtained show that at least in populations studied, tuberculosis and HIV/AIDS are disorders belonging to intermediate age categories with male predominance, in contrast to septicemia and cardiometabolic diseases. It is suggested that partially tuberculosis may be a consequence of HIV / AIDS.

Introduction

In 2005 we have retrieved for the first time epidemiologic data from Brazilian national database called DataSus for cardiometabolic disorders [1]. Thereafter we have repeated this operation for many other diseases [2], including infections [3]. In addition, we have performed recently some international comparisons, especially of Brazilian state of Rio Grande do Sul (RS) with the population of Chile, as referred to morbidity, including that from tuberculosis and HIV/AIDS [4]. In present article we describe in more detail the data for tuberculosis and some other infections, as compared with cardiometabolic disorders. The aim of this work was to evaluate age-related patterns and gender differences for tuberculosis and other pathologies, in order to elaborate further the ontopathogenic model [3] in the framework of developmental origins of health and disease (DOHaD).

Methodology

Since 2005 we have used the same methodology of raw data processing for finding the indices of relative (or proportional) morbidity and mortality [5]. At first, the data of annual morbidity (in accord with the number of hospital admissions) and mortality in each age category were calculated as a percentage of total morbidity or mortality for both genders together, in three Brazilian states of Southern region: RS, Santa Catarina (SC) and Parana (PR), as well as the population of Chile (raw data for it were retrieved from the website maintained by Chilean Ministry of Health). Thereafter, female fraction of morbidity and mortality was calculated as a percent of total morbidity or mortality in each category of age for Southern region of Brazil. Finally, descriptive statistics were performed, finding arithmetic means and standard errors for each 3-4 year chronologic period. The

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plots (except two figures comparing the state of RS with Chile) were constructed by means of Microsoft Excel software, using only arithmetic means. Letter "a" in the designation of age category (in years) along horizontal axis on these plots means hyphen of interval.

Results & discussion

Figures 1-3 present the data for relative morbidity caused by tuberculosis and other disorders in three Brazilian states of Southern region, and figures 4-6 show female fraction of such morbidity in chronologic period 2001-2004. Figures 7-9 demonstrate the data for relative mortality, and figures 10-12 present female fraction of such mortality in the same chronologic period.

Figures 13-16 compare relative morbidity and mortality, as well as female fraction of morbidity and mortality only for tuberculosis in the state of RS between two chronologic periods, 1998-2000 and 2005-2007. Finally, figures 17 and 18 show international comparisons of relative morbidity caused by tuberculosis and HIV/AIDS between the state of RS and the population of Chile during the periods 2006-2008 and 2009-2011.

As can be seen on the figures presented, tuberculosis and HIV/AIDS are infections characteristic of intermediate age categories, i.e. quite different from cardiometabolic disorders belonging to the period of senescence. Therefore, it can be concluded that tuberculosis and HIV/AIDS are age-related, but not aging-related diseases. On the other hand, there are two peaks of morbidity caused by septicemia: In early postnatal life and during senescence. This fact can be explained by immature immune defense in the infantile period and by immunosenescence in advanced age categories. By the way, there is only one peak of mortality caused by septicemia, in senescence.

What for female fraction, it is clear from the data obtained that tuberculosis and HIV/AIDS are infections with male predominance, whereas for septicemia it is not the case. As in earlier studies [1,2], there is male predominance in morbidity and mortality caused by myocardial infarction. However, there exists female predominance in morbidity (but not mortality) from diabetes mellitus and arterial hypertension. Moreover, with the onset of menopause, there is a tendency to diminution (and sometimes even reversion) of gender differences for at least cardiometabolic disorders, what was previously interpreted by us as manifestation of accelerated aging for females [6].

According to the data obtained, there exists certain relationship between tuberculosis and HIV/AIDS in morbidity and mortality. This fact allows for suggestion that at least in the populations studied, tuberculosis may be partially a consequence of decreased immunity provoked by HIV/AIDS.

And finally, we affirm once more that really great stability of relative morbidity and mortality indices and female fraction can be observed both in time and space. This conclusion is supported by low standard errors (usually less than 10% of arithmetic means) in each chronologic period, as well as by only slight differences between sequential chronologic periods or between separate Brazilian states of Southern region, although some notable differences can be observed, when comparing the state of RS with the population of Chile.

Conclusion

The ontopathogenic model we are elaborating [3,7] is destined to description of the pathogeny of various diseases along the whole ontogeny, including pre- and postnatal development, continuing to adult state, intermediate age categories and senescence. However, classical infections, at least tuberculosis and HIV/AIDS, were not evaluated in the framework of DOHaD, in contrast to cardiometabolic disorders. Nevertheless, even for the last pathologies there exist suggestions of the contribution of intracellular pathogens that provoke only subclinical manifestations for several decades, before the catastrophic events like myocardial infarction occur in later life [3].

It means that studies on interactions of bacterial and viral pathogens with host immune defense along the age scale continue to be the priority of biomedical paradigm. In this regard, the roles of stress hormones and proteins are in the focus of our attention [8], considering that glucocorticoids occupy central place on the crossroads of principal bioregulatory systems: nervous, endocrine and immunologic. Therefore, anti-inflammatory and immunosuppressive treatment of various disorders with exogenous glucocorticoids should be re-evaluated, especially in the elderly patients, taking into account a strong tendency for greater predisposition to infectious diseases provoked by these drugs [3], at least in high doses and in the cases of prolonged treatment.

Figures

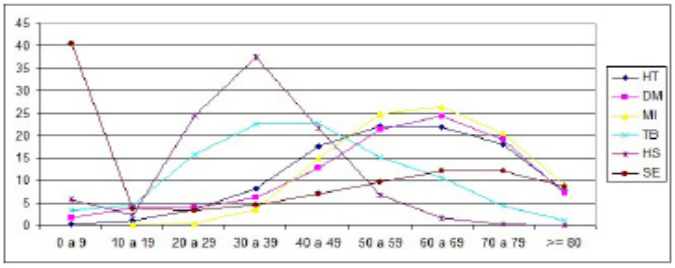

Figure 1: Morbidity caused by infections (pulmonary tuberculosis–TB, HIV/AIDS – HS, septicemia–SE) and cardiometabolic disorders (hypertension–HT, diabetes mellitus–DM, myocardial infarction–MI) in the state of RS during the period of 2001-2004.

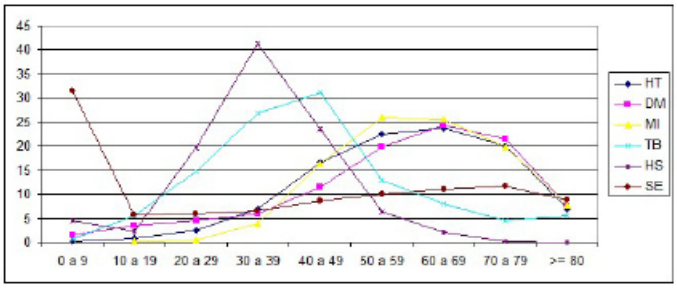

Figure 2: Morbidity caused by infections and cardiometabolic disorders in the state of SC during the period 2001-2004.

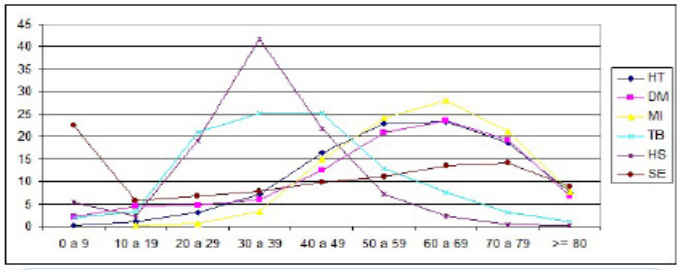

Figure 3: Morbidity caused by infections and cardiometabolic disorders in the state of PR during the period 2001-2004.

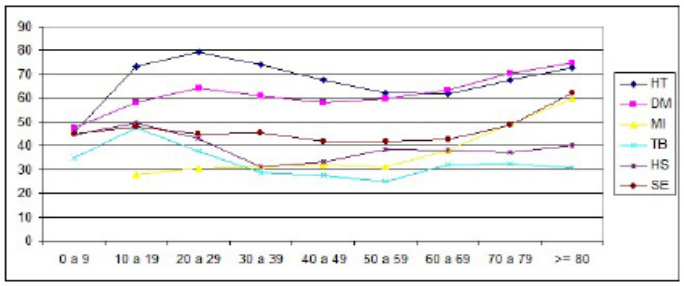

Figure 4: Female fraction of morbidity caused by infections and cardiometabolic disorders in the state of RS during the period 2001-2004.

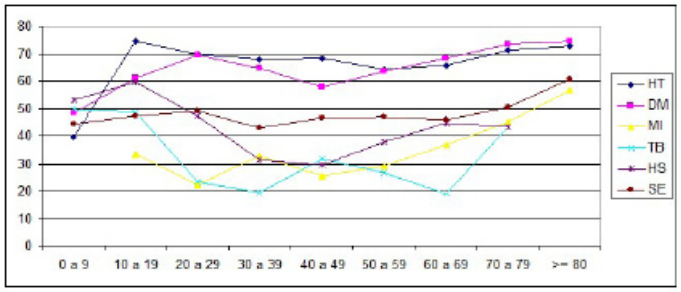

Figure 5: Female fraction of morbidity caused by infections and cardiometabolic disorders in the state of SC during the period 2001-2004.

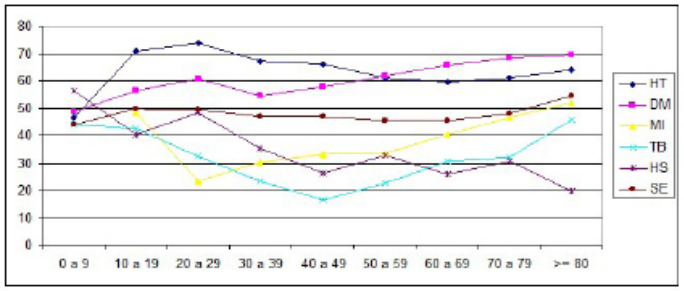

Figure 6: Female fraction of morbidity caused by infections and cardiometabolic disorders in the state of PR during the period 2001-2004.

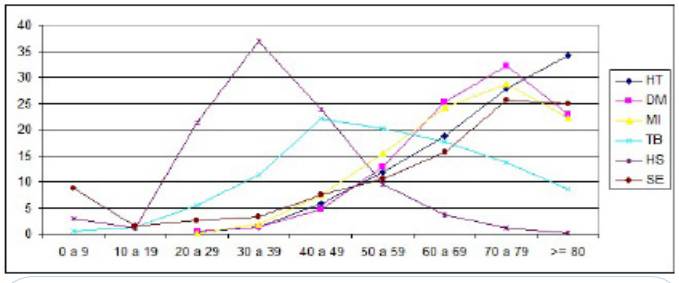

Figure 7: Mortality caused by infections (respiratory tuberculosis – TB, HIV/AIDS – HS, septicemia – SE) and cardiometabolic disorders (hypertension – HT, diabetes mellitus – DM, myocardial infarction – MI) in the state of RS during the period 2001-2004.

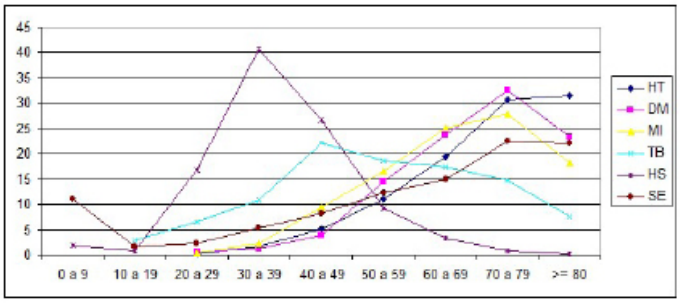

Figure 8: Mortality caused by infections and cardiometabolic disorders in the state of SC during the period 2001-2004

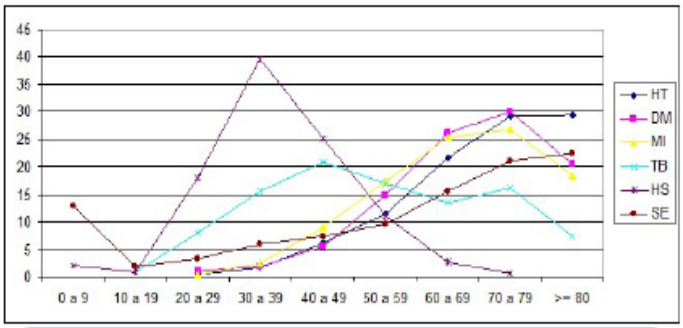

Figure 9: Mortality caused by infections and cardiometabolic disorders in the state of PR during the period 2001-2004.

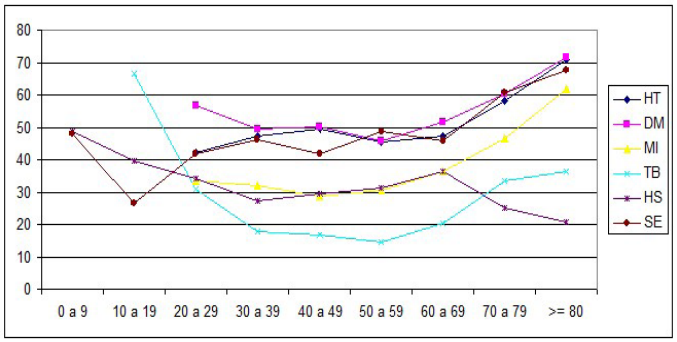

Figure 10: Female fraction of mortality caused by infections and cardiometabolic disorders in the state of RS during the period 2001-2004.

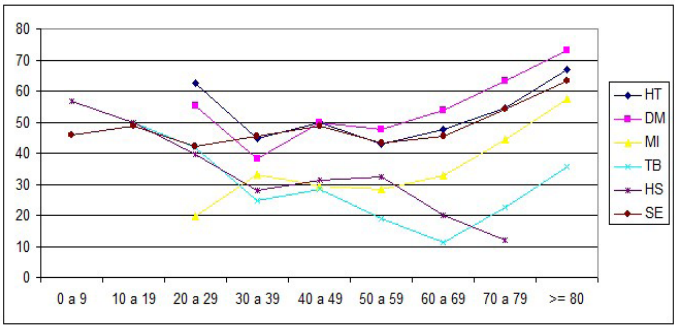

Figure 11: Female fraction of mortality caused by infections and cardiometabolic disorders in the state of SC during the period 2001-2004.

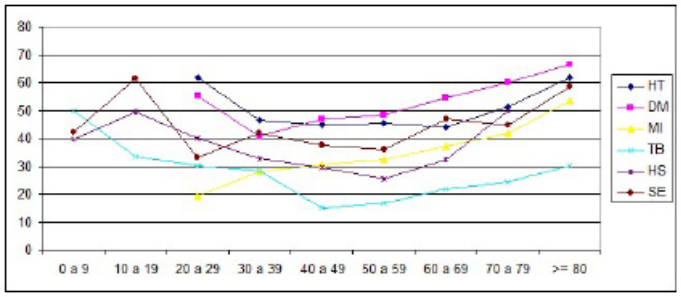

Figure 12: Female fraction of mortality caused by infections and cardiometabolic disorders in the state of PR during the period 2001-2004.

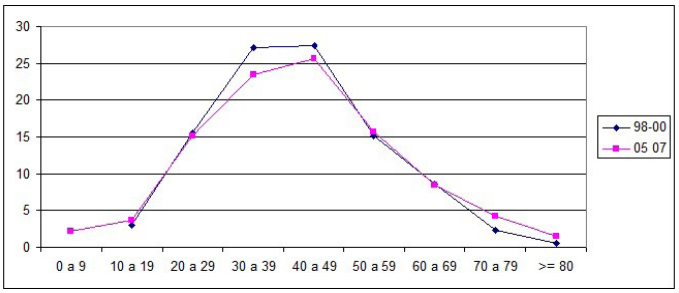

Figure 13: Comparison of morbidity caused by pulmonary tuberculosis in the state of RS during the periods 1998-2000 and 2005-2007.

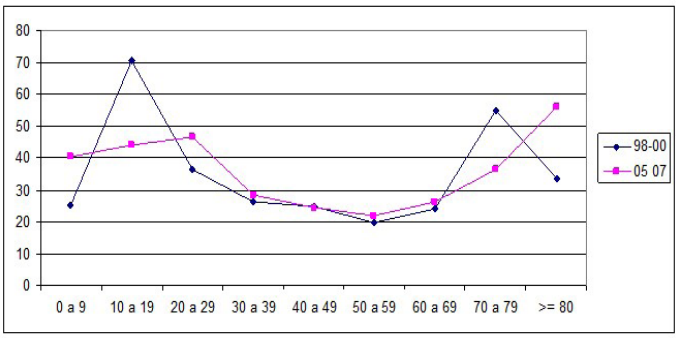

Figure 14: Comparison of female fraction of morbidity caused by pulmonary tuberculosis in the state of RS during the periods 1998-2000 and 2005-2007.

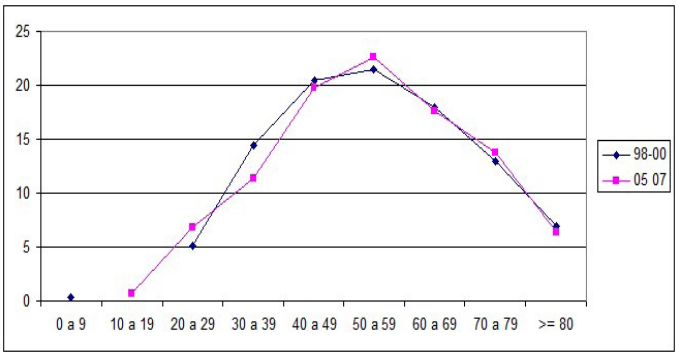

Figure 15: Comparison of mortality caused by respiratory tuberculosis in the state of RS during the periods 1998-2000 and 2005-2007.

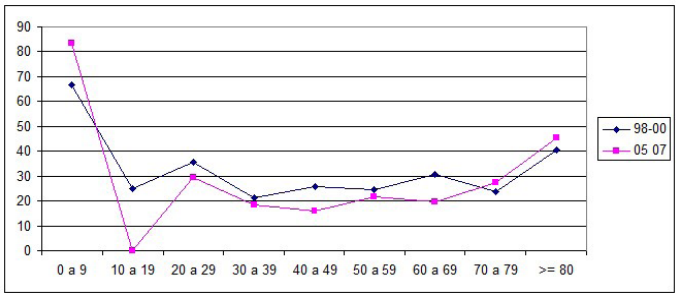

Figure 16: Comparison of female fraction of mortality caused by respiratory tuberculosis in the state of RS during the periods 1998-2000 and 2005-2007.

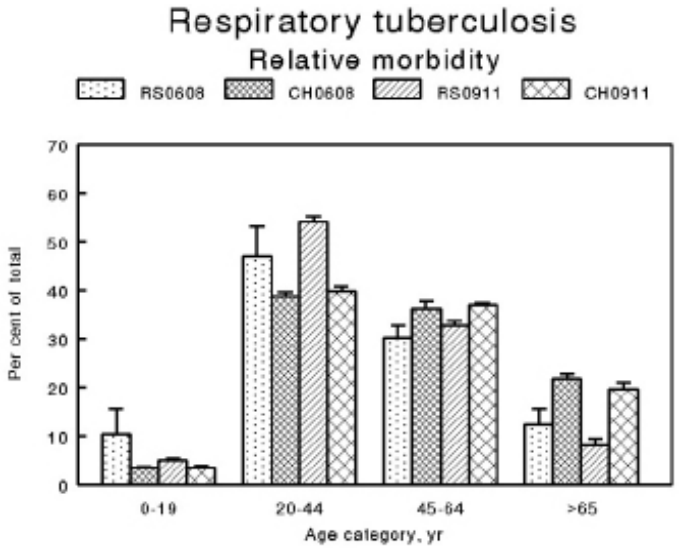

Figure 17: International comparison of morbidity caused by respiratory tuberculosis between Brazilian state of RS and Chile during the periods 2006-2008 and 2009-2011.

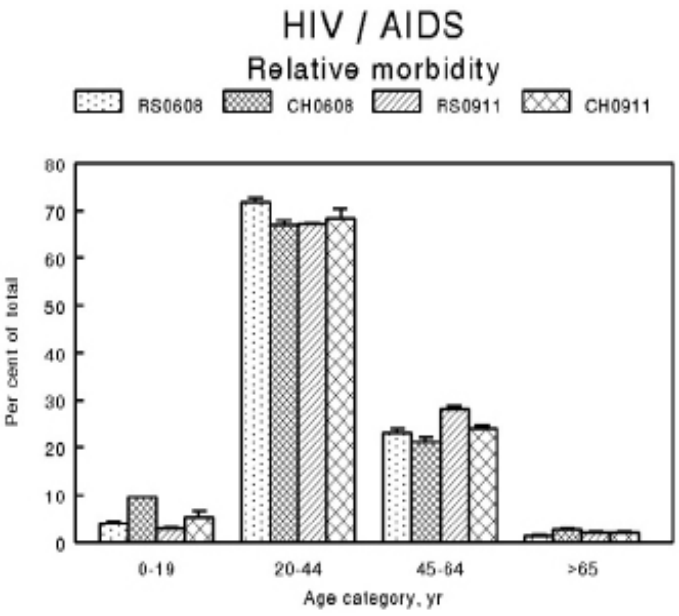

Figure 18: International comparison of morbidity caused by HIV/ADS between Brazilian state of RS and Chile during the periods 2006-2008 and 2009-2011.

References

1. Goudochnikov VI. [Morbidity and mortality in disorders related to metabolic syndrome: age-dependent patterns and sexual differences in Brazilian states of Southern region]. Rev Cient Jopef (Curitiba). 2005; 2: 979-999.

2. Goudochnikov VI. Comparison of age-related dynamics and gender differences in morbidity and mortality caused by several groups of diseases: No evidence for unique general scheme of aging potentially modifiable by perinatal programming. J Dev Orig Health Dis. 2009; 1: S123.

3. Goudochnikov VI. The contribution of stress and its mediators to the ontopathogeny of infections: A focus on the interactions of cytokines and glucocorticoids. Adv Gerontol. 2017; 7: 25-28.

4. Goudochnikov VI. Direct comparisons of relative morbidity caused by various disorders in the populations of Chile and one of Brazil's southern states. J Dev Orig Health Dis. 2017; 8: S448.

5. Almeida Filho N, Rouquayrol MZ. [Introduction to Epidemiology]. Rio de Janeiro: Medsi. 2002.

6. Goudochnikov VI, Prokhorov LY. [Accelerated aging with the onset of menopause: Possible connection to hormonal changes and stress proteins]. Probl Star Dolgolet (Kiev). 2012; 21: 274-279.

7. Goudochnikov VI. Gender differences of age-related morbidity and mortality: On the way to ontopathogenic model. J Dev Orig Health Dis. 2015; 6: S50.

8. Goudochnikov VI. [Role of stress proteins and hormones in bioregulation of ontogeny]. Probl Endokrinol (Moscow) 2015; 61: 49-53.