

Behavioral Risk Factors for Chronic Non-Communicable Diseases in Adults and Elderly People in the City of Ribeirão Preto—SP

Jennifer Vieira Paschoalin Marques, Carla Regina de Souza Teixeira, Maria Lucia Zanetti, Vívian Saraiva Veras, Paula Parisi Hodniki, Luis Fernando Costa Pereira

Fundamental Nursing Department, Escola de Enfermagem de Ribeirão Preto, Universidade de São Paulo, Ribeirão Preto, Brazil
Email: jennifervpm@usp.br, carlarst@eerp.usp.br, zanetti@eerp.usp.br, vivian@unilab.edu.br, paulaph@hotmail.com, luisfernandocosta@usp.br

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Abstract

Aims: to analyze the presence and simultaneity of behavioral risk factors for chronic non-communicable disease (NCD) in adults and the elderly. **Methods:** quantitative, cross-sectional and observational study. Healthy and unhealthy eating are classified according to the frequency of food consumption. Smoking is expressed by the percentage of smokers. Harmful alcohol consumption by the percentage of individuals who consumed alcoholic beverages at least once in the last 30 days. Classification of the level of physical inactivity required to practice at least 150 minutes of physical activity. **Results:** the sample constituted 719 people, 535 adults and 184 elderly. The behavioral risk factor reported by most adults 499 (93.3%) and elderly 156 (84.8%) was unhealthy eating. Frequency 72% higher of smoking, four times higher of harmful alcohol consumption and 10% higher of unhealthy food among adults when compared to the elderly. The simultaneity between risk factors was 39% greater in adults than in the elderly. **Discussion:** risk factors evaluated in this study are key aspects of the development of NCDs. Adults have 2.43 times the chance of presenting two risk factors and 7.73 times the chance of presenting three in relation to the elderly. **Conclusion:** To achieve more effective and differentiated results, knowing and directing measures to control behavioral risk factors, whether isolated or concurrent, requires specific knowledge.

Keywords

Risk Factors, Chronic Disease, Adult, Elderly People, Health Unic System

1. Introduction

Chronic Non-Communicable Diseases (NCDs) respond to approximately 71%

of deaths worldwide. Estimates showed that in 2016 there were almost 41 million deaths related to NCD [1]. Risk factors have negative effects at all ages, especially in years of life lost or incapacities acquired prematurely or throughout life in older individuals. In all age groups, these conditions demand a lot of health services, in addition to family and social support. Promotion and prevention measures are more effective, depending on a differential approach in relation to age groups and other sociodemographic characteristics [2].

There are risk factors related to NCDs classified as non-modifiable, such as gender, age and genetics, and modifiable ones, which are called health risk behaviors, especially those related to the individual's lifestyle [3], being the most studied and complex the smoking, unhealthy eating, harmful alcohol consumption and physical inactivity, which are responsible for most deaths from NCDs [4] [5].

In Brazil, a study that assessed the attributable risk for 25 types of cancer resulting from exposure to various behavioral risk factors (smoking, alcohol consumption, diet, overweight and obesity, physical inactivity, occupational and environmental agents, among others) concluded that these were responsible for 34% of cancer cases among men and 35% among women in 2020, and for 46% and 39% of deaths, respectively [6].

A descriptive study with data from the National Health Survey (PNS) showed that 46% of the population is insufficiently active, 14.5% are smokers, 13.7% abuse alcohol, only 37.3% consume fruits and vegetables and more than 50% of the elderly had at least two simultaneous risk factors [7].

Studies prove that the interaction of risk factors is more concerning in terms of damage to health than just their sum [8] [9] [10]. Therefore, it is important to consider their simultaneity and not only assess the prevalence and define strategies for combating these factors in isolation.

In adults, the occurrence of two or more factors decreased with advancing age, while in the elderly population it was lower with increasing age [11] [12], thus being able to cause negative impacts both for individuals, their families, and for society as a whole, especially in years of life lost due to disability, premature deaths, public health expenses and worsens in quality of life [9].

Given the above, the purpose of the study is to analyze the presence of the main behavioral risk factors and their simultaneous occurrence related to lifestyle in adults and elderly people in the city of Ribeirão Preto. These data are important, as they allow us to evaluate the population's lifestyle and support the development of NCD prevention programs, since the simultaneous occurrence of these factors tends to increase the risk of developing these diseases, allowing us to know their distribution and identify situations of risk to direct health promotion actions and prevention of harm and disease.

2. Methods

A quantitative, descriptive, observational, cross-sectional study performed in five

Health Districts in the city of Ribeirão Preto—SP. Of the 53,240 consultations carried out in Pharmacies in 2016, the sample calculation was performed. The sample consisted of 719 people. The parameters of sampling relative errors of 10% were adopted, with a significance level of 5%. The sample size of the study was determined by calculating the sample size of the 53,240 adult consultations performed in pharmacies in 2016. The sampling strategy used was stratified random sampling with proportional allocation by stratum, where each stratum is made up of Ribeirão Preto—SP health districts.

2.1. Risk Factors

A questionnaire containing 68 closed and 11 open questions called “Characterization of users with and without NCD” was used, containing: identification of the health service user, sociodemographic variables, clinical variables and modifiable risk factors. The pilot study ran from 03/03/2017 to 03/15/2017. Participants included 50 health service users, 10 from each Health District.

2.2. Unhealthy Eating

Variables related to food consumption were self-reported. Healthy eating: It was considered good consumption for those who reported eating healthy foods at least three times a week and beans at least five times a week. And when they consumed up to twice a week unhealthy foods as little consumption. Unhealthy eating: low consumption was considered to be those who reported eating healthy foods less than three times a week and beans less than five times a week. And, when unhealthy foods were consumed more than twice a week as high consumption [13].

2.3. Smoking and Harmful Alcohol Consumption

Presence of smoking: expressed as the percentage of smokers among the individuals interviewed. Those who answered positively to the question “Mr. (s) do you smoke?” regardless of the number of cigarettes and duration of smoking, those who denied smoking and former smokers. Harmful alcohol consumption was added to the doses (on the day) of beer, wine and distilled, resulting in the dose/day variables for each type of beverage. Harmful consumption of alcohol is considered to be the summed dose equal to or greater than 4 for women and the summed dose equal to or greater than 5 for men [14].

2.4. Physical Inactivity

To obtain data on physical activity, the International Physical Activity Questionnaire (IPAQ) instrument, long version, was used, following the recommendation of the World Health Organization, which considers it necessary to practice at least 150 minutes of moderate physical activity or walking in the week [15]. Considered as active, people with moderate activity/walking ≥ 150 minutes per week and inactive those who did not reach the described value.

2.5. Data Collect

Data collection started in May 2017 and recruitment was in consecutive order. This work was approved by the Research Ethics Committee of the Ribeirão Preto College of Nursing, University of São Paulo, under number 1.875.599. The interviewers explained the nature and purpose of the study to the participants and, for those who agreed to participate in the research, signed the Informed Consent Form (ICF).

2.6. Data Analysis

Data were organized, typed and subjected to double validation in Microsoft Excel, version XP (Microsoft Co, USA) by duly trained researchers. After importing the data into the Statistical Package for Social Sciences (SSPS) for the Windows base module and exact test version 22.

Comparisons of the variables of interest regarding the number of risk factors were analyzed using the multinomial logistic regression model. To estimate the prevalence ratios (PR) of the simultaneity of risk factors according to the variables of interest, the log-binomial regression model was used [16].

When evaluating simultaneity, a cluster analysis approach was used, in which the ratio between observed and expected prevalence (O/E) for each grouping is considered. The expected prevalence for each specific combination is calculated by multiplying the prevalence of risk factors present by the inverse of the prevalence of absent factors. For example, to calculate a cluster of physical inactivity (I), smoking (T) and harmful alcohol consumption (A), the multiplication took place as follows: $I \times T \times A \times (1 - E)$, where: I is the prevalence of physical inactivity, T is the prevalence of smoking, A is the prevalence of harmful alcohol consumption, and $(1 - E)$ is the inverse of the prevalence of unhealthy eating. Clusters were defined as all groups whose O/E ratio was greater than 1 and whose 95% confidence interval did not encompass the unity. It was assumed that the risk factors occurred independently.

3. Results

The study included 719 users of health services in the city, 535 adults and 184 elderlies. Regarding gender, most adults and elderly were women, 393 (73.5%) and 119 (64.7%) respectively. Regarding marital status, most adults did not have a partner ($n = 295$; 55.1%), while most elderly had a partner ($n = 99$; 53.8%). Regarding education, adults and elderly, most have 0 to 8 years of study, 173 (34.3%) and 127 (73.8%) respectively. Regarding occupation, most adults were employed ($n = 287$; 53.6%) and most elderly were retired ($n = 129$; 70.1%). Regarding economic class, most adults and elderly were from class C, $n = 266$ (49.7%) and $n = 107$ (58.1%), respectively. Evidence was found in the difference in marital status ($p = 0.010$), education ($p = 0.031$) and occupation (<0.001) between adults and the elderly (data not shown).

Evidenced difference between the number of risk factors in adults in relation

to marital status. Adults without partners have 3.35 times the chance of having only one risk factor, 5 times the chance of having two risk factors, and 5.89 times the chance of having three risk factors compared to adults with a partner. There was no evidence of a difference in the number of risk factors in adults regarding gender, occupation, education and economic classification (**Table 1**).

Table 1. Association of sociodemographic variables with the number of risk factors found in adults, Ribeirão Preto—SP, 2021.

Variable	Number of risk factors in Adults*							
	1 vs. 0		2 vs. 0		3 vs. 0		4 vs. 0	
	OR (95% IC)	p value	OR (95% IC)	p value	OR (95% IC)	p value	OR (95% IC)	p value
Gender								
Female (n = 393)	1	-	1	-	1	-	1	-
Male (n = 142)	1.02 (0.36 - 2.91)	0.97	1.05 (0.36 - 3.03)	0.93	2.21 (0.73 - 6.71)	0.16	0.8 (0.07 - 8.91)	0.86
Occupation								
Retired/Pensioner (n = 38)	1	-	1	-	1	-	1	-
Unemployed (n = 210)	2.04 (0.37 - 11.26)	0.41	2.33 (0.40 - 13.43)	0.34	3 (0.43 - 20.95)	0.27	-	0.98
Employee (n = 287)	0.96 (0.20 - 4.53)	0.96	1.19 (0.24 - 5.88)	0.83	1.32 (0.217 - 8.04)	0.76	-	0.98
Marital status								
With a partner (n = 240)	1	-	1	-	1	-	1	-
Without a partner (n = 295)	3.35 (1.19 - 9.42)	0.02	5 (1.76 - 14.25)	<0.01	5.89 (1.93 - 17.96)	<0.01	2.13 (0.27 - 16.59)	0.47
Education (years of study)								
0 - 8 (n = 173)	1	-	1	-	1	-	1	-
9 - 11 (n = 169)	1.44 (0.45 - 4.57)	0.54	1.97 (0.61 - 6.38)	0.26	1.46 (0.41 - 5.18)	0.56	0.53 (0.04 - 6.65)	0.63
≥12 (n = 163)	1.14 (0.38 - 3.42)	0.82	1.41 (0.46 - 4.34)	0.55	1.58 (0.47 - 5.24)	0.46	0.44 (0.04 - 5.41)	0.52
Economic classification								
A (n = 19)	1	-	1	-	1	-	1	-
B (n = 184)	0.74 (0.09 - 6.38)	0.78	3.78 (0.31 - 45.98)	0.3	0.72 (0.07 - 7.34)	0.78	-	0.99
C (n = 266)	1.37 (0.16 - 11.85)	0.78	5.63 (0.46 - 69.01)	0.18	1.09 (0.11 - 11.15)	0.94	-	0.99
D/E (n = 66)	0.92 (0.09 - 9.69)	0.94	3.67 (0.25 - 53.83)	0.34	0.5 (0.04 - 6.68)	0.6	-	0.98

*multinomial logistic regression.

When sociodemographic variables were associated with the number of risk factors, it was found that, regardless of gender, occupation and marital status, most elderly patients had only one risk factor. Most elderly with education between 0 and 8 years and 12 years or more had only one risk factor, while most elderly between 9 and 11 years of education had two risk factors. As for the economic classification, the elderly from class A equally presented one or two risk factors, while most elderly from classes B to E presented only one risk factor. There was no evidence of the difference between sociodemographic variables and the number of risk factors among the elderly. No elderly presented four risk factors (**Table 2**).

When comparing adults and elderly in terms of the chance of each presenting one or more risk factors (**Table 3**), it appears that adults are more likely to have two and three risk factors when compared to the elderly, so adults have 2.43 times the chance of having two risk factors and 7.73 times the chance of having three risk factors compared to the elderly.

By combining the risk factors, there was evidence that the presence of unhealthy eating among adults is 6% higher among smokers when compared to

Table 2. Association of sociodemographic variables with the number of risk factors found in the elderly, Ribeirão Preto—SP, 2021.

Variable	Number of risk factors*					
	1 vs. 0		2 vs. 0		3 vs. 0	
	OR (95% IC)	p value	OR (95% IC)	p value	OR (95% IC)	p value
Gender						
Female (n = 119)	1		1		1	
Male (n = 65)	0.88 (0.3 - 2.62)	0.82	0.97 (0.31 - 3.06)	0.96	0.67 (0.1 - 4.58)	0.68
Occupation						
Retired/Pensioner (n = 129)	1		1		1	
Unemployed (n = 30)	-	0.99	-	0.99	-	0.99
Employee (n = 25)	1.23 (0.25 - 6.06)	0.80	2 (0.39 - 10.31)	0.41	-	0.99
Marital status						
With a partner (n = 99)	1		1		1	
Without a partner (n = 85)	1.27 (0.43 - 3.76)	0.66	1.73 (0.55 - 5.38)	0.35	4.17 (0.61 - 28.62)	0.15
Education (years of study)						
0 - 8 (n = 127)	1		1		1	
9 - 11 (n = 25)	0.27 (0.07 - 1.06)	0.06	0.58 (0.15 - 2.27)	0.43	1.13 (0.14 - 8.88)	0.91
≥12 (n = 20)	0.9 (0.18 - 4.59)	0.90	0.23 (0.03 - 1.87)	0.17	1.13 (0.08 - 16.31)	0.93
Economic classification						
A (n = 2)	-	0.99	-	0.99	-	0.99
B (n = 45)	0.23 (0.03 - 2.16)	0.2	0.43 (0.04 - 4.26)	0.47	0.1 (0 - 2.5)	0.16
C (n = 107)	0.33 (0.04 - 2.72)	0.3	0.39 (0.04 - 3.49)	0.4	0.2 (0.01 - 2.88)	0.24
D/E (n = 30)	1		1		1	

*multinomial logistic regression.

Table 3. Comparison between adults and the elderly in relation to the number of risk factors, Ribeirão Preto—SP, 2021.

Age group	Number of risk factors*							
	1 vs. 0		2 vs. 0		3 vs. 0		4 vs. 0	
	n (%)	OR (95% IC)	n (%)	OR (95% IC)	n (%)	OR (95% IC)	n (%)	OR (95% IC)
Elderly	104 (56.5%)	1	57 (31.0%)	1	7 (3.8%)	1	0 (0%)	1
Adult	256 (47.8%)	1.88 (0.94 - 3.74)	182 (34.0%)	2.43 (1.19 - 4.97)	71 (13.3%)	7.73 (2.81 - 21.28)	5 (0.9%)	-

*multinomial logistic regression model.

Table 4. Prevalence and prevalence ratio (gross and adjusted) for the occurrence of two risk factors in adults and elderly, Ribeirão Preto—SP, 2021.

Combination of risk factors*	Adults (n = 535)					Elderly (n = 184)				
	n (%)	RP _{bruto}	95% IC	RP _{adjusted}	95% IC	n (%)	RP _{bruto}	95% IC	RP _{adjusted}	95% IC
Smoking and physical inactivity	35 (6.5%)	1.14	0.85 - 1.55	1.16	0.85 - 1.58	6 (3.3%)	0.98	0.48 - 2	0.76	0.34 - 1.69
Smoking and unhealthy eating	98 (18.3%)	1.06	1.02 - 1.11	1.04	0.83 - 1.29	17 (9.2%)	1.00	0.83 - 1.22	1.09	0.63 - 1.89
Smoking and harmful alcohol consumption	28 (5.2%)	2.10	1.41 - 3.12	2.52	1.58 - 4.03	1 (0.5%)	1.37	0.17 - 10.78	1.41	0.15 - 13.43
Physical inactivity and harmful alcohol consumption	23 (4.3%)	0.80	0.51 - 1.24	0.75	0.48 - 1.18	2 (1.1%)	0.91	0.18 - 4.57	1.11	0.20 - 6.21
Physical inactivity and unhealthy eating	160 (29.9%)	1.03	0.99 - 1.08	1.01	0.89 - 1.15	46 (25.0%)	0.96	0.83 - 1.1	0.99	0.68 - 1.43
Unhealthy food and harmful alcohol consumption	81 (15.1%)	1.17	0.51 - 2.7	1.11	0.48 - 2.56	6 (3.3%)	1.08	0.13 - 8.61	0.46	0.05 - 4.48

*RP calculated in relation to the first risk factor. RP adjusted by district, gender, marital status, education, occupation, and income classification. In bold: associations with p-value below 0.05. The RP was calculated based on a log-binomial regression model.

non-smokers. The presence of harmful alcohol consumption is double among smokers compared to non-smokers. This presence is maintained when adjusted by district, gender, marital status, education, occupation and income classification. There was no evidence of the combination of risk factors among the elderly (**Table 4**).

When the observed and expected prevalence between the risk factors and the simultaneity between the four risk factors (smoking, physical inactivity, harmful alcohol consumption and unhealthy eating) with different associations between them was verified, an association was only evidenced in the simultaneity be-

tween the smoking, harmful alcohol consumption and unhealthy diet among adults (Table 5).

Table 5. Presence and association of risk factors stratified by age group, Ribeirão Preto—SP, 2021.

Number of factors	Smoking	Physical inactivity	Harmful alcohol consumption	Unhealthy food	Adults (n = 535)			Elderly (n = 184)		
					O (%)	E (%)	O/E (95% IC)*	O (%)	E (%)	O/E (95% IC)
0	-	-	-	-	21 (3.9%)	16.86 (3.1%)	1.25 (0.66 - 2.36)	16 (8.7%)	16.71 (9.1%)	0.96 (0.48 - 1.90)
1	-	-	-	+	241 (45.0%)	233.6 (43.7%)	1.03 (0.86 - 1.24)	94 (51.1%)	93.05 (50.6%)	1.01 (0.76 - 1.35)
1	-	-	+	-	5 (0.9%)	3.23 (0.6%)	1.55 (0.38 - 6.27)	1 (0.5%)	0.66 (0.4%)	1.52 (0.07 - 33.92)
1	-	+	-	-	8 (1.5%)	7.72 (1.4%)	1.04 (0.39 - 2.79)	8 (4.3%)	7.31 (4.0%)	1.09 (0.40 - 2.98)
1	+	-	-	-	2 (0.4%)	3.87 (0.7%)	0.52 (0.09 - 2.85)	1 (0.5%)	2.04 (1.1%)	0.49 (0.04 - 5.36)
2	-	-	+	+	35 (6.5%)	44.73 (8.4%)	0.78 (0.50 - 1.22)	3 (1.6%)	3.68 (2.0%)	0.82 (0.18 - 3.74)
2	-	+	-	+	107 (20.0%)	106.93 (20.0%)	1.00 (0.77 - 1.31)	40 (21.7%)	40.7 (22.1%)	0.98 (0.64 - 1.52)
2	+	-	-	+	40 (7.5%)	53.7 (10.0%)	0.74 (0.49 - 1.12)	12 (6.5%)	11.35 (6.2%)	1.06 (0.47 - 2.38)
2	+	+	-	-	0 (0%)	1.77 (0.3%)	-	2 (1.1%)	0.89 (0.5%)	2.25 (0.18 - 27.31)
3	-	+	+	+	18 (3.4%)	20.47 (3.8%)	0.88 (0.47 - 1.66)	2 (1.1%)	1.61 (0.9%)	1.24 (0.16 - 9.90)
3	+	-	+	+	23 (4.3%)	10.28 (1.9%)	2.24 (1.07 - 4.67)	1 (0.5%)	0.45 (0.2%)	2.22 (0.07 - 74.94)
3	+	+	-	+	30 (5.6%)	24.58 (4.6%)	1.22 (0.72 - 2.08)	4 (2.2%)	4.96 (2.7%)	0.81 (0.22 - 3.01)
4	+	+	+	+	5 (0.9%)	4.71 (0.9%)	1.06 (0.30 - 3.74)	0 (0%)	0.2 (0.1%)	-

E: expected value; O: observed value; O/E: observed/expected. *The observed/expected ratios and the respective 95% confidence interval were calculated assuming a Poisson distribution, as described by Breslow and Day (1987).

4. Discussion

This study verified the presence and simultaneity of the main modifiable risk factors in the adult and elderly population in the city of Ribeirão Preto—SP.

Marital status affected the prevalence of risk factors for NCDs since adults without partners participating in this study were more likely to have one, two or three risk factors compared to adults with partners. These findings corroborate those of another study that suggests that support between the couple enables better lifestyle habits and health behaviors and that partners can positively influence each other [9].

Regarding smoking as a risk factor for NCD, a cross-sectional, descriptive study carried out in Paraná with 100 primary care users identified a longer average time of smoking among widowers. In addition, a study carried out in the Metropolitan Region of Belo Horizonte showed a higher rate of smoking cessation among married people [17] [18].

On the other hand, a Japanese cross-sectional study conducted with 20,206 men and 21,093 women found that being married was positively associated with smoking in the population between 18 and 39 years, contradicting the findings of this study [19].

Regarding harmful alcohol consumption, studies performed with young adults corroborate the finding of this study of a higher prevalence of this risk factor in adults without a partner compared to adults with a partner, as harmful alcohol consumption usually occurs in social events that are most frequented by young singles. However, in studies carried out with older adults, the prevalence of harmful alcohol consumption is higher among married people, due to the factors that motivate alcohol consumption in this group, which involve tiredness at the end of the workday, economic problems and problems in the family relationships [20] [21] [22].

In this study, we verified that adults are more likely to have two and three risk factors when compared to the elderly and it was also estimated that the simultaneity between the risk factors was greater in adults than in the elderly.

Most studies on the simultaneity of risk factors refer to the adult population, with studies of this nature involving the elderly population being less frequent [11] [23]. In a systematic review that sought to assess the grouping or simultaneity of risk factors and their predictors, adults were the population studied in 11 studies, young adults in two studies, and older adults in only one study [23].

Age was the only variable associated with the simultaneity of risk factors found in a study that concluded that the older the individual, the lower the chance of presenting more than one risk factor [11]. Another study suggests that despite not being strong evidence, the younger population was, in general, associated with a higher risk of presenting multiple risk factors [23]. Authors suggest that the simultaneity of risk factors may decrease with advancing age [24]. This may be related to survival bias, that is, elderly with more risk factors, suffering from more health problems, are probably not alive and, therefore, not evaluated.

In addition, the elderly attend health services more often and are more careful. Due to the diseases presented with advancing age, the elderly may have stopped some habits they practiced throughout their lives, such as harmful consumption of alcohol and smoking [9] [11].

On the other hand, a cross-sectional study carried out with 1705 elderly in Florianópolis identified that 57.7% had at least two risk factors simultaneously [25].

As for the combinations between risk factors, we did not find any association between risk factors among the elderly. On the other hand, in adults, two combinations were evidenced: unhealthy eating and smoking; harmful consumption of alcohol and smoking. When the observed prevalence and the expected prevalence between the simultaneity of risk factors in adults were verified, the only combination that showed a significantly higher observed prevalence than expected was smoking, harmful alcohol consumption and unhealthy eating. Two studies corroborate the findings of this study regarding the combination of factors smoking, harmful alcohol consumption and unhealthy eating, characterized by inadequate consumption of vegetables, and legumes, [9] [24] and one of them also found an association between harmful consumption of alcohol and smoking, in addition to other associations different from those found in this study, such as unhealthy eating and physical inactivity, which was the most prevalent, in addition to physical inactivity, smoking and harmful alcohol consumption [24].

Other authors have also highlighted the combinations between smoking and harmful alcohol consumption; healthy eating and smoking, in agreement with our findings, in addition to the simultaneous physical inactivity and smoking. These factors varied according to the characteristics of the population, and in adults, the most prevalent combination was low fruit and vegetable intake and physical inactivity, followed by the combination of low fruit and vegetable intake and smoking, in addition to harmful alcohol consumption and smoking [23].

In this study, we showed that adult smokers have a greater presence of unhealthy eating when compared to non-smokers. One study identified an association between smoking and consumption of fruits and salads in women, such that smoking women consumed fewer fruits and salads compared to non-smoking women [5].

Harmful alcohol consumption was double among smokers compared to non-smokers. Harmful alcohol consumption, a common risk factor found in studies, is culturally acceptable, causing the beginning of alcohol use to be early, still in adolescence, perpetuating it into adulthood. The associations between harmful alcohol consumption and smoking suggest that the consumption of one stimulates the use of the other, influenced by cultural factors [11] [24].

One of the limitations of this study refers to the need to expand the understanding of behavioral risk factors in the elderly population. Future studies are still needed to establish relationships between these factors, isolated or con-

mitant, with senility, with specific instruments for this audience, as we are going through a transformation in the age structure of our country with the increase in the elderly population, as well as your life expectancy, thus being expected a progressive increase in NCDs.

The strong point is that this study seeks to expand the knowledge of the general population, health professionals and scientific entities about the profile of these factors in the adult and elderly population of the municipality to develop new strategies and/or improve the measures already adopted today, with effective actions and investments in strategies, thus providing a favorable environment for healthy lifestyle choices.

5. Conclusion

In summary, knowing and directing measures to control behavioral risk factors, whether isolated or simultaneous, for adults and the elderly, requires specific knowledge to achieve more effective and differentiated results.

Conflicts of Interest

The authors declare that there is no conflict of interest.

References

- [1] WHO (2018) World Health Statistics 2018: Monitoring Health for the SDGs Sustainable Development Goals.
<http://apps.who.int/iris/bitstream/handle/10665/272596/9789241565585-eng.pdf?ua=1>
- [2] Francisco, P.M.S.B., Assumpção, D., Borim, F.S.A., Senicato, C. and Malta, D.C. (2019) Prevalência e coocorrência de fatores de risco modificáveis em adultos e idosos. *Revista de Saúde Pública*, **53**, 1-13.
<https://doi.org/10.11606/s1518-8787.2019053001142>
- [3] Malta, D.C., Andrade, S.S.C.A., Stopa, S.R., Pereira, C.A., Szwarcwald, C.L. and Silva Júnior, J.B. (2015) Estilos de vida da população brasileira: Resultados da Pesquisa Nacional de Saúde, 2013. *Epidemiologia e Serviços de Saúde*, **24**, 217-226.
<https://doi.org/10.5123/S1679-49742015000200004>
- [4] WHO (2014) Global Status Report on Noncommunicable Diseases 2014. WHO, Geneva.
https://apps.who.int/iris/bitstream/handle/10665/148114/9789241564854_eng.pdf;jsessionid=B06F4ED9B90F771832F3940710215159?sequence=1
- [5] Berto, S.J.P., Carvalhaes, M.A.B.L. and Moura, E.C. (2011) Tabagismo, estado nutricional e hábitos alimentares em população adulta de município paulista. *Revista Ciência em Extensão*, **7**, 57-70.
- [6] Azevedo, S.G., Moura, L., Curado, M.P., Gomes, F.S., Otero, U. and Rezende, L.F.M. (2016) The Fraction of Cancer Attributable to Ways of Life, Infections, Occupation, and Environmental Agents in Brazil in 2020. *PLOS ONE*, **11**, e0148761.
<https://doi.org/10.1371/journal.pone.0148761>
- [7] Malta, D.C., Bernal, R.T.I. and Oliveira, M. (2015) Tendências dos fatores de risco de doenças crônicas não transmissíveis, segundo a posse de planos de saúde, Brasil, 2008 a 2013. *Ciência e Saúde Coletiva*, **20**, 1005-1016.
<https://doi.org/10.1590/1413-81232015204.14712014>

- [8] D'amico, M.M. and Souza, R.K. (2014) Simultaneidade de fatores de risco cardiovascular controláveis: Estudo de base populacional. *Revista Brasileira de Cardiologia*, **27**, 318-326.
- [9] Hirschmann, R., Bortolotto, C.C., Martins-Silva, T., Machado, A.K.F., Xavier, M.O. and Fernandes, M.P. (2020) Simultaneidade de fatores de risco para doenças crônicas não transmissíveis população rural de um município no sul do Brasil. *Revista Brasileira de Epidemiologia*, **23**, e200066. <https://doi.org/10.1590/1980-549720200066>
- [10] Streb, A.R., Duca, G.F.D., Silva, R.P., Benedet, J. and Malta, D.C. (2020) Simultaneidade de comportamentos de risco para obesidade em adultos das capitais do Brasil. *Ciência e Saúde Coletiva*, **25**, 2999-3007. <https://doi.org/10.1590/1413-81232020258.27752018>
- [11] Cruz, M.F., Ramires, V.V., Wendt, A., Mielke, G.I., Martinez-Mesa, J. and Wehrmeister, F.C. (2017) Simultaneidade de fatores de risco para doenças crônicas não transmissíveis entre idosos da zona urbana de Pelotas, Rio Grande do Sul, Brasil. *Cadernos de Saúde Pública*, **33**, e00021916. <https://doi.org/10.1590/0102-311x00021916>
- [12] Silva, D.A.S., Peres, K.G., Boing, A.F., González-Chica, D.A. and Peres, M.A. (2013) Clustering of Risk Behaviors for Chronic Noncommunicable Diseases: A Population-Based Study in Southern Brazil. *Preventive Medicine*, **56**, 20-24. <https://doi.org/10.1016/j.ypmed.2012.10.022>
- [13] Ministério da Saúde (2015) Orientações para Avaliação de Marcadores de Consumo Alimentar na Atenção Básica. Ministério da Saúde, Brasília. <https://aps.saude.gov.br/biblioteca/visualizar/MTMyMw>
- [14] Brasil (2019) Ministério da Saúde, Agência Nacional de Saúde Suplementar. VIGITEL Brasil 2018: Vigilância de fatores de risco e proteção para doenças crônicas por inquérito telefônico. Ministério da Saúde, Brasília.
- [15] WHO (2010) Global Recommendations on Physical Activity for Health. WHO, Geneva. <https://www.who.int/publications/i/item/9789241599979>
- [16] Skov, T., Deddens, J., Petersen, M.R. and Endahl, L. (1998) Prevalence Proportion Ratios: Estimation and Hypothesis Testing. *International Journal of Epidemiology*, **27**, 91-95. <https://doi.org/10.1093/ije/27.1.91>
- [17] Müller, E.V., Silva, M.T., Grden, C.R.B., Reche, P.M., Borges, P.K.O. and Souza, J.A.V. (2017) Fatores Associados Ao Tabagismo Usuários da Estratégia Saúde da Família. *Cogitare Enfermagem*, **22**, e50600. <https://doi.org/10.5380/ce.v22i4.50600>
- [18] Peixoto, S.V., Firmo, J.O.A. and Lima, C.M.F. (2007) Fatores Associados Ao Índice de cessação do hábito de fumar em as diferentes populações adultas (Projetos Bambuí e Belo Horizonte). *Cadernos de Saúde Pública*, **23**, 1319-1328. <https://doi.org/10.1590/S0102-311X2007000600007>
- [19] Fukuda, Y., Nakamura, K. and Takano, T. (2005) Socioeconomic Pattern of Smoking in Japan: Income Inequality and Gender and Age Differences. *Ann Epidemiology*, **15**, 365-372. <https://doi.org/10.1016/j.annepidem.2004.09.003>
- [20] Abreu, M.N.S., Eleotério, A.E., Oliveira, F.A., Pedroni, L.C.B.R. and Lacena, E.E. (2020) Prevalência e fatores associados ao consumo excessivo episódico de álcool entre adultos jovens brasileiros de 18 a 24 anos. *Revista Brasileira de Epidemiologia*, **23**, e200092. <https://doi.org/10.1590/1980-549720200092>
- [21] Guimarães, M.S.F. and Tavares, D.M.S. (2019) Prevalência e fatores associados ao abuso e provável dependência de álcool entre idosos. *Texto Contexto Enfermagem*, **28**, e20180078.

- [22] Pinheiro, M.A., Torres, L.F., Bezerra, M.S., Cavalcante, R.C., Alencar, R.D., Donato, A.C., Campêlo, C.P.B., Gomes, I.P., Alencar, C.H. and Cavalcanti, L.P.G. (2017) Prevalência e fatores associados ao consumo de álcool e tabaco entre estudantes de medicina no nordeste do Brasil. *Revista Brasileira de Educação Médica*, **41**, 231-239. <https://doi.org/10.1590/1981-52712015v41n2rb20160033>
- [23] Meader, N., King, K., Moe-Byrne, T., Wright, K., Graham, H., Petticrew, M., Power, C., White, M. and Sowden, A.J. (2016) A Systematic Review on the Clustering and Co-Occurrence of Multiple Risk Behaviours. *BMC Public Health*, **16**, Article No. 657. <https://doi.org/10.1186/s12889-016-3373-6>
- [24] Rocha, F.L. and Velásquez-Meléndez, G. (2019) Simultaneity and Aggregation of Risk Factors for Noncommunicable Diseases among Brazilian Adolescents. *Escola Anna Nery*, **23**, e20180320. <https://doi.org/10.1590/2177-9465-ean-2018-0320>
- [25] Medeiros, P.A., Cembranel, F., Figueiró, T.H., Souza, B.B., Antes, D.L., Silva, D.A.S., Zanelatto, C. and d'Orsi, E. (2019) Prevalence and Simultaneity of Cardiovascular Risk Factors in Elderly Participants of a Population-Based Study in Southern Brazil. *Revista Brasileira de Epidemiologia*, **22**, e190064. <https://doi.org/10.1590/1980-549720190064>