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LIFESTYLE BEHAVIORS AND NON-COMMUNICABLE DISEASES IN OLDER ADULTS: BEYOND THE CUMULATIVE EFFECT

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ABSTRACT: Background: Lifestyle behaviors are key determinants of non-communicable diseases (NCDs), but their cumulative impact in older adults remains unclear. **Objective:** To evaluate lifestyle habits in older adults with and without NCDs and to investigate whether the number and profile of healthy behaviors are associated with disease presence. **Methods:** This cross-sectional study included 100 individuals aged ≥74 years. Participants were categorized into two groups: with NCDs (n=61) and without NCDs (n=39). Lifestyle habits were assessed using the Individual Lifestyle Profile (PEVI) questionnaire and a structured survey. Comparisons between groups were performed using t-tests and chi-square tests. **Results:** Overall lifestyle scores were positive in both groups, with no significant difference in total scores (p=0.17). However, individuals without NCDs had a higher proportion of favorable lifestyle classification (51.2% vs. 39%; p=0.02). Adequate sleep duration (6–8 hours), lower saturated fat intake, and marital status were associated with lower prevalence of NCDs, while a higher proportion of former smokers was observed among individuals with NCDs. No significant association was found between the cumulative number of healthy lifestyle habits and NCD presence. **Conclusion:** In older adults, specific lifestyle behaviors—rather than the cumulative number of healthy habits—are associated with the presence

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of NCDs. These findings highlight the need for targeted interventions focusing on key modifiable behaviors in aging populations.

Keywords: Aging; Lifestyle; Noncommunicable diseases; Elderly; Health behavior.

Comportamentos de Estilo de Vida e Doenças Crônicas Não Transmissíveis em Idosos: Além do Efeito Cumulativo

RESUMO: Introdução: Os hábitos de estilo de vida são determinantes fundamentais das doenças crônicas não transmissíveis (DCNT), porém seu impacto cumulativo em idosos ainda não está completamente esclarecido. **Objetivo:** Avaliar os hábitos de estilo de vida em idosos com e sem DCNT e investigar se o número e o perfil dos comportamentos saudáveis estão associados à presença dessas doenças. **Métodos:** Estudo transversal com 100 indivíduos com idade ≥74 anos. Os participantes foram divididos em dois grupos: com DCNT (n=61) e sem DCNT (n=39). Os hábitos de estilo de vida foram avaliados por meio do questionário Perfil do Estilo de Vida Individual (PEVI) e de um questionário estruturado. Foram utilizados testes t e qui-quadrado para comparação entre os grupos. **Resultados:** O escore global de estilo de vida foi considerado positivo em ambos os grupos, sem diferença significativa (p=0,17). No entanto, indivíduos sem DCNT apresentaram maior proporção de classificação favorável (51,2% vs. 39%; p=0,02). A duração adequada do sono (6–8 horas), menor consumo de gordura saturada e estado civil (casados) estiveram associados à menor prevalência de DCNT, enquanto maior proporção de ex-tabagistas foi observada entre indivíduos com DCNT. Não houve associação significativa entre o número cumulativo de hábitos saudáveis e a presença de DCNT. **Conclusão:** Em idosos, comportamentos específicos de estilo de vida, mais do que o número total de hábitos saudáveis, estão associados à presença de DCNT. Esses achados destacam a importância de intervenções direcionadas a fatores específicos na promoção da saúde em populações envelhecidas.

Palavras-chave: Idosos; Doenças crônicas não transmissíveis; Estilo de vida; Comportamento em saúde; Envelhecimento.

Comportamientos de Estilo de Vida y Enfermedades Crónicas no Transmisibles en Adultos Mayores: Más Allá del Efecto Acumulativo

RESUMEN: Antecedentes: Los comportamientos de estilo de vida son determinantes clave de las enfermedades crónicas no transmisibles (ECNT), pero su impacto acumulativo en adultos mayores aún no está completamente claro. **Objetivo:** Evaluar los hábitos de

estilo de vida en adultos mayores con y sin ECNT, e investigar si el número y el perfil de comportamientos saludables están asociados con la presencia de enfermedades. **Métodos:** Este estudio transversal incluyó a 100 individuos con edad ≥74 años. Los participantes fueron categorizados en dos grupos: con ECNT (n=61) y sin ECNT (n=39). Los hábitos de estilo de vida se evaluaron mediante el cuestionario Perfil de Estilo de Vida Individual (PEVI) y una encuesta estructurada. Las comparaciones entre grupos se realizaron utilizando pruebas t y chi-cuadrado. **Resultados:** Los puntajes globales de estilo de vida fueron positivos en ambos grupos, sin diferencia significativa en los puntajes totales (p=0,17). Sin embargo, los individuos sin ECNT presentaron una mayor proporción de clasificación favorable de estilo de vida (51,2% vs. 39%; p=0,02). La duración adecuada del sueño (6–8 horas), un menor consumo de grasas saturadas y el estado civil se asociaron con una menor prevalencia de ECNT, mientras que una mayor proporción de exfumadores se observó entre los individuos con ECNT. No se encontró asociación significativa entre el número acumulado de hábitos de vida saludables y la presencia de ECNT. **Conclusión:** En adultos mayores, comportamientos específicos de estilo de vida—más que el número acumulado de hábitos saludables—están asociados con la presencia de ECNT. Estos hallazgos destacan la necesidad de intervenciones dirigidas a comportamientos modificables clave en poblaciones envejecidas.

Palabras clave: Envejecimiento; Estilo de vida; Enfermedades crónicas no transmisibles; Adulto mayor; Conducta de salud.

INTRODUCTION

Non-communicable diseases (NCDs) are currently the leading cause of morbidity and mortality worldwide, accounting for approximately 74% of all deaths globally, with a disproportionate burden in low- and middle-income countries[1]. In Brazil, this pattern is similarly observed, with high prevalence of cardiovascular diseases, diabetes mellitus, chronic respiratory diseases, and cancer, all of which substantially contribute to disability-adjusted life years and increased healthcare demand[2].

Population aging has further exacerbated this scenario, as advancing age is strongly associated with a higher prevalence of NCDs and multimorbidity[3]. Among older adults, these conditions are frequently linked to functional decline, loss of independence, reduced quality of life, and increased need for long-term care[4]. Therefore, identifying modifiable factors that can prevent or delay the onset of these diseases has become a major public health priority.

Lifestyle behaviors have been consistently recognized as key determinants in the development and progression of NCDs. A large body of evidence demonstrates that unhealthy dietary patterns, physical inactivity, smoking, excessive alcohol consumption, poor sleep quality, and chronic stress are strongly associated with increased risk of chronic diseases and premature mortality[5–7]. Conversely, adherence to healthy lifestyle behaviors has been associated with increased life expectancy and compression of morbidity, even in older populations[8].

More recently, the concept of the cumulative effect of lifestyle factors has gained attention, suggesting that the combined adoption of multiple healthy behaviors exerts a synergistic effect in reducing NCD risk and promoting longevity[8,9]. However, although this effect is well established

in general populations, its applicability in long-lived individuals remains insufficiently explored. Evidence suggests that even older adults with NCDs may present relatively favorable lifestyle profiles, raising questions about the magnitude of the protective effects of these behaviors in advanced age[10].

Furthermore, the literature presents inconsistent findings regarding the relationship between the number of healthy lifestyle habits and the presence of NCDs among older adults. These inconsistencies may be explained by methodological differences, population heterogeneity, and the limited ability to account for the duration and intensity of exposure to health-related behaviors. Consequently, it remains unclear whether older individuals without NCDs truly exhibit a higher number or better quality of lifestyle habits compared to those with chronic conditions.

In this context, it is essential to investigate not only individual health behaviors but also their combined and cumulative effects in aging populations, particularly in socioeconomically vulnerable settings. A better understanding of these relationships may contribute to more effective health promotion and disease prevention strategies in older adults.

Therefore, the present study aims to evaluate lifestyle habits in older adults with and without non-communicable diseases, and to investigate whether the presence of these conditions is associated with the number and profile of health-related behaviors.

METHODS

This was a cross-sectional observational study conducted among community-dwelling older adults. The sample consisted of 100 individuals aged 74 years or older, recruited by convenience sampling.

Eligible participants included men and women with sufficient cognitive ability to understand and respond to the questionnaires, who agreed to participate by providing written informed consent. Exclusion criteria comprised severe cognitive impairment, inability to communicate effectively, and incomplete data in the applied instruments.

Participants were categorized into two groups according to the self-reported presence of non-communicable diseases (NCDs), including cardiovascular diseases, diabetes mellitus, chronic respiratory diseases, and other long-term conditions previously diagnosed by a healthcare professional. The NCD group included individuals reporting at least one chronic condition, whereas the non-NCD group included those reporting no such diagnoses.

Lifestyle habits were assessed using the Individual Lifestyle Profile (PEVI), a validated instrument covering five domains: nutrition, physical activity, preventive behavior, social relationships, and stress management. Additional information was collected תועצמאב a structured questionnaire, including sleep duration, saturated fat intake, smoking history, and marital status.

The primary outcome of the study was the presence of non-communicable diseases (NCDs), analyzed in relation to lifestyle habits. Secondary outcomes included the overall lifestyle score and its individual domains.

Statistical analyses were performed using SPSS version 20.0. Descriptive statistics were used to summarize the data, with means and standard deviations for continuous variables and absolute and relative frequencies for categorical variables. Normality was assessed using the Shapiro–Wilk test. Comparisons between groups were performed using Student's t-test for continuous

variables and the chi-square test for categorical variables. A significance level of $p < 0.05$ was adopted.

The study was conducted in accordance with the Declaration of Helsinki and approved by a Research Ethics Committee.

RESULTS

A total of 100 community-dwelling older adults aged ≥74 years were included in the analysis. Among them, 61 participants (61.0%) reported the presence of at least one non-communicable disease (NCD), whereas 39 (39.0%) reported no chronic conditions.

The sociodemographic and clinical characteristics of the sample are presented in **Table 1**. No significant differences were observed between groups regarding age and sex distribution ($p > 0.05$). However, marital status differed significantly between groups, with a higher proportion of married individuals in the non-NCD group compared to the NCD group ($p = 0.02$).

Tabela 1. Características antropométricas sociais da amostra

Variables	NCDs (+) n= 61 (%)	NCDs (-) n= 39 (%)	P
Age (years)	78.4±4.7	79.7±5.1	0.1
Woman (%)	47 (73.4)	24(61.5)	**0.03**
Man (%)	14 (21.8)	14(35.8)	
BMI (kg/m²)	26.65	25.15	0.21
Married (%)	19 (30.1)	23 (57.5)	**0.0002**
Widowed	33 (52.4)	13 (32.5)	**0.006**
Single	5 (7.9)	1 (2.5)	0.16
Divorced	3 (7.61)	1 (2.5)	0.16
Retired	33 (52.4)	13 (32.5)	**0.006**
Stressed	20 (31.7)	10 (25)	0.43
Stressful environment	16 (25.4)	10 (25)	0.99

No significant differences were observed between groups regarding body mass index (BMI) categories. The proportion of participants with BMI >24 kg/m² was similar between individuals with and without NCDs (68.25% vs. 64.1%, $p = 0.65$), as well as for BMI <18 kg/m² (6.35% vs. 5.1%, $p = 0.99$). Smoking status analysis revealed no significant difference in current smoking prevalence between groups (6.3% vs. 2.5%, $p = 0.27$). However, a significantly higher proportion of former smokers was observed among individuals with NCDs compared to those without NCDs (62% vs. 28%, $p = 0.001$). Alcohol consumption did not differ significantly between groups (11.1% vs. 7.5%, $p = 0.45$), nor did physical activity levels, with identical proportions of physically active individuals in both groups (63.5%, $p = 0.99$).

Sleep duration showed a significant association with NCD status. A higher proportion of individuals without NCDs reported sleeping between 6 and 8 hours compared to those with NCDs (65% vs. 49.2%, $p = 0.03$). Dietary behavior also differed significantly between groups.

Participants without NCDs more frequently reported a low intake of saturated fats compared to those with NCDs (20% vs. 9.5%, p = 0.04). Finally, no statistically significant difference was observed regarding exposure to stressful environments between groups (31.7% vs. 25%, p = 0.43).

Table 2. The distribution of lifestyle-related variables according to the presence of non-communicable diseases (NCDs) is presented

Variables	DCNT (+) N=61(%)	DCNT (-) N=39(%)	P
BMI >24kg/m2	40(68,25)	25(64,1)	0,65
BMI <18kg/m2	10(6,35)	2(5,1)	0,99
Smoker	4 (6,3)	1 (2,5)	0,27
Former smoker	38(62)	11(28)	**0,001**
Alcohol user	7 (11,1)	3 (7,5)	0,45
Physically active	40 (63,5)	40 (63,5)	0,99
Sleep between 6 and 8 hours	31 (49,2)	26 (65)	**0,03**
Low saturated fat diet	6 (9,5)	8 (20)	**0,04**
Stressful environment	20 (31,7)	10 (25)	0,43

Most individuals in both groups reported up to three healthy lifestyle factors, with no statistically significant difference between participants with and without non-communicable diseases (NCDs) (63.9% vs. 56.4%, respectively; p = 0.23). Similarly, the proportion of individuals reporting between four and five healthy habits did not differ significantly between groups (21.3% in the NCD group vs. 28.2% in the non-NCD group; p = 0.32).

For participants reporting six to seven healthy lifestyle habits, comparable proportions were observed in both groups (16.3% vs. 15.3%; p = 0.65). Overall, no statistically significant differences were identified in the distribution of the number of healthy lifestyle habits between individuals with and without NCDs across all categories (p > 0.05).

Table 3. The distribution of participants according to the number of healthy lifestyle habits is presented

	NCD (+) n=61 (%)	NCD (-) n=39(%)	P
Until three factors (%)	39(63.9)	22(56.4)	0.23
Between four and five habits (%)	13(21.3)	11(28.2)	0.32
Six to seven habits(%)	10(16.3)	6(15.3)	0.65

No statistically significant differences were observed between groups in the overall lifestyle score, with mean values of 29.8 ± 8.5 in the NCD group and 31.6 ± 6.6 in the non-NCD group (p = 0.17).

Similarly, no significant differences were identified across the individual lifestyle domains. The nutrition domain showed comparable scores between groups (6.2 ± 2.1 vs. 6.1 ± 1.9; p = 0.34), as did physical activity (3.8 ± 3.3 vs. 4.7 ± 2.9; p = 0.11).

Scores for social aspects were also similar between participants with and without NCDs (6.4 ± 2.5 vs. 6.9 ± 2.6; p = 0.17). Likewise, stress management scores did not differ significantly

(6.9 ± 1.8 vs. 6.8 ± 1.5; p = 0.47), nor did preventive behavior scores (6.6 ± 2.1 vs. 6.5 ± 2.4; p = 0.44).

Overall, these findings indicate that both the total lifestyle score and its individual domains were comparable between individuals with and without NCDs, with no statistically significant differences observed (p > 0.05 for all comparisons).

Table 4. The comparison of lifestyle domain scores and overall lifestyle index between individuals with and without non-communicable diseases (NCDs)

Variables	NCDs (+) N=61	NCDs (-) N=39	P
PEVI total	29.8±8.5	31.6±6.6	0.17
Nutrition	6.2±2.1	6.1±1.9	0.34
Physical activity	3.8±3.3	4.7±2.9	0.11
Social aspect	6.4±2.5	6.9±2.6	0.17
Stress control	6.9±1.8	6.8±1.5	0.47
Preventive behavior	6.6±2.1	6.5±2.4	0.44

Table 5 presents lifestyle-related self-perceived health comparisons between individuals with and without non-communicable chronic diseases (NCDs). The sample consisted of 61 individuals with NCDs (DCNT+) and 39 without NCDs (DCNT–). Regarding self-rated health compared to individuals of the same age, most participants in both groups reported their health as "better" (42.9% in DCNT+ vs. 42.5% in DCNT–). However, significant differences were observed in some categories: a higher proportion of individuals with NCDs rated their health as "worse" (11.1% vs. 2.5%; $p = 0.02$), while more individuals without NCDs reported their health as "much better" (17.5% vs. 4.8%; $p = 0.004$). Additionally, the proportion reporting "equal" health was higher among those with NCDs (30.2% vs. 17.5%; $p = 0.04$). No significant differences were observed for the categories "much worse" and "better" ($p = 0.99$).

In relation to self-rated health compared to one year prior**,** no statistically significant differences were found between groups across all categories ($p > 0.05$). In both groups, the most frequent response was "equal" (39.7% in DCNT+ and 42.5% in DCNT–), followed by "better" (25.4% vs. 27.5%).

Table 5. Presents lifestyle-related self-perceived health comparisons between individuals with and without non-communicable chronic diseases (NCDs).

Variables	NCDs (+) N=61(%)	NCDs (-) N=39(%)	P
Health compared to individuals of the same age			
Very poor	1 (1.6)	0	0.99
Poor (%)	7 (11.1)	1 (2.5)	**0.02**
Equal (%)	19 (30,2)	7 (17.5)	**0.04**
Better (%)	27 (42,9)	17 (42.5)	0.99
Much better (%)	3 (4.8)	7 (17.5)	**0.004**

Variables	NCDs (+) N=61(%)	NCDs (-) N=39(%)	P
Health compared a last year			
Very poor	2 (3.2)	0	0.24
Poor (%)	10 (15.9)	7 (17.5)	0.84
Equal (%)	25 (39.7)	17 (42.5)	0.77
Better (%)	16 (25.4)	11 (27.5)	0.87
Much better (%)	4 (6.3)	2 (5)	0.99

Overall, the results suggest that individuals without NCDs tend to perceive their health more positively when compared to peers of the same age, whereas perceptions of change over the past year are similar between groups.

Discussion

The present study investigated the relationship between lifestyle habits and the presence of non-communicable diseases (NCDs) in older adults, providing important insights into the complexity of behavioral determinants of health in advanced age. The main findings indicate that, although overall lifestyle scores were generally positive in both groups, specific lifestyle components such as sleep duration, dietary patterns, smoking history, and social factors were differentially associated with the presence of NCDs. Notably, no significant association was observed between the cumulative number of healthy lifestyle habits and the presence of chronic diseases.

One of the most relevant findings of this study is the apparent dissociation between the overall lifestyle score and the presence of NCDs. While individuals without NCDs showed a higher proportion of favorable lifestyle classifications, the absence of differences in the cumulative number of healthy habits suggests that simply counting behaviors may not adequately capture their biological impact. This finding aligns with emerging evidence indicating that the quality, intensity, and duration of exposure to lifestyle behaviors may be more relevant than their mere presence or number[11,12]

The higher proportion of individuals without NCDs among those reporting adequate sleep duration (6–8 hours) reinforces the growing recognition of sleep as a critical determinant of cardiometabolic health. Sleep plays a central role in immune regulation, hormonal balance, and metabolic homeostasis, and both short and long sleep durations have been associated with increased risk of hypertension, diabetes, and cardiovascular disease[13, 14]. In older adults, sleep disturbances are particularly prevalent and may contribute to chronic inflammation and functional decline, further increasing vulnerability to NCDs.

Dietary patterns also emerged as an important factor, with a lower prevalence of NCDs among individuals reporting reduced intake of saturated fats. This finding is consistent with extensive literature demonstrating the role of diet quality in modulating cardiovascular and metabolic risk. Diets rich in saturated fats are associated with dyslipidemia, endothelial dysfunction, and systemic inflammation, whereas healthier dietary patterns such as those emphasizing fruits, vegetables, and whole foods have protective effects against chronic diseases[15,16].

Another notable result is the higher proportion of former smokers among individuals with NCDs. This likely reflects a reverse causality phenomenon, in which individuals adopt healthier behaviors

following disease diagnosis. However, it also highlights the long-term cumulative effects of tobacco exposure, which may persist even after cessation[17]. Smoking is a well-established risk factor for multiple chronic conditions, and its effects are known to be dose-dependent and long-lasting.

The influence of social factors, particularly marital status, is another important aspect of this study. The lower prevalence of NCDs among married individuals supports the hypothesis that social support plays a protective role in health outcomes. Social relationships may enhance adherence to healthy behaviors, improve psychological resilience, and reduce stress-related physiological responses, all of which are associated with lower morbidity and mortality[18,19].

Despite these associations, the lack of a significant relationship between the cumulative lifestyle score and NCD presence deserves careful consideration. One possible explanation is that the cross-sectional design limits the ability to capture the temporal relationship between exposure and disease development. Many NCDs develop over decades, and current lifestyle may not accurately reflect past exposures that contributed to disease onset. Additionally, the use of self-reported measures may introduce recall bias and social desirability bias, potentially overestimating healthy behaviors.

Another important consideration is that aging itself may attenuate the measurable impact of lifestyle behaviors. In long-lived populations, genetic factors, survivorship bias, and resilience mechanisms may play a more prominent role, potentially masking the effects of lifestyle differences. This hypothesis is supported by studies suggesting that determinants of health may differ between younger and older populations[20].

From a clinical and public health perspective, these findings highlight the importance of targeting specific lifestyle behaviors rather than relying solely on composite scores. Interventions aimed at improving sleep quality, promoting healthy dietary patterns, and reinforcing social support networks may be particularly effective in reducing the burden of NCDs in older adults.

This study has several limitations that should be acknowledged. First, its cross-sectional design precludes causal inference. Second, lifestyle habits and disease status were self-reported, which may introduce measurement bias. Third, the study did not account for the duration or intensity of exposure to lifestyle factors, which may be critical in determining their health impact. Finally, the relatively small and region-specific sample may limit generalizability.

CONCLUSION

In conclusion, while overall lifestyle patterns were generally positive among older adults, specific behaviors rather than their cumulative number were associated with the presence of NCDs. These findings suggest that a more nuanced approach to lifestyle assessment is needed, emphasizing the quality and context of behaviors, particularly in aging populations.

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