ReGeo ISSN: 2177-3246

CLASSIFICATION OF THE PHENOTYPE OF FRAGILTY IN THE ELDERLY OF A CHIROPRACTIC SCHOOL CLINIC: A CROSS-SECTIONAL STUDY

CLASSIFICAÇÃO DO FENÓTIPO DE FRAGILIDADE EM IDOSOS ATENDIDOS EM UMA CLÍNICA-ESCOLA DE QUIROPRAXIA: UM ESTUDO TRANSVERSAL

CLASIFICACIÓN DEL FENOTIPO DE FRAGILIDAD EN ADULTOS MAYORES EN UNA CLÍNICA-ESCUELA DE QUIROPRÁCTICA: UN ESTUDIO TRANSVERSAL

https://doi.org/10.56238/revgeov17n11-026

Data de submissão: 05/10/2026 **Data de publicação:** 05/11/2026

Pablo Fabrício Flores Dias[1], Carlos Eduardo Duarte Moraes[2], Francesco Todde[3]

ABSTRACT

Increased life expectancy has created new challenges in caring for the elderly population, especially in recognizing and managing frailty. Frailty is a multidimensional geriatric syndrome associated with negative outcomes such as falls, hospitalizations, and premature death. Chiropractic, because it affects musculoskeletal health, can play an important role in detecting and addressing early signs of frailty. This cross-sectional study aimed to classify the frailty phenotype in elderly individuals treated at a chiropractic school clinic. The sample consisted of 10 elderly individuals aged 60 years and older. Handgrip strength, gait speed, self-reported fatigue, weight loss, and physical activity level were assessed. The analysis followed the criteria of Fried et al. (2001). The results showed that 60% of participants were pre-frail and 40% were frail. It is concluded that frailty assessment should be integrated into chiropractic care for the elderly, with multimodal therapeutic strategies.

Keywords: Frailty. Chiropractic. Elderly. Public Health. Functional Assessment.

RESUMO

O aumento da expectativa de vida trouxe novos desafios ao cuidado da população idosa, especialmente no que tange ao reconhecimento e ao manejo da fragilidade. A fragilidade é uma síndrome geriátrica multidimensional associada a desfechos negativos, como quedas, hospitalizações e morte prematura. A quiropraxia, por atuar na saúde musculoesquelética, pode desempenhar um papel importante na detecção e no enfrentamento de sinais precoces de fragilidade. Este estudo transversal teve como objetivo classificar o fenótipo de fragilidade em idosos atendidos em uma clínica-escola de quiropraxia. A amostra foi composta por 10 idosos com 60 anos ou mais. Foram avaliados a força de preensão manual, a velocidade da marcha, a fadiga autorrelatada, a perda de peso e o nível de atividade física. A análise seguiu os critérios estabelecidos por Fried et al. (2001). Os resultados mostraram que 60% dos participantes apresentavam pré-fragilidade e 40% eram frágeis. Conclui-se que a avaliação da fragilidade deve ser integrada ao atendimento quiroprático voltado a idosos, por meio de estratégias terapêuticas multimodais.

[1] Bachelor. Esp. D.C. (Lead author). Universidade Federal de Ciências da Saúde de Porto Alegre (UFCSPA). Orcid: https://orcid.org/0009-0003-5829-9762
[2] PhD. Faculdade Caduceu. Orcid: https://orcid.org/0000-0002-3865-2763
[3] Ph.D. Department of Medical Sciences and Public Health, School of Sport Medicine, University of Cagliari. Cagliari, Italy. Orcid: http://orcid.org/0000-0003-1292-6428

Palavras-chave: Fragilidade. Quiropraxia. Idosos. Saúde Pública. Avaliação Funcional.

RESUMEN
El aumento de la esperanza de vida ha planteado nuevos desafíos en el cuidado de la población de edad avanzada, especialmente en lo que respecta a la identificación y el manejo de la fragilidad. La fragilidad es un síndrome geriátrico multidimensional asociado a resultados adversos, tales como caídas, hospitalizaciones y muerte prematura. La quiropráctica, al incidir en la salud musculoesquelética, puede desempeñar un papel importante en la detección y el abordaje de los signos tempranos de fragilidad. Este estudio transversal tuvo como objetivo clasificar el fenotipo de fragilidad en personas mayores atendidas en una clínica docente de quiropráctica. La muestra estuvo compuesta por 10 personas de 60 años o más. Se evaluaron la fuerza de prensión manual, la velocidad de la marcha, la fatiga autoinformada, la pérdida de peso y el nivel de actividad física. El análisis siguió los criterios establecidos por Fried et al. (2001). Los resultados mostraron que el 60 % de los participantes presentaba prefragilidad y el 40 % fragilidad. Se concluye que la evaluación de la fragilidad debería integrarse en la atención quiropráctica para personas mayores, mediante estrategias terapéuticas multimodales.

Palabras clave: Fragilidad. Quiropráctica. Personas Mayores. Salud Pública. Evaluación Funcional.

1 INTRODUCTION

Population aging has been consolidated as one of the main contemporary demographic challenges, both in Brazil and globally. The drop in fertility rates, the increase in life expectancy and the reduction in mortality contribute to a significant change in the age structure of the population. In Brazil, the fertility rate is close to the replacement level, with an average of 2.1 children per woman (SIMÕES, 2006), which has a direct impact on the base of the age pyramid, resulting in a reduction in the number of children and adolescents.

Projections by the Brazilian Institute of Geography and Statistics (IBGE) indicate that, by 2050, there will be a significant increase in the population aged 60 and over, reaching about 64 million people, surpassing the number of individuals up to 14 years of age. This age group will represent approximately 24.7% of the total population, which requires adaptations of health services and trained professionals to meet the specificities of aging.

During the aging process, there is a greater propensity for the emergence of functional, cognitive, and physical limitations. Frailty, in this context, is one of the main risk factors, being associated with higher rates of hospitalization, functional dependence and mortality. According to Fried et al. (2001), frail elderly people had a mortality rate six times higher in three years of follow-up, when compared to non-frail people.

In addition to clinical issues, aging must also be understood in its social and political context. The Statute of the Elderly (Law No. 10,741/2003) establishes the responsibility of the family, society and the State to guarantee the fundamental rights of the elderly, including health, dignity and community participation. In this scenario, it is necessary to involve professionals from different areas, including chiropractic, in promoting the health and quality of life of this population.

Chiropractic is defined by the World Federation of Chiropractic (2006) as a health profession focused on the diagnosis, treatment and prevention of dysfunctions of the neuromusculoskeletal system and their impacts on general health. By working in primary care and having specific skills for functional assessment, the chiropractor can play an important role in identifying early signs of frailty in the elderly.

Considering the relevance of the theme and the need for local data to guide evidence-based clinical practice, the present study aims to classify the phenotype of frailty in elderly people treated at the CIES/Feevale Chiropractic School Clinic, verify its association with self-reported health status, and discuss the findings in the light of the literature. It is intended,

therefore, to contribute to the expansion of knowledge about the performance of chiropractic in the care of the elderly and to foster new investigations in the area.

2 METHODS

This study was characterized as a cross-sectional research with a quantitative approach, with the objective of collecting data on the classification of the frailty phenotype in elderly patients attended by the Chiropractic School Clinic of the Integrated Center for Health Specialties (CIES) of Feevale University. The quantitative methodology allowed the measurement and description of the variables related to frailty, through the application of standardized instruments and descriptive statistical analysis.

2.1 POPULATION AND SAMPLE

The study population was composed of individuals aged 60 years or older, of both sexes, who received care at the Chiropractic School Clinic. The sample was non-probabilistic by convenience, totaling 10 participants. The subjects were approached in person at the outpatient clinic, respecting the inclusion criteria, and voluntarily agreed to participate in the research. All participants answered a sociodemographic questionnaire and underwent physical evaluation.

2.2 ETHICAL ASPECTS

This study followed the guidelines of Resolution No. 466/12 of the National Health Council (CNS), ensuring the secrecy, confidentiality, and integrity of the information provided by the participants. All subjects signed the Informed Consent Form (ICF), which was provided in two copies. The study did not involve any type of therapeutic intervention, being approved by the advising professor and conducted in accordance with current ethical principles. The research data and documents will be stored for five years, and will then be discarded, and will not be used for purposes other than those provided for in this study.

2.3 DATA COLLECTION

Data collection was carried out in person, immediately after signing the ICF. The instruments used included a sociodemographic and basic health questionnaire, in addition to the application of physical tests to assess the components of frailty according to the criteria of Fried et al. (2001), adapted to the Brazilian reality. The tests were carried out individually,

respecting the health standards in force at the time, related to the prevention of COVID-19. The indicators evaluated included: unintentional weight loss (self-reported), handgrip strength (measured by dynamometer), fatigue level (assessed by the Fitch Pictogram), level of physical activity (using the IPAQ questionnaire – long version) and gait speed (assessed by the 6-Minute Walk Test). Based on these criteria, participants were classified as non-frail, pre-frail, or frail.

2.4 DATA ANALYSIS

The data were organized and analyzed in a descriptive way, with the presentation of absolute and relative frequencies, through the elaboration of tables. For this, the Microsoft Excel® 2010 software was used. The results allowed us to characterize the sociodemographic profile of the sample and identify the prevalence of criteria associated with the frailty phenotype among the elderly evaluated.

3 RESULTS

Table 1 presents the sociodemographic data of the 10 participants of the research, all of whom were elderly and attended at the Chiropractic School Clinic of Feevale University. There was a predominance of females, representing 70% of the sample, while men corresponded to 30% of the subjects evaluated.

Regarding the age group, most participants (50%) were between 65 and 70 years old. The others were distributed between 70 and 75 years (20%) and 75 to 80 years (30%), with no individuals over 80 years of age in the sample. Regarding marital status, most of the elderly were married (70%), followed by 10% of widowers, 10% of single and 10% of divorced. These data suggest the predominance of stable family contexts among the participants, which can positively influence the social support network.

With regard to the level of education, 50% of the subjects had only incomplete elementary school, while 40% had completed high school. Only one participant (10%) reported having completed higher education, indicating a mostly low educational profile.

All the elderly (100%) reported having a family income between 1 and 2 minimum wages, and this income came exclusively from retirement or pension. This pattern reflects a limited socioeconomic reality, with a potential impact on the autonomy, access to health services, and quality of life of these individuals.

Table 1

Variable	Categoria	Frequency (n)	Percentage (%)
Sex	Female	7	70%
	Male	3	30%
Age	65 to 70 years old	5	50%
	70 to 75 years old	2	20%
	75 to 80 years old	3	30%
Marital status	Married	7	70%
	Single	1	10%
	Widow(er)	1	10%
	Divorced	1	10%
Schooling	Incomplete fundamental	5	50%
	Complete high school	4	40%
	Complete higher education	1	10%
Household income	1 to 2 minimum wages	10	100%
Source of income	Retirement/Pension	10	100%

Source: Dias et al (2025)

These sociodemographic data provide important support for understanding the context in which the elderly are inserted, helping to interpret the clinical and functional findings related to the frailty phenotype.

Table 2 presents the main indicators related to the frailty phenotype evaluated in the sample composed of 10 elderly patients treated at the Chiropractic School Clinic of Feevale University. The data reveal that 30% of participants reported involuntary weight loss in excess of 4.5 kg or 5% of body weight in the last year, while 70% did not experience significant weight loss.

Regarding handgrip strength (HGS), used as a marker of muscle strength, it was observed that 50% of the individuals presented values below the reference parameters described in the literature, being considered at risk for muscle fragility. The other half of the sample showed preserved strength.

The evaluation of fatigue, carried out using the Pictogram of Fitch (2003), showed that 20% of the elderly had high levels of fatigue (very or extreme), while 80% reported mild, moderate or absent levels, indicating that, although most do not report intense fatigue, this is still a component present in a relevant part of the sample. Regarding the level of physical activity, measured by the International Physical Activity Questionnaire (IPAQ), a balanced

distribution was identified: 50% of the participants were classified as very active or active, while the remaining 50% were considered sedentary or irregularly active. This data suggests a division in the adoption of healthy movement habits among the elderly evaluated.

Finally, all individuals in the sample (100%) performed below the expected in the Six-Minute Walk Test (6MWT), not reaching the minimum distance predicted based on the equations of Enright and Sherril (1998). This finding reinforces the impairment of the locomotor functional capacity of the sample and represents an objective criterion for the classification of frailty.

These results indicate the presence of different components of the frailty syndrome among the elderly evaluated, with low gait speed being the most prevalent marker (present in 100% of the sample), followed by low muscle strength, sedentary lifestyle, weight loss, and fatigue, which were variously distributed among the participants.

Table 2

Indicators Related to Frailty in the Elderly (n = 10)

Indicator	Category	Percentage Frequency (n)	(%)
Self-Reported Weight Loss	No weight loss	7	70%
	With weight loss (>4.5kg) or 5%	3	30%
Grip Strength Manual (FPM)	Within the values of reference	5	50%
	Below the values of reference	5	50%
Fatigue (Pictogram of Fitch)	Mild/moderate/absent	8	80%
	Excessive or extreme fatigue	2	20%
Physical Activity (IPAQ)	Very active or active	5	50%
	Sedentary or irregular active	5	50%
Gait speed (TC6M)	Below the minimum distance expected	10	100%
	Within the minimum distance expected	0	0%

Source: Dias et al (2025)

Based on the evaluation of the five components of the frailty phenotype proposed by Fried et al. (2001) — weight loss, self-reported fatigue, handgrip strength, level of physical activity and gait speed — it was possible to classify the participants according to their degree of frailty.

As shown in Table 7, none of the participants was classified as "non-frail". Most of the sample (60%) was classified as pre-frail, i.e., it presented one to two frailty criteria. The remaining 40% were classified as frail, presenting three or more positive criteria.

Table 3

Classification of the Phenotype of Frailty

Category	Frequency (n)	Percentage (%)
Prefragile	6	60%
Fragile	4	40%
Non-fragile	0	0%

Source: Dias et al 2025

4 DISCUSSION

Sociodemographic data are fundamental in research with the elderly, as they provide important information about the socioeconomic, cultural, and health characteristics of the elderly population, allowing a better understanding of social and health inequalities in this age group. With this data, researchers can analyze the differences between groups and identify the factors that can influence the health and well-being of the elderly. Sociodemographic data are also important for the planning and implementation of public policies aimed at this population.

The prevalence of women in this study reflects the reality of other research centers, Schenkman (2013) and Vindrola-Padros (2006) show that elderly women tend to be more engaged in university health care. This engagement can be explained by several factors, such as the search for preventive care, the possibility of access to a multidisciplinary health team, and the opportunity to participate in scientific research.

Low schooling, such as that found in the results of this study, is one of the main factors that contribute to frailty in the elderly. Lack of access to education and information can result in unhealthy lifestyle choices, such as unhealthy diets, physical inactivity, and smoking. Lack of access to health knowledge can lead to low adherence to preventive measures, such as vaccination and regular checkups. Liu et al (2020), in their study carried out in China, found an association between low education and a higher risk of developing frailty in the elderly. In addition, the study also showed that low health literacy was associated with a higher risk of frailty.

Low education is also related to lower income and precarious socioeconomic conditions, which can limit access to health services and adequate nutrition. The lack of financial resources can make it difficult to access medicines and health treatments, as well as adaptations at home that make the environment safer for the elderly. Garcia-esquinas (2016) found a strong relationship between low income and frailty in older adults in Spain. The results suggest that social inequality is an important factor in explaining health disparities in the elderly. In our research, we also evidenced a limitation in financial resources, since all patients earn less than 2 minimum wages per month.

Considering that only 50% of the subjects are in a situation of Very Active or Active, it is coherent that only half of the subjects were within the reference values according to Massy-Westropp et al. (2004) and 100% did not obtain the appropriate values of gait speed. Physical activity is an important factor for longevity and health in the elderly. Importantly, physical activity can be tailored to the individual needs and limitations of older adults and should be encouraged as a preventive measure against mortality in older adults. In a Framingham study, researchers evaluated the relationship between physical activity and mortality in older adults. The results showed that those who exercised regularly had a significant reduction in mortality compared to those who did not exercise.

Vining et al (2016) evaluated the effect of chiropractic care on muscle strength, balance, and endurance in active-duty military personnel and found that the intervention group (who received chiropractic care) showed significant improvements in muscle strength compared to the control group. Although we still have limited evidence, the literature suggests that chiropractic adjustment may have a positive effect on improving muscle strength in some cases. However, more studies are needed to confirm these results and identify the specific conditions under which chiropractic adjustment can be effective in improving muscle strength.

Due to the great impact of a sedentary lifestyle on the frailty of the elderly, and consequently on their longevity, physical activity programs could be implemented for this population with the aim of reducing these phenotype effects of aging. Currently, 40% of the sample is in frailty and 60% in pre-frailty. Manual chiropractic treatment alone has not been enough to put these elderly people out of a classification, so it is necessary to think about a multimodal approach to offer the best possible treatment for these patients.

5 CONCLUSION

The present research indicates that the elderly treated at the chiropractic clinic of CIES/Feevale are predominantly in a condition of pre-frailty or frailty, states that are associated with a higher risk of falls, hospitalizations, disabilities and early mortality. In view of this, it is essential to promote a safe and accessible environment, as well as to encourage healthy lifestyle habits — including a balanced diet, regular physical activity, and social integration — as preventive or mitigating strategies for frailty syndrome.

The relevance of the multimodal approach in the care of frail elderly is also highlighted, since this condition is multifactorial and involves interdependent biological, psychological and functional aspects. Integrated interventions, such as chiropractic, physiotherapy, occupational therapy, nutritional support, management of chronic diseases and psychological follow-up, are effective when they are personalized to the individual needs of each patient.

By addressing frailty in a comprehensive way, multimodal treatment contributes not only to the reduction of morbidity and mortality, but also to the improvement of the quality of life and functionality of the elderly. In addition, its positive impact on the reduction of hospitalizations and complications can significantly contribute to the sustainability of public and private health systems, by reducing costs and overloading services.

REFERENCES

1 - FRIED LP, et al. Frailty in older adults: evidence for a phenotype. The Journals of Gerontology Series A: Biological Sciences and Medical Sciences, 2001; 56(3): M146–M157.

2 - GARCÍA-ESQUINAS E, et al. Housing conditions and limitations in physical function among older adults. Journal of Epidemiology and Community Health, 2016; 70(10): 954–960.

3 - LIU Y, et al. The relationship between health literacy, social support, depression, and frailty among community-dwelling older patients with hypertension and diabetes in China. Frontiers in Public Health, 2020; 8: 280.

4 - MASSY-WESTROPP N, et al. Measuring grip strength in normal adults: reference ranges and a comparison of electronic and hydraulic instruments. The Journal of Hand Surgery, 2004; 29A(3): 514–519.

5 - SCHENKMAN M, et al. Engaging older adults in health care innovation: lessons from a university-based clinic. Journal of the American Geriatrics Society, 2013; 61(8): 1386–1391.

6 - SIMÕES CCS. A transição da fecundidade no Brasil: análise de seus determinantes e as novas questões demográficas. São Paulo: Arbeit Factory; Brasília: UNFPA, 2006.

7 - VINING R, et al. Effects of chiropractic care on strength, balance, and endurance in active-duty US military personnel with low back pain: a randomized controlled trial. The Journal of Alternative and Complementary Medicine, 2020; 26(7): 592–601.

8 - VINDROLA-PADROS C, et al. Engaging with and recruiting older people to a randomized controlled trial of a community-based health intervention: lessons learned from the TOPSHAPED study. Trials, 2020; 21(1): 898.

9 - WORLD FEDERATION OF CHIROPRACTIC. Definition of chiropractic. Available from: http://www.wfc.org