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Older Adults with Chronic Low Back Pain: A Clinical Population Vulnerable to Frailty?

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Abstract

The purpose of this secondary analysis was to explore the differences in proportions of frailty criteria, pre-frailty, and frailty in older adults with and without chronic low back pain (CLBP). Among individuals with CLBP, we also explored whether the proportions of these outcomes differed based on pain intensity status. Using measures to determine weakness, slowness, and exhaustion, we determined that older adults with CLBP had higher proportions of frailty criteria and were more likely to be classified as pre-frail. Older adults with high intensity CLBP had greater proportions of weakness and pre-frailty compared to those with low intensity CLBP. These preliminary findings suggest older adults with CLBP may be at a higher risk for frailty than those without pain; pain intensity may be an important factor in assessing risk of frailty in this population.

Keywords

frailty; chronic low back pain; older adults

INTRODUCTION

Low back pain is a prevalent (1) and expensive condition (2) in older adults. Individuals with chronic low back pain (CLBP) are thought to account for the majority of expenditures (3). Among older adults, individuals with CLBP have higher levels of disability and comorbidity burden, in comparison to their pain-free counterparts (4). Despite the fact that older adults with CLBP are generally less healthy than the general geriatric population, we have little understanding of the impact CLBP may have on broader clinical outcomes.

Frailty is described as a clinical syndrome that lowers an individual's resiliency to health stressors, increasing the risk of dependency and death (5). Fried and colleagues have created valid clinical criteria, which aid in screening those for frailty. These criteria are: 1) muscle weakness, 2) slowness, 3) exhaustion, 4) recent, unintentional weight loss, and 5) sedentary lifestyle (5). These criteria help to identify "frail" (having ≥3 of 5 criteria) individuals, as

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CONFLICT OF INTEREST

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well as those who are at an increased risk for becoming frail, otherwise known as “pre-frail” (having 1–2 of 5 criteria). Recent evidence suggests that pain and frailty may be linked (6).

Although older adults with CLBP have higher levels of disability and comorbidity burden compared to those without pain (4), these constructs are independent of frailty (7). To our knowledge, there are no investigations exploring the potential link between frailty and CLBP in older adults.

The purpose of our study is to determine whether frailty is proportionally higher among community-dwelling older adults with CLBP, compared to those without pain. Furthermore, we aim to investigate the potential relationship between pain intensity and frailty. We hypothesize individual frailty markers, pre-frailty, and frailty will be greater in those with CLBP compared to pain-free individuals. Second, we hypothesize that greater pain intensity will be linked to higher proportions of frailty markers, pre-frailty, and frailty.

METHODS

Participants

This is a secondary analysis of a comparative study that included 123 older adults with (n=66) and without (n=57) CLBP. All participants were 60–85 years old and cognitively intact. Participants with CLBP were included if they met the following pain criteria: ≥ 3/10 pain intensity rating, ≥ 4 days per week in frequency, and ≥ 3 months duration. CLBP participants were excluded if they had radicular symptoms, non-mechanical LBP symptoms, a progressive neurological disease, a terminal illness, or if they needed an assistive device for household ambulation. Older adults without CLBP were included if they had no low back pain, but were excluded if they had a history of lumbar surgery, treatment for low back pain in the past 6 months, severely limited mobility, a progressive neurological disease, or a terminal illness. All participants were recruited from newspaper advertisements, local senior centers, and retirement communities. The University of Delaware Institutional Review Board approved the study, and all participants signed an informed consent form.

Demographics and Self-Ratings

Participants reported their age and sex, while the modified Oswestry Disability Questionnaire (mOSW), which has shown to be reliable and valid in older adults (8), was used to measure low back pain-related disability. The mOSW is a self-report instrument, which measures perceived functional limitation due to low back pain on a 0–100% scale.

Frailty Criteria

Fried defined “frailty” by the presence of ≥ 3 of the following 5 criteria: 1) muscle weakness, 2) slowness, 3) exhaustion, 4) recent, unintentional weight loss, and 5) sedentary lifestyle (5). “Pre-frailty”, which has been shown to increase an older adult’s risk of developing frailty, is defined as having 1–2 of the frailty criteria.

Given the limitations of the dataset, we were only able to evaluate the following criteria: muscle weakness, slowness, and exhaustion. Grip strength data was not available; therefore, we used the Repeated Chair Rise test to evaluate muscle weakness (9), as this test is used in

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other frailty criteria (10). Participants were instructed to perform five sit-to-stands as fast as possible with their arms folded across their chest, and the time was recorded. Participants with timed scores that fell below the median, population-based cut-points identified by Guralnik and colleagues were classified as having weakness (11). If the self-selected gait speeds, taken on an 8-foot walkway, fell below the cut-points that were established by Fried, then participants were classified as having slowness (5). Finally, participants met exhaustion criteria if they answered "No" to the following item on the Geriatric Depression Scale: "Do you feel full of energy?" (10).

Pain Intensity

Pain intensity rating in the last 24 hours was measured using the pain thermometer, which is a vertically oriented Likert (0–10) scale, with higher ratings indicating more severe pain (12). Those scoring ≥5/10 on the pain thermometer were considered to have high intensity CLBP, while those scoring <5/10 were considered to have low intensity CLBP. Self-reported analgesic medication-use was compared between high and low intensity CLBP groups to ensure this factor did not confound group classification.

Statistical Analysis

SPSS 22 (SPSS IBM, Inc., Chicago, IL) was used for all statistical analyses. Descriptive analyses were performed for both groups. Chi-squared tests were used to assess differences in the proportions of the three individual frailty criteria, pre-frailty (i.e. meeting 1–2 of the 3 criteria), and frailty (i.e. meeting all 3 criteria) between those with and without CLBP (α=.050). The same approach was used to compare those with high intensity CLBP to those with low intensity CLBP.

RESULTS

Sixty-six older adults with CLBP and 57 without pain met the inclusion and exclusion criteria for this study. Table 1 contains descriptive statistics for both groups. The presence of comorbidities was similar between each group, with the exception of osteoarthritis (p=.001). Hypertension, cancer, and osteoarthritis were among the most common comorbidities.

Table 2 contains the results of chi-square tests of differences in proportions of clinical markers of frailty, as well as pre-frail and frail conditions. Because of the low prevalence of frailty (CLBP n = 4, pain-free n = 0), we collapsed pre-frail and frail individuals into one group. Older adults with CLBP had significantly greater proportions of muscle weakness (p=.006), slowness (p=.030), exhaustion (p<.001), and pre-frailty or frailty (p<.001), compared to those without pain. Furthermore, those with high intensity CLBP had higher proportions of muscle weakness (p=.020), exhaustion (p = .041), and pre-frailty or frailty (p=.002). Analgesic medication-use was similar between high and low intensity CLBP groups (p=.345), indicating that this likely did not influence group classification.

DISCUSSION

Our results suggest that markers and conditions of frailty are significantly more prevalent in older adults with CLBP, compared to those without pain. Furthermore, those with high

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intensity CLBP, have higher proportions of weakness, exhaustion, and frailty conditions than those with low intensity pain.

Although separate constructs, comorbid disease burden and disability share close relationships with frailty, such that disease burden and disability can be the cause or effect of frailty in older adults (7). Past work indicates that those with CLBP have a greater burden of comorbid disease, compared to those without CLBP (13). Furthermore, older adults with CLBP perform worse on tests of physical function, suggesting greater disability (4). However, clinicians and researchers agree, that comorbid disease and disability are not the same as frailty.

Preliminary evidence suggests that pain and frailty are linked (6). Despite a lack of research, a relationship between CLBP and frailty is clearly plausible. Older adults with CLBP are thought to be less physically active than those without pain (5). Higher intensity CLBP is more disabling than lower intensity CLBP (14), which may potentially elevate sedentary behavior. Sedentary behavior can cause further disability and the incidence of new diseases, increasing the risk of frailty. Therefore, older patients with CLBP may be at a unique risk for frailty, and our results suggest that pain intensity may play an important role in this process.

Study Limitations

There are some limitations with our study. We were only able to evaluate three of the five established criterion. In addition, we did not measure grip strength, but there is evidence to suggest that chair rise testing may be a valid, surrogate measure of knee extensor strength as it was used in the Study of Osteoporotic Fractures' frailty criteria (9). Regardless, only three frailty criterion are needed to establish a positive result; we suspect that if we were able to evaluate all five frailty criteria, the proportion of frailty in older adults with CLBP, would increase. Furthermore, the cross-sectional study design only allows us to establish that a relationship exists, but a prospective study is needed to establish causality. Therefore, future research should focus on prospectively evaluating this relationship with the full compendium of frailty criteria.

CONCLUSION

Clinicians should be aware of the potential link between frailty and CLBP in older patients, and continually monitor for signs of frailty in those with CLBP, as they may be at a unique risk for frailty. If frailty is identified, it is imperative to initiate a multidisciplinary approach to the management of this complex condition, with collaborative efforts from a team of healthcare providers (15).

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TABLE 1

Descriptive analysis of participants

Characteristics	CLBP (n=66)	No CLBP (n=57)
	n (% of group)	
Female	37 (56%)	40 (70%)
Hypertension	40 (61%)	28 (49%)
Diabetes	7 (11%)	3 (5%)
Cancer	11 (17%)	16 (28%)
Anxiety or Depression	14 (21%)	9 (16%)
Osteoarthritis	44 (67%) *	20 (35%) *
Osteoporosis	10 (15%)	9 (16%)
	Mean (SD)	
Age (y)	70.1 (6.8)	71.5 (6.9)
BMI	29.4 (5.7) *	27.0 (4.8) *
mOSW	34.3 (10.6)	–
Average pain intensity (0–10)	3.4 (1.6)	–

Abbreviations: CLBP = chronic low back pain; SD = standard deviation; BMI = body mass index; mOSW = Modified Oswestry Disability Questionnaire

* $p<.05$

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TABLE 2

Chi-square tests of differences in proportions of frailty conditions and criteria between those with & without pain and between those with high & low intensity CLBP

Criteria	CLBP (n=66)	No CLBP (n=57)	P	High Intensity CLBP (n=45)	Low Intensity CLBP (n=21)	P
	n (% of group)			n (% of group)		
Muscle Weakness	20 (31.3)	6 (10.5)	.006*	18 (40)	2 (10.5)	.020*
Slowness	10 (15.5)	2 (3.5)	.030*	8 (17.8)	2 (9.5)	.384
Exhaustion	43 (66.1)	10 (17.5)	<.001*	33 (73.3)	10 (50)	.041*
Pre-Frail or Frail	48 (72.7)	15 (26.3)	<.001*	38 (84.4)	10 (47.6)	.002*

Abbreviations: CLBP = Chronic Low Back Pain

*$p<.05$

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