ORIGINAL ARTICLE

https://doi.org/10.61910/ricm.v8i2.239

Determinants of the presence of chronic non-communicable diseases and their correlation with health, daily activity, and social participation

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ABSTRACT

Introduction: The investigation of determinants related to the presence of Chronic Non-Communicable Diseases (CNCD) contributes to the population's rehabilitation and prevention process. **Objectives:** To investigate the determinants of the presence of CNCD and individuals' perception of their health and level of activity and participation. **Method:** In this cross-sectional observational study, questions were asked about sociodemographic characteristics, lifestyle habits, CNCD, and their characteristics, as well as their perceptions. Multiple linear regression and Pearson's correlation coefficient were the statistical analyses used. **Results:** The prevalence of CNCD was 68% (n=411). The regression analysis showed that age alone was able to explain 24% (R^2=0.24, p<0.001) of the presence of CNCD. When sex, physical activity, and smoking were added to the model, the percentage of explanation increased to 30% (R^2=0.30, p<0.001). Significant correlations were found with the ability to carry out daily activities, social participation, life satisfaction, and perceived health (-0.16≤ρ≤-0.35; p<0.01). **Conclusion:** As observed, according to the determinant factors found for the presence of NCDs (age, sex, physical activity, and smoking), older women, sedentary lifestyles, and smoking are the characteristics that most explain the presence of CNCD in the population. In addition, individuals with CNCD are less able to carry out daily activities and have poorer social participation, life satisfaction, and perception of their health.

Keywords: Chronic Disease; Noncommunicable Diseases. Prevalence. Risk factors. Perception.

INTRODUCTION

The constant changes in Brazil, being political, economic, or demographic, have led to significant changes in the epidemiological profile of the population[1]. In the past, most people died from infectious and parasitic diseases, while nowadays, the main causes of death are related to diseases of the circulatory system, diabetes mellitus, and various types of cancer[2].

Chronic Non-Communicable Diseases (NCDs) are pathologies that affect many systems permanently[3]. They are long-term illnesses with low cure rates, which demand adaptations to the changes and thus make it necessary for the individual to learn to live with the limitations[4]. These conditions manifest chronically, affect the

functionality of the organs and tissues of the human body, and can cause changes in homeostasis due to circulatory imbalance[3].

According to the World Health Organization - WHO (2018), the NCDs with the highest incidence are: cancer, diabetes mellitus, systemic arterial hypertension (SAH), cardiovascular diseases, and chronic respiratory diseases[5]. In 2016, of the 57 million deaths worldwide, 41 million, or approximately 71%, were due to NCDs, while in low- and middle-income countries, the percentage of deaths due to NCDs was 78%[5]. In Brazil, NCDs are the biggest health problem and account for around 75% of the causes of death[6]. NCDs are very costly due to hospitalizations, medication, and consultations, as well as the reduction or loss of working capacity, which can result in early definitive absence from work[7].

In addition to the epidemiological data on NCDs, it is also important to understand the main factors related to these conditions[8,9]. The factors can be non-modifiable (gender and age, for example) or modifiable, also known as behavioral, related to the individual's lifestyle[10]. Understanding the determining factors for the onset of these diseases is important, as it will contribute to the rehabilitation process and, above all, to prevention strategies.

Finally, NCDs may worsen individuals' perception of their existence, causing a reduction in their quality of life[11]. Individuals may have a lower perception of their health and a lower level of activity and participation than the general population, which may even be directly related to the number of NCDs they have[12]. Thus, this study aimed to investigate the determining factors of the presence of NCDs in the population, as well as to analyze the relationship between the presence of NCDs and individuals' perception of health and level of activity and participation.

METHOD

Study design

This is an observational, cross-sectional study, with questionnaires administered to individuals from the general community in the city of Belo Horizonte and the metropolitan region, as well as a city in the countryside. The study was approved by the Ethics and Research Committee of the FUNCESI University Center (CAAE 70319323.2.0000.5110), and all participants were asked to sign an informed consent form (ICF).

Sample

The questionnaire was answered between March and July 2020 by members of the general community from various cities in the state of Minas Gerais. All individuals of both sexes, aged over 18 and able to answer simple questions, were included. Residents of long-stay institutions (nursing homes) and/or hospitalized individuals were excluded, as they generally have a higher number of NCDs, and the results found in these individuals may not be generalized to the entire population.

Considering the inclusion of eight determining variables (gender, age, schooling, physical activity, smoking history, alcohol consumption, regular fruit consumption, and regular vegetable consumption) and using the formula n=50k, where k is the number of possible predictor variables to be included, the minimum sample size required was 400 individuals[13].

Procedures

The interviews were conducted online, using a virtual form via Google Forms, which was made available on social networks. Individuals were recruited in person or by publicizing the survey online, where the interview link was made available. Individuals recruited in person received the interview link via email or WhatsApp, sent by the authors JCV and RGS.

Measures

The questionnaire consisted of personal data, such as age, sex, weight, height, number of medications in use, and schooling. Various types of NCDs were presented (heart disease - such as heart failure, heart attack, valvular heart disease, arrhythmia - hypertension, peripheral vascular disease, respiratory diseases - such as bronchitis, emphysema, asthma -, high cholesterol, diabetes, psychiatric/psychological diseases - such as depression, anxiety - musculoskeletal diseases - such as herniated discs, osteoporosis, arthrosis/arthritis -, renal diseases - such as kidney failure, kidney stones or cysts -, neurological diseases - such as strokes, Parkinson's, Alzheimer's, sclerosis - genetic diseases - such as Down's syndrome, sickle cell anemia, muscular dystrophies - immunological diseases - such as lupus, vitiligo, celiac disease - oral or visual diseases, cancer, and obesity), with the interviewer having to select the option by checking if they have one or more of the pathologies mentioned. In the case of other pathologies not mentioned, the interviewee could designate them, pointing out another that was not included in the options listed. Other questions were asked to identify determining factors, such as physical activity (150 minutes/week), smoking history (active smokers or not), alcohol consumption (> two doses/week), as well as eating habits such as regular consumption of fruit and vegetables (at least 5 times/week). Finally, five questions were asked about the individual's perception, measured using a Likert scale, with scores ranging from zero (worst) to 10 (best). The questions were based on the ability to carry out daily activities (0=Totally unable, 10=Totally able), ability to participate in society (0=Totally unable, 10=Totally able), perception of their health (0=Very bad, 10=Very good), satisfaction with life (0=Very dissatisfied; 10=Very satisfied) and attitude towards their health care (0=Very bad, 10=Very good).

Statistical analysis

Normality tests (Kolmogorov-Smirnov) and descriptive statistics were carried out for all the variables. Regarding the analysis of the determinants of the presence of NCDs, Spearman's correlation coefficient was first used to assess the correlations between the eight determinant variables and the number of NCDs since these variables behaved asymmetrically, requiring non-parametric statistics. The strength of the correlations was interpreted as follows: high (≥ 0.70), moderate (0.70 < r < 0.30), and low (≤ 0.30)[14]. Stepwise multiple linear regression was used to assess which of the factors could explain the presence of NCDs. The dependent variable considered was the presence of NCDs, while the independent variables were physical activity (at least twice a week), smoking history (active smokers or not), alcohol consumption (> two doses/week), as well as eating habits for regular consumption of fruit and vegetables (at least 5 times a week). Pearson's correlation coefficient was used to assess the correlation between the number of NCDs and individuals' perception of health, activity, and participation, using the same classification as mentioned above. All the analyses were carried out using SPSS 23.0 statistical software, with a significance level of 5%

RESULTS

In total, 411 individuals were interviewed (Figure 1), with an average age of 44 (±16) years, the majority were female (n=219, 53%) and had completed high school (n= 194, 47%). All the participants' characteristics can be found in Table 1.

Figure 1- Participant inclusion flowchart.

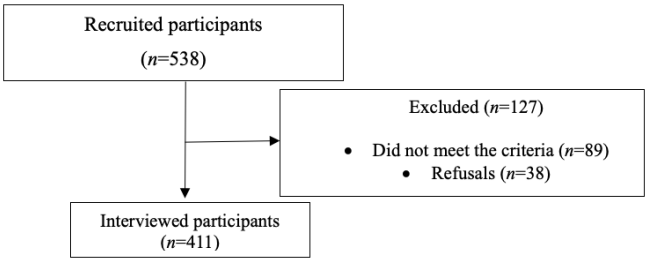


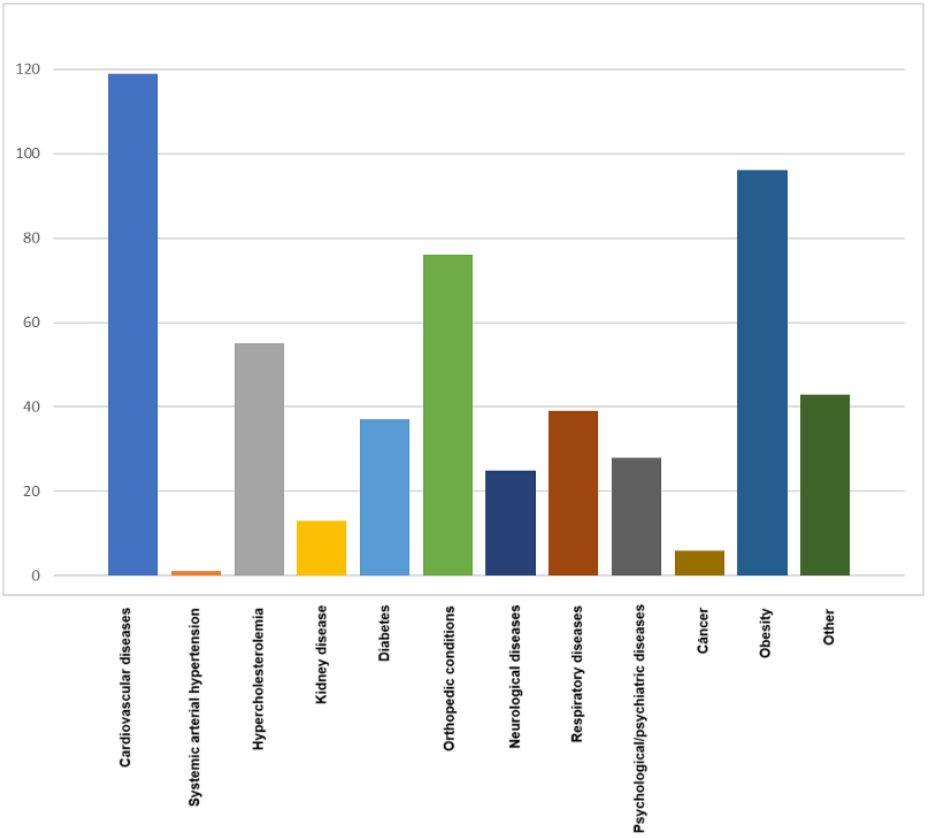
Table 1 – Sample characteristics.

		n= 411
Age (years), mean (SD)		44 (16)
Sex, woman, n (%)		219 (53)
BMI (kg/m²), mean (SD)		26 (4)
Schooling, n (%)		
	Illiterate	2 (1)
	Elementary school incomplete	73 (17)
	Elementary school complete	4 (1)
	High School Incomplete	21 (5)
	High School Complete	194 (47)
	Graduation Incomplete	41 (11)
	Graduation Complete	73 (17)
	Postgraduate or other	3 (1)
Number of diseases, mean (SD)		1 (1)
Number of medicines, mean (SD)		1 (2)

*SD = Standard Deviation; BMI = Body Mass Index

Eighteen types of NCDs were found, with hypertension (18%), obesity (16%), hypercholesterolemia (9%), oral diseases (7%) and lung diseases (7%) being the most prevalent. The full list of all the diseases and their respective percentages can be found in Figure 1. Of the 411 interviewees, 279 (68%) had some type of NCD, with an average number of 1.4 (1.4 SD) diseases per individual.

Figure 2- Prevalence of types of chronic non-communicable diseases (%).



Determinants of the presence of NCDs

The correlation analysis revealed a significant correlation of low to moderate magnitude between all the determining variables and the number of NCDs ($0.20 \leq r \leq 0.41$; $p<0.05$). When all variables were included in the regression analysis, age alone was able to explain 24% ($R^2=0.24$, $p<0.001$) of the presence of NCDs. When sex was added to the model, the percentage of explanation increased to 27% ($R^2=0.27$, $p<0.001$). When physical activity was added to the model, the percentage of explanation increased to 29% ($R^2=0.29$, $p<0.001$). Finally, when smoking was added to the model, the percentage of explanation increased to 30% ($R^2=0.30$, $p<0.001$). Although the other variables showed a significant correlation, they were not retained in the regression analysis ($0.12>p>0.65$) and were not explanatory in the model.

Table 2 - Regression analysis for the determinants of the presence of chronic non-communicable diseases.

Model	B (DP)	B	Adjusted R^2	SEE
Model 1				
Constant	-0,57 (0,18)	-	-	-
Age	0,04 (0,01)	0,49	0,24	1,26
Model 2				
Constant	-0,84 (0,19)	-	-	-
Age		1 (0,4%)		
Sex	0,04 (0,01)	27 (11,3%)		
Model 3				
Constant	-0,99 (0,20)	-	-	-
Age	-	7,1 (5,2 - 9,8)		
Sex		8,1 (4,1)		
Physical activity	0,05 (0,01)			
Model 4				
Constant	-1,00 (0,20)	-	-	-
Age	239	32 (13,4%)		
Sex	-	63 (26,4%)		
Physical activity	239	44 (18,4%)		
Smoking	-	3 (1,3%)		

SD = Standard deviation; SSE = Standard error of estimate.

Correlation between the number of NCDs and perception of health, activity, and participation

Significant correlations of low magnitude were found between the number of NCDs and the ability to participate in society (r=-0.21; p<0.001) and satisfaction with life (r=-0.16; p<0.01). Significant correlations of moderate magnitude were found between the number of NCDs and the ability to carry out daily activities (r=-0.35; p<0.001) and perception of one's own health (r=-0.34; p<0.001). No correlations were found between the number of NCDs and the attitude toward self-care (p=0.24).

DISCUSSION

This study aimed to investigate the determinants of the presence of NCDs in the population, as well as to analyze the relationship between the presence of these diseases and individuals' perception of their health, level of activity, and participation. The results show that the majority of those interviewed had NCDs, with a prevalence of 68%. Sex, age, physical activity, and smoking were the determining variables for the presence of NCDs, explaining 30% of the model. In addition, individuals with NCDs are less able to carry out daily activities and have worse social participation, life satisfaction, and perception of their health.

The prevalence of NCDs found in this study was 68%, indicating that the majority of those interviewed have these diseases. The figures were higher than those of a previous study carried out with the Brazilian adult population by the National Health Survey in 2013, with a sample of 60,202 adults, which showed that 45% of the population has at least one NCD[6], and the diseases reported were similar to those in this study. These data

show that there has been an increase in the prevalence of these diseases over the last 10 years. In addition, the data in this study was collected in person, which may also have influenced the results due to the greater possibility of some people being inhibited in answering about their real health condition.

Age was the determining variable that best explained the presence of NCDs. This result can be justified by the fact that with advancing age and the aging process, physical disabilities such as loss of strength and balance also increase, as well as physiological changes in the systems of the human body, which increase the likelihood of certain diseases[15]. Sex was the second determining variable for the onset of NCDs, indicating that women have a higher prevalence of NCDs compared to men. This difference may be associated with the fact that women have more regular check-ups and routine consultations, have more access to clinics and hospitals, and are more aware of their health, leading to a higher rate of diagnosis in this sex[16]. Previous studies have shown that the highest prevalence of NCDs is observed with increasing age and in women, who use health services more (both for consultations and hospitalizations) and report more physical limitations because of NCDs[17,18].

The practice of physical activity was a determinant that also added explanatory power to the model of the presence of NCDs. Previous epidemiological studies have shown that physical inactivity substantially increases the relative incidence of coronary artery disease (45%), acute myocardial infarction (60%), hypertension (30%), colon cancer (41%), breast cancer (31%), type II diabetes (50%) and osteoporosis (59%)19. In addition, a sedentary lifestyle is associated with excess weight, as well as affecting emotions and reducing quality of life[20]. It's important to note that to be considered active, according to the World Health Organization, individuals must do at least 150 minutes of moderate physical activity a week, which was the criterion for this sample. Finally, this study showed that individuals who smoke were more likely to have a higher number of NCDs. Previous studies have also pointed to smoking as a risk factor associated with the presence of NCDs since smoking is responsible for the burden of coronary heart disease, stroke, cancer, and lung disease, all of which are NCDs[21,22].

Finally, it is expected that individuals who have a higher number of NCDs will also have a lower capacity to carry out daily activities, as well as poorer social participation, satisfaction with their own lives, and perception of their health. Chronic diseases are related to changes in the individual's functional capacity, which can affect all aspects of life, such as loss of quality and a high degree of limitation in social, economic, and leisure activities and personal goals[3,23]. Previous studies investigating the impact of these diseases on the lives of the elderly have reported that NCDs are associated with loss of functionality and are the main cause of dysfunctionality in most South American countries, including Brazil[24,25]. Dysfunctionality refers to disabilities, limitation of activities, or restriction in community and social participation[24,25]. It is therefore important to pay attention to these aspects during the rehabilitation of this population so that the quality of life of these individuals is not, or at least minimally, impacted by the presence of NCDs.

The positive aspect of this study was the possibility of verifying, through a large sample, the factors that most explain the emergence of NCDs, as well as relating this number of diseases to individual perspectives on health, activity, and participation. However, as a limitation, we can mention the use of a convenience sample and online questionnaires. Although this sample was large and drawn from several different locations, it was not randomly selected, and the digital

medium may exclude individuals without access to this technology, so it may not be fully representative of the general population. Future studies should investigate the association of NCDs with other factors, as well as analyze, through longitudinal studies, the ability of these factors to predict the onset and evolution of these diseases.

CONCLUSION

Overall, the data showed that most of the individuals interviewed (68%) had NCDs. Age, gender, physical activity, and smoking were the determining variables that explained the onset of these diseases, indicating that females, older age, a sedentary lifestyle, and smoking are the characteristics that most explain the presence of NCDs in the population. In addition, individuals with NCDs are less able to carry out daily activities and have poorer social participation, life satisfaction, and perception of their health.

Conflicts of interest: None

Acknowledgments: None

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THE AUTHORS DECLARE THAT THERE IS NO CONFLICT OF INTERESTS IN RELATION TO THIS ARTICLE.