

Common Mental Disorders and Circulatory Diseases Associated Prevalence: Age Related Differences from a Health Survey Analysis

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ABSTRACT

Background: Epidemiological studies reveals that there is a progressive increasing in the incidence of Mental Disorders. Concomitantly, Circulatory Diseases (CD) are a major adult health problem worldwide being the leading causes of death. **Aims:** This study aims to evaluate aspects related to the prevalence and its association between Common Mental Disorders (CMD) and CD in different age groups. **Methods:** It has been evaluated data from the 2015 São Paulo City Health Survey, which have classified CMD patients employing the Self Report Questionnaire-20, and have collected information of referred CD. To analyze the association between CMD and CD, Pearson chi-square, Satterthwaite corrected tests, univariate and multivariate Poisson regression has used. **Results:** Among the elderly, there was a greater strength of association between CMD and all the CD studied: Hypertension, Angina, Acute Myocardial Infarction, Cardiac Arrhythmias and Stroke (all with $p < 0.01$). The CD more strongly associated with CMD was Cardiac Arrhythmias (adjusted PR=2.84; 95%IC=1.75-3.52). For Angina, the CMD was considered important risk factor because their precocious association (PR=5.42 for 15-29 years of age). **Conclusion:** CMD and CD share biopsychosocial factors and result in higher expenses for the Health System and for those patients. The action of multidisciplinary teams, especially in the sphere of Primary Care, is essential to reduce damage and better meet the specific needs of CMD and CD patients, with special attention to young people with CMD as a risk factor for CD and to elderly people already affected by such association.

Key words: Circulatory Diseases, Health System, Common Mental Disorders, Epidemiological Surveys, Mental Health.

BACKGROUND

According to epidemiological studies, there is a progressive increase in the incidence of Mental Disorders (MD) globally, especially in developing countries (1). Because of this process, it can be observed that, in 2000, the WHO attributed 12% of the years of lives lost due to disability because MD worldwide, forecasting the growth of this figure to 15% by 2020 (2). They defined such disorders as deleterious conditions that manifest on the affective-cognitive functions of

patients due to biopsychosocial, genetic, physical and chemical disorders, with impact on their global performance in the personal, social, occupational and family spheres (3). Their impact on such spheres of life of the affected, together with their prevalent character, makes them represent five of the ten pathologies most strongly associated with disabilities in the world, with emphasis on conditions such as depression (13%), alcoholism (7.1%), bipolar disorders (3.3%) and schizophrenia (4%) (4).

Among the MD the so-called Common Mental Disorders (CMD) stand out, whose clinic does not fully meet the formal prerequisites for the diagnosis of depression and anxiety recommended by the DSM-5 and ICD-11 classifications, although even so result in symptoms such as insomnia, fatigue, somatization, forgetfulness, irritability and difficulty concentrating, having not only biopsychosocial but also socioeconomic impacts (5–7). CMD present in 14.7 to 21.8% of the world population (6) may be closely associated with Circulatory Diseases (CD) in order to participate as an important risk factor for its pathogenesis, and as a result of its chronicity, both scenarios of worse prognosis compared to the presence of CMD or CD alone (7). The described association is stronger with aging (7), and is a great challenge for the Health Systems (HS), especially due to the need for understanding its genesis, for treatments and interventions that interdisciplinary teams can implement (7–9). CD is a major challenge facing the HS (10), as they affect more than a third of adult worldwide, generating high costs for their treatment in the Public Health sphere (11). The WHO considers CD as the leading cause of death around the world (12). It is necessary to consider for understanding of this process the presence of worse health conditions demonstrated by individuals from precarious socioeconomic realities, reinforcing the existence of a pattern of health risk. Thus, the services offered by the HS act by intervening in the health-disease process so that the inequalities produced by society on health can be minimized (13). The equity linked with access to such services can be considered, therefore, stakeholder, however insufficient, to minimize inequalities surrounding the getting sick (14). Facing all direct and indirect contact with health services, the study of the association between CMD and CD and its relationship with sociodemographic factors reveals itself as a tool to identify the most needed population groups, as well as to maximize possibilities of planning in such a sphere that equity can be achieved (13). These studies, when applied to realities affected by socioeconomic and geographical inequalities that tear apart most of the opportunities for maintenance and access to health for certain groups, have their reiterated importance (15).

In Brazil, the State is legally responsible for strategic planning in health. The Ministry of Health defined it through the implementation of the National Policy on Primary Care. Any inhabitant can access health care in an unrestricted way, wherever they reside. That should act, as a preferential access tool to HS, as well as the Family Health Strategy should present itself as a model of Primary Care and a key mechanism for its functioning (13). However, the services in Primary Care are insufficient and incapable of correctly managing such patients when placed in front of scenarios in which it is necessary MD diagnoses and treatments. These problems are present in great volume in this sphere of health, demonstrating the urgency of acquiring knowledge about the management of mental health at this level of care (16, 17). To this end, it is necessary crucial epidemiological studies mediated by population surveys, through which their data used for the formulation and evaluation of public health policies (14).

To favor the realization of studies associated with emotional health, the WHO recommends the implementation of the Self-Reporting Questionnaire (SQR - 20). This tool was designed in such a way as to, through multiple-choice and easy-to-apply questions, detect possible cases of CMD in the sphere of Primary Care, encouraging planning with regard to positive interventions on the mental health of vulnerable populations (17-19).

In the city of São Paulo, to analyze health conditions at certain periods, as well as to assess health care in relation to the reality observed, population-based studies carried out entitled Health Survey of the City of São Paulo (ISA/SP-Capital). This one, put into practice between 2003 and 2008, has an update linked to the period from September 2014 to December 2015 (ISA/SP-Capital/2015). As a series of cross-sectional studies, they seek to analyze living and health conditions through the acquisition of information via household interviews, also encompassing the use and availability of public and private health services in that area for the studied population.

AIMS

General - This article aims to describe epidemiological aspects based on data provided by ISA/SP-Capital/2015, and discuss pathophysiological and psychosocial aspects related to the association between CD and CMD in different age groups. The relevance of this resides on the need for studies aimed at mental health, in association with CD in Primary Care, as well as for evaluating public policies regarding the guarantee of quality of life for those who suffer the product of these associations.

Specifics –

- Description of the referred weighted prevalence (%) of Hypertension, Angina, Acute Myocardial Infarction, Cardiac Arrhythmias and Stroke according to presence of CMD among age-groups 15-29, 30-44, 45-59 and 60 and more years, and total;
- Description of the raw and adjusted PR, respective 95%IC and its significance (p) of cited CD according to presence of CMD;
- Analysis of patterns of referred weighted prevalence (%) and raw PR of cited CD for CMD individuals.

METHODS

The ISA/SP-Capital seeks to analyze living and health conditions through the acquisition of information via households, also encompassing the use and availability of public and private services in this area for the population studied. Its methodology is a population-based and cross-sectional study to assess public health information. Interviewers collected data during household identification in the city of São Paulo in 2014 and 2015. The population studied consisted of residents in urban areas of collective and private households in the city of São Paulo.

The methodology used during the survey based on its probabilistic aspects. Clusters stratify the sample in two stages of selection. In the first, the census tracts randomly selected and, in the second, the households of each previously selected census tract randomly selected. The sample was also stratified in geographic domains, being North, Midwest, Southeast, South and East Health Regions, while the demographic ones comprised Adolescents (12 to 19 years old);

Adults (20 to 59 years old) and Elderly (60 years old and over) in the male and female population (20).

The interviewers had completed high school at least, and were not part of the health professionals group. Interviewees were known the information reported by the under the aegis of confidentiality and the signature of the informed consent was measured. Interviewees answered the Questionnaires, directly by aged 12 and over, and by legal guardians when younger than this. The Data collected were through Software on Tablets with automatic sending mediated by the Internet connection to servers that already incorporated the information provided to the EXCEL database.

It was organized the survey in thematic blocks and most questions were multiple choice. The thematic blocks that were applied in 2015 were about the social and demographic characteristics of families, their heads, and individuals; referred morbidity; use of health services; lifestyle habits; and CMD. The information used in this research includes referred morbidity of CD and CMD, and Age.

In order to achieve the objectives proposed in this study it is analyzed the age aspects of the differences between young people, adults and the elderly. The population studied is composed of individuals who reported CD classified as having CMD or not, aged 15 years and over in four different age groups: from 15 to 29 years old, from 30 to 44 years old, from 45 to 59 years and 60 years and more. The classification of CMD is according to the SRQ-20 and referred to Block M (Emotional Health) of the ISA/SP-Capital 2015: males with a score of ≥ 8 and females with a score of ≥ 6 if individuals under 65 years of age; and individuals over 65 years of age, male and female, with a score of ≥ 5 . The SRQ-20 has been performing satisfactorily, with a sensitivity of 83% and a specificity of 80% (5).

For the statistical analysis, it is described the relative frequencies (%) of the variables and categories studied, as well as the association between CMD and CD by age groups. For this, have been used Pearson chi-square and Satterthwaite corrected tests, uni and multivariate Poisson Regression, Prevalence Ratios (PR) and respective 95% Confidence Intervals (95%CI), for weighted, raw, and adjusted data. It has considered significant a $p < 0.05$. They were applied graph resources to show patterns of weighted prevalence (%) and raw PR of cited CD for CMD individuals.

The Ethics Committee approved this research. Participants have given consent for their data used in this research.

RESULTS

The analyzed sample consisted of 3618 individuals, 2054 females and 1564 males, belonging 1077 to age group of 15 to 29 years old, 863 of 30 to 44 years old, 701 of 45 to 59 years old and 977 of 60 years old and more. It has been classified participants according to information about the presence of the CD. Hypertension N=899, 9 missing. Angina N=53, 8 missing. Acute Myocardial Infarction N=77, 3 missing. Cardiac Arrhythmias N=165, 11 missing. Accident Cerebral Vascular N=59, 1 missing. CMD with 780 carriers and 2838 non-carriers, 18 missing. It has been adjusted these values as a function of the weighted proportion between individuals, sectors and districts required by the cluster analysis used.

As the main results found, it was observed that, for most of the analyses, the analyzed PR are significant (Tables 1 and 2), indicating a higher risk of CD for CMD patients (Table 1). For the age group between 45 and 59 years, there is no significant association between CMD and CD, except for Cardiac Arrhythmias. The PR values for CMD are not significant for the age group between 15 and 29 years for Arterial Hypertension and Cardiac Arrhythmias. For the age group between 30 and 44 years, there is no association between CMD and Acute Myocardial Infarction or Stroke. In relation to the age group of 60 years and over, the significance of PR remains, although considerably more robust for all CD (Table 1). If the PR adjusted for age categories are considered, an increase in the prevalence of CD is observed in the presence of CMD, with a narrower 95%CI and PR values greater than 1 (Table 2). It also observed that the CD most strongly associated with CMD patients with the adjustment for age category is cardiac arrhythmias.

The graphs generated (Figure 1 and 2) from the tabulated information allows to assess the prevalence of CD among CMD patients in the studied age groups and to observe the behavior of PR in these groups. When comparing them to the information in Tables 1 and 2, it is observed that, although it is not the most prevalent CD in this age group, Angina is 5.42 times more prevalent among young people with CMD compared to those without these disorders (on not-adjusted data). Yet, Hypertension is more prevalent in all ages, even with CMD or not; and Acute Myocardial Infarction presents a higher PR among 30-44 years-old individuals.

It is worth remember that, among patients with CMD, values taken as Not- Calculable (NC) for certain PR and 95%CI resulted from a n=0 for patients with Angina aged 30 to 44 years and for patients with Acute Myocardial Infarction aged 15 to 29. The same is true for patients aged 15 to 29 years with Stroke among those without CMD. In case of Angina, this lack of value filled by imputed value to construct Figure 2, as a mean of immediate previous and posterior known prevalence values.

DISCUSSION

On the literature, the prevalence of the CD studied is higher among CMD patients in different age groups (10-12, 21-26), a fact that is corroborated through the results of the present study. The reasons why CD and CMD are associated can be considered multifactorial and bidirectional (25, 26), demonstrated in their genesis with epidemiological, pathophysiological and psychosocial components. They are important in order to evidence such association and the characteristic signs and symptoms of patients with CMD in individuals with CD. Stress, irritability and feelings analogous to anxiety and depression, and the impact of these manifestations in these patients are comparable to the impact caused by exposure to determinants such as obesity and sedentary lifestyle for the development of CD (10).

Given the association between CD and CMD, it is necessary, especially in the context of Primary Care, interdisciplinary intervention measures to integrate psychological processes to the range of factors related to the development, injury and treatment of CD, which are scarce in Public Health services, mainly in Brazil (11). Negligence regarding this demand is one of the key factors to explain the frequent abandonment and non-adherence to treatment by CMD patients, which impact fully compromises their quality of life (11). Studies suggest that informed patients regarding the association between CMD and CD allow they have greater chances of controlling these conditions, and greater adherence to treatment and better quality of life (12). Thus, one

can speculate about the effectiveness of psychoeducation regarding the association between CMD and CD for patients with any of the conditions listed in this study. The adoption of holistic, interdisciplinary and comprehensive approaches and treatments that promote a significant improvement in the quality of life of patients in the spheres of physical and mental health can result in an effective and efficient resolution of the diseases that affect them (24, 26, 27). In addition, there is a need for reducing expenditures related to the field of Public and Private Health, often linked to ineffective treatments, sometimes iatrogenic and favorable to evasion and reduction in the quality of life of the patients in question (25-27).

There is a link between the association of CD and CMD, from a pathophysiological point of view, among other factors, to chronic stress and insomnia. These common symptoms among patients with CMD and associated with biological responses of hypercortisolism and activation of the sympathetic nervous system, with intense noradrenergic discharge, result in a highly vulnerable immune and cardiovascular status (21). It can related the disabling character of CMD symptoms to states analogous to anhedonia. This subjects the patient to sedentary lifestyles, without great care with their health, especially with regard to food (21, 24). It favors in the long term states of cardiovascular vulnerability that are not able to keep up with the circulatory demand associated with stress, which may explain the higher prevalence of CD, especially Angina and Acute Myocardial Infarction, in these patients (21). Negative emotions and those analogous to depression and anxiety have the potential for destabilization of the His-Purkinje system, mainly through factors associated with the sympathetic hyperactivation previously described, triggering arrhythmias of the most diverse types (21, 24).

Beside to the general pathophysiological mechanisms that regulate the association between CMD and CD, some neurophysiological aspects support the association between CMD and cerebrovascular accident, specifically. These are the hypotheses of biogenic amines and cytokines (25). The hypothesis of biogenic amines refers that ischemic events compromise the axonal transport of monoamines from the brainstem to the cerebral cortex, reducing the concentration of this substance in the basal nuclei and limbic system for regulation of the humor (25). On the other hand, the hypothesis of cytokines, interleukins and other pro-inflammatory substances released in the face of tissue necrosis resulting from the ischemic episode, highlights they demonstrate a depressive character by mediating limbic neuronal loss, greater metabolism of monoamines and deregulation of the hypothalamic-pituitary-adrenal axis (25).

It cannot separate psychosocial aspects from the epidemiological and pathophysiological aspects in order to analyze the existing association between CMD and CD. Thus, the risk of developing fatal cardiovascular events places the patient in front of the possibility of death, which makes him reflect on various aspects of his life and submits him to feelings of stress, anhedonia and intense sadness (23). Such a state can act as a determining factor for a worse prognosis and for a reduction in the quality of life of patients with CD and CMD (23). The emotions of fear and hopelessness in the face of the possibility of dependence on caregivers and health services, associated to feeling of approaching death also favors carelessness with food and physical exercise (21,24), favoring the state of cardiovascular vulnerability in the long term and its implications (21,24). Finally, chronic pain with a direct impact on the quality of life of patients, work and academic limitations with reduced productivity, health expenses and the

impossibility of profits collaborate strongly with the bidirectional and multifactorial mechanisms that solidify the association between CD and CMD (25-27).

Aside from psychosocial aspects that govern the association between CD and CMD, some elements stand out for the relationship between these disorders and Stroke. They are those related to the family and economic spheres (25, 26). Patients affected by the CMD-CD association report greater dependence on third parties and health services in their daily activities, given the physical limitations that prevent them from performing important, basic and pleasure-related tasks, resulting in negative impacts on mental health of these individuals (26,27). Lower adherence to treatment and search for a definitive diagnosis is more frequent in patients with CMD, who also report greater disregard for their own health and surrender to risk factors closely linked to stroke, such as sedentary lifestyle, obesity, smoking, alcoholism and lack of control of other CD such as Hypertension (25). Finally, the work and intellectual limitations in patients with cerebrovascular accident and CMD are, from a cognitive point of view, more robust, since the changes in the hypothalamic-pituitary-adrenal axis, result in hypocortisolism associated with reduced attention, anhedonia and memory dysfunction, given the reduction of hippocampal stimuli linked to cortisol. The difficulties while performing intellectual and work tasks reflects this mechanism, with lower productivity, greater frustration and great impacts on the mental health of patients (26).

Considering, therefore, the epidemiological, pathophysiological, psychosocial aspects explored above, it noted that a feedback process in which physical illness results in degradation of mental health is influenced by large the association between CMD and CD, which is responsible for the worsening of physical illness and consequent further degradation of mental health (26). Due to its bidirectional aspect, it is needed several studies to recognize the initiating factor of this vicious cycle (26).

Then analyzing the age groups studied, it was expected that the prevalence of all CD, already increased in CMD patients compared to the population without these disorders, would increase with age, reaching its peak in the group aged 60 and over (11, 22, 26), a fact corroborated by the results of the present study. The higher prevalence of CD in this age group gives the greatest strength of association between CMD and CD in the elderly (10,26). As well as the greater chances of developing CMD among individuals in this group, given the characteristics of the aging process related to losses in the occupational, social, economic and physical-mental spheres in their lives, revealing biopsychosocial impairment in this population and making them more vulnerable (11,22). It is leveraged such situations of vulnerability by the loss of autonomy and dependence on third parties and health services, as well as the stress of not understanding and adapting to the demands of the changing society in which the elderly are inserted (22).

The literature not predicted the results of this study related to Angina in young people with CMD. Through them, it appears that CMD already in adolescence and early adulthood act as considerably important risk factors for the early development of Angina. The natural history of this disease predicts its appearance more frequently in the general population from 50 years of age onwards (28), with major deleterious implications for the quality of life of patients (29). The early identification of CMD among young people is essential to prevent the early onset of Angina and its adverse events associated or not with CMD, concerning the epidemiological,

pathophysiological and psychosocial mechanisms that involve the association between CMD and CD and, more specifically, between CMD and Angina. Knowledge of the aforementioned association is therefore a key to managing these patients and positively intervening in their quality of life. This can reduce future social and health expenses when they become ill and dependent on others for their daily activities. Unless they stop exercising them due to disability, given the presence of CD as a risk factor for the development of other more disabling CD or for death from cardiovascular events (29).

Among the limitations of this study, its cross-sectional character and the presence of sometimes-reduced population number stand out. Such obstacles limit the possibility of evaluating the evolution of CD in patients with CMD over time, as well as attributing to the data obtained less chances of reflecting on reality. Summed up to these limitations, important variables were not taken into account for the analysis of the prevalence of CD, CMD and their association, such as the presence of other chronic comorbidities that those listed, gender, ethnicity and other sociodemographic conditions of the individuals, such as income, education, place of birth, marital status, among others. Finally, important limitations for this study are the presence of residual biases intrinsic to population surveys and the use of referred morbidities to classify individuals as having or not certain CD. The use of referred morbidities prevents absolute affirmation of the veracity of the diagnosis, because it depends on factors such as interest and knowledge on the part of individuals to communicate or not their pathological condition. Moreover, their individual ability to remember diagnosis, use of medications and control of diseases in question, and presence of diseases not yet diagnosed to demonstrate veracity (30). By comparing self-reported information and clinical and laboratory diagnoses obtained after other population surveys that also employ referred morbidities, an important overestimation of the data collected during the surveys were found. Although the literature reports underestimation and overestimation between diagnoses and referred morbidities in different degrees depending on the nature of the disease, the characteristics of the population, the presence of symptoms or health status (30).

The presence of subjective criteria clinical and laboratory diagnoses, with inadequate access to health care among some populations for the diagnosis and treatment of their health conditions, make the differences between referred morbidities and definitive diagnoses more discrepant (30).

Thus, further studies are needed, preferably larger and longitudinal, to analyze and explain the existing association between CMD and the CD studied so that more convincing results can be obtained and applicable to Public Health (10,23-27). In these, it is interesting to include a larger spectrum of CD in the analysis, and the sociodemographic criteria previously mentioned and not used in this study.

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Table 1 - Prevalence of referred Circulatory Diseases (CD) according to the presence of Common Mental Disorders (CMD) in different age groups. ISA/SP-CAPITAL/2015

Circulatory Diseases	Age groups	CMD - weighted frequencies (%)			
		Sim (%)	Não (%)	p	PR (95%CI) (IC95%)
Hypertension	All ages	29.33	18.88	< 0.01	1.55 (1.34 - 1.8)
	15 - 29	5.95	2.75	0.08	2.16 (0.90 - 5.19)
	30 - 44	16.45	8.44	< 0.01	1.95 (1.30 - 2.92)
	45 - 59	39.92	33	0.15	1.21 (0.94 - 1.55)
	60 ou +	66.29	50.87	< 0.01	1.30 (1.15 - 1.48)
Angina	All ages	2.3	0.82	< 0.01	2.81 (1.56 - 5.07)
	15 - 29	1.04	0.19	< 0.01	5.42(1.80 - 16.36)
	30 - 44	0	0.39	0.50	N.C.
	45 - 59	3.17	0.92	0.05	3.46(0.93 - 12.88)
	60 ou +	6.17	2.79	0.01	2.21 (1.17 - 4.18)
Myocardial Infaction	All ages	3.1	1.21	< 0.01	2.56 (1.62 - 4.04)
	15 - 29	0	0.13	0.63	N.C.
	30 - 44	1.1	0.14	0.05	8.06(0.68 - 95.17)
	45 - 59	3.49	1.6	0.15	2.18 (0.74 - 6.41)
	60 ou +	9.52	4.98	0.02	1.91 (1.13 - 3.23)
Cardiac Arrhythmias	All ages	8.58	3.23	< 0.01	2.66 (1.86 - 3.81)
	15 - 29	2.21	1.8	0.71	1.23 (0.41 - 3.73)
	30 - 44	8.34	2.58	0.01	3.23 (1.33 - 7.84)
	45 - 59	10.95	3.32	< 0.01	3.30 (1.58 - 6.90)
	60 ou +	15.01	7.22	< 0.01	2.08 (1.33 - 3.26)
Stroke	All ages	2.73	0.84	< 0.01	3.26 (2.02 - 5.26)
	15 - 29	0.83	0	0.01	N.C.
	30 - 44	1.45	0.44	0.04	3.25(0.99 - 10.94)
	45 - 59	0.97	0.85	0.88	1.14 (0.22 - 5.96)
	60 ou +	8.85	3.27	< 0.01	2.71 (1.46 - 5.03)

N.C = Not-calculable

Table 2 – Age-adjusted Prevalence Ratios and 95% Confidence Intervals of Circulatory Diseases in Common Mental Disorders individuals. ISA/SP-CAPITAL/2015

Circulatory Diseases	Age-adjusted PR and 95%CI
Hypertension	1.38 1.21 - 1.57
Angina	2.42 1.35 - 4.34
Myocardial Infarction	2.11 1.35 - 3.29
Cardiac Arrhythmias	2.84 1.75 - 3.52
Stroke	2.72 1.68 - 4.42



