The effect of kinesiophobia in older people with acute low back pain: longitudinal data from *Back Complaints in the Elders* (BACE)

O efeito da cinesiofobia em idosos com dor lombar aguda: dados longitudinais do estudo *Back Complaints in the Elders* (BACE)

El efecto de la quinesofobia en personas mayores con dolor lumbar agudo: datos longitudinales de *Back Complaints in the Elders* (BACE)

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Abstract

This study aimed to investigate the course of low back pain (LBP) intensity over a period of 12 months in older people with and without kinesiophobia. This was an international multicenter study. LBP intensity was examined by using the Numerical Pain Scale *at baseline and over five follow-up periods. The* Fear-Avoidance Beliefs Questionnaire *was used to measure patients' beliefs and fears. The study included 532 older adults (non kinesiophobic = 227; kinesiophobic = 305). The individuals had moderate pain at baseline, with a significant difference observed between the groups. Participants showed a rapid improvement in the first 6 weeks, followed by minor improvements in the succeeding months. However, a significant difference between groups remained during the follow-up period. Independently, kinesiophobia is a significant prognostic factor. These findings suggest the importance of screening for psychosocial factors in the management of older patients with LBP. Practice implications: patients need to be warned that pain can be perpetuated by inappropriate avoidance behaviors that may later lead to disability.*

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Introduction

Aging is accompanied by an increase in the incidence and prevalence of chronic diseases, and low back pain (LBP) stands out as one of the three main causes of non-fatal health loss for nearly three decades [1]. Historically, LBP research has focused on the general, economically active population. Unfortunately, research about older people is still incipient. A systematic review assessed the age-related inclusion criteria distribution of participants in randomized controlled trials of LBP interventions. A total of 41.6% of the included trials excluded people aged > 65 years [2]. In a systematic review of the course of LBP in older people, only five cohort studies have been found. It was observed that at 3 and 12 months of follow-up, approximately 40% of participants still reported pain. The authors highlighted the unfavorable prognosis and the need for more evidence on the topic [3].

Several reasons show why the clinical course of LBP in old adults may be different from younger populations. Older people have a greater number of comorbidities, including sarcopenia. Reports on the relationship between LBP and muscles indicated that LBP is related to lower skeletal muscle mass and intramuscular fat of spinal muscles [4]. The older adults also entail more frequent use of medications [5]. Furthermore, the anatomical basis for explaining LBP in older people may be different from young people. The source of LBP [6] in older patients are associated with increases in the probability of symptomatic facet or sacroiliac joint pain and decreases in the probability of intervertebral discs.

The LBP approach is complex. Physical and psychological aspects, including kinesiophobia, must be considered. Kinesiophobia is the term used to define the excessive fear of movement that results in feelings of vulnerability to pain or fear of injury recurrence [7]. Negative beliefs and attitudes can limit the individual's ability to deal with symptoms and reduce their ability to adopt positive coping strategies [8].

Studies regarding kinesiophobia and pain have provided controversial results. In a prospective cohort study, Ranger et al. [9] investigated the relationship between kinesiophobia, catastrophization, depression, and anxiety with LBP intensity and disability. When all factors were added to the regression model, only catastrophization and depression were statistically associated with the worst outcomes [9]. On the other hand, Nordstoga et al. [10] observed an association between kinesiophobia and pain in another prospective cohort study of individuals with LBP [10]. Note that, the aforementioned studies did not include an older population. Kinesiophobia increases the patients' chance of developing symptoms of depression and disability when compared to those who had positive beliefs and attitudes [11]. Thus, considering the lack of studies on LBP in older people and the possible relationship between psychosocial factors, this study aimed to investigate the course of LBP intensity over a 12 month-period in older people with and without kinesiophobia.

Materials and methods

Study design

This was an observational, longitudinal, ancillary study of the *Back Complaints in the Elders* study (BACE), an international multicenter study [12]. The Federal University of Minas Gerais's Ethics Research Committee approved this study (ETIC 0100.0.203.00-11) and all participants were informed of the study details and signed an informed consent form before participating in this study.

Participants

Sample selection was conducted by convenience. The inclusion criteria were individuals (aged ≥ 60 years) who presented a new (acute) episode of LBP (with current symptoms that had been occurring for < 6 weeks). The episode was defined as new if the person did not seek for care because of LBP during the 6 months before data collection. LBP was defined as any pain between the lowest ribs and the inferior gluteal folds, with or without leg pain [12]. Participants with severe diseases (infectious processes, malignant tumors, cauda equina syndrome), cognitive impairment [13], severe visual, motor, or hearing loss were excluded from the study.

Procedures

Data on sample characteristics, sociodemographic, and clinical conditions of the older adults, such as age, education level, number of comorbidities, body mass index (BMI), depressive symptoms [14], and sex were obtained using a standardized multidimensional questionnaire defined by the BACE research group. All questionnaires were applied by trained researchers.

Pain

LBP intensity was assessed with the *Numerical Pain Scale* (NPS). A reading of 0 (zero) indicated no pain, whereas 10 indicated the worst pain possible (severe pain). LBP can be classified as none (for 0 score), mild (1, 2, or 3), moderate (4, 5, or 6), and severe (7, 8, 9, or 10) [15]. LBP intensity was assessed at baseline and over five follow-up periods (6 weeks, 3, 6, 9, and 12 months). This is a simple instrument that is easy to apply and has high reliability and reproducibility [16].

Kinesiophobia

The *Fear-Avoidance Beliefs Questionnaire* (FABQ) was used to measure patients' beliefs and fears. The FABQ is composed of 16 self-reported items. Items are divided into two subscales, FABQ-Phys and FABQ-Work. The FABQ two subscales present a score that can range from 0 to 6. Based on the sample, participants completed only the FABQ-Phys. Within the FABQ-Phys, 4 out of the 5 questions are scored, for a maximal score of 24 points. Higher FABQ scores indicate a greater tendency to demonstrate avoidance of activity [7]. Psychometric properties of the FABQ were validated by Abreu et al. [17] and had an intra-class correlation coefficient between 0.8 and 0.9 [17]. Participants were divided into older people with (kin, FABQ-Phys ≥ 16) and without (nKin, FABQ-Phys ≤ 15) kinesiophobia [18]. An assessment to differentiate the groups was fulfilled at the baseline.

Statistical analysis

Sample characterization was determined using descriptive statistics. Data distribution was determined using the Shapiro Wilk's test. To verify if there were differences between the groups, Student's paired t-test or chi squared test were performed at baseline. In order to examine the clinical course of LBP, the Generalized Estimating Equation (GEE) model was used. The Tweedie model was employed according to the *Quasi-likelihood under Independence Model Criterion* (QIC). The FABQ-Phys score and time were the independent variables, while the intensity of the LBP was the dependent variable. For comparison between means, the pairwise contrast with Bonferroni correction method was used. A significance level of 0.05 was considered statistically significant. Statistical analysis was performed using SPSS (https://www.ibm.com/).
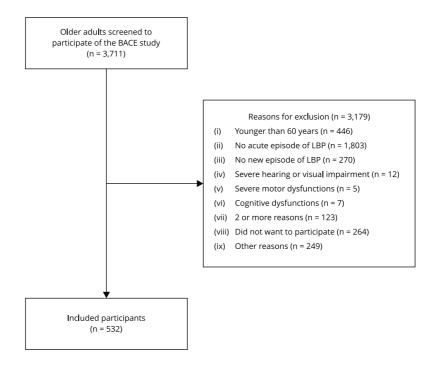
Results

The research team screened 3,711 older adults to participate in the BACE study. Among them, 532 participants met the inclusion criteria (Figure 1). Missing values corresponded to 24.6% of the data.

Table 1 shows the sociodemographic and clinical characteristics of the older adults, divided into the nKin and Kin groups. The data are presented as the mean ± standard deviation (SD) or percentage (%). Generally, most participants were female patients (nKin group = 84.1%; Kin group = 86.8%), with medium educational level (nKin group = 11.6±2.6 years; Kin group = 13.9±3.1 years), multiple comorbidities (nKin group = 4.9±2.6; Kin group = 4.8±2.7), obesity (nKin group = 29.4±5.0kg/m², Kin group = 28.6±5.2kg/m²), and depressive symptoms (nKin group = 22.3±10.3; Kin group = 21.2±9.8).

Figure 1

Flowchart of patient recruitment. Belo Horizonte, Minas Gerais State, Brazil, from September 2011 to December 2013.

BACE: *Back Complaints in the Elders* study; LBP: low back pain.

Table 1

Baseline characteristics of the study participants (n = 532). Belo Horizonte, Minas Gerais State, Brazil, from September 2011 to December 2013.

Characteristic	Non kinesiophobic (n = 227)	Kinesiophobic (n = 305)	p-value
Age (years) [mean±SD]	68.7±6.0	69.2±6.4	0.86 *
Education (years) [mean±SD]	11.6±2.6	13.9±3.1	0.57 *
Comorbidities (n) [mean±SD]	4.9±2.6	4.8±2.7	0.40 *
Body Mass Index (kg/m^2) [mean±SD]	29.4±5.0	28.6±5.2	0.84 *
Center for Epidemiological Studies Depression (0-60) [mean±SD]	22.3±10.3	21.2±9.8	0.29 *
Pain (0-10) [mean±SD]	4.4±3.0	5.0±3.1	0.03 *,**
Fear-Avoidance Beliefs Questionnaire (0-24)	9.8±2.2	20.2±4.6	< 0.01 *,**
Women [%]	84.1	86.8	0.37 ***

SD: standard deviation.
* Independent t-test;
** Significant statistical difference;
*** Chi-square test.

Figure 2 shows the intensity of LBP assessed by *Numerical Pain Scale* (0-10) at baseline and over five follow-up periods (6 weeks, 3, 6, 9, and 12 months). It was observed that the group of non Kinesiophobic older adults (FABQ-Phys ≤ 15) had a better clinical course of LBP.

Table 2 shows the comparison of the baseline with the five follow-up periods. The pairwise contrast showed statistically significant results between the groups throughout the study period.

Figure 2

Clinical course of low back pain. Belo Horizonte, Minas Gerais State, Brazil, from September 2011 to December 2013.
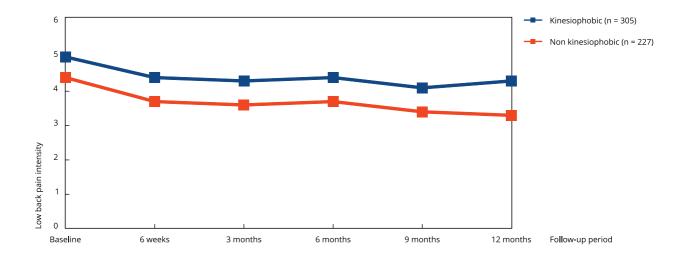

Table 2

comparison of the baseline low back pain intensity in kinesiophobic (n = 305) and non kinesiophobic older adults (n = 227) with the 5 follow-up periods. Belo Horizonte, Minas Gerais State, Brazil, from September 2011 to December 2013.

Period	Mean difference	Standard error	Bonferroni Sig	95%CI
Baseline				
6 weeks	0.65	0.17	< 0.01 *	0.12-1.12
3 months	0.75	0.18	< 0.01 *	0.19-1.27
6 months	0.65	0.19	< 0.01 *	0.07-1.21
9 months	0.95	0.20	< 0.01 *	0.34-1.52
12 months	0.90	0.19	< 0.01 *	0.22-1.38

95%CI: 95% confidence interval.
* Different from the baseline.

Discussion

This study aimed to compare the course of LBP intensity in older adults with and without kinesiophobia for 12 months. It was observed that kinesiophobic older individuals presented greater pain complaints during the 12-month period.

The groups were comprised of a majority of female patients. The literature indicates differences between genders regarding the incidence and clinical course of LBP which are higher in women [19]. Possible explanations are abdominal muscle strength [20], hormonal aspects [21], workplace [22], and negative beliefs [23]. The older adults had low education level, suggesting that older people with higher education have higher income, are more engaged in social participation, physical activity, leisure activities, and prevention and treatment of this disease [24]. Participants had a large number of comorbidities and the presence and severity of comorbidities are independently associated with worst prognosis of LBP [25]. Regarding BMI, the older adults were mostly obese. Body fat releases inflammatory mediators that are catabolic to muscle fibers. Older individuals with LBP have the highest sTNF plasma levels and the worst functional performance [26]. Finally, some older adults presented depressive symptoms. Depression can trigger the onset of back pain or worsen it. A longitudinal study showed that older people with depressive symptom score at baseline were twice as likely to have LBP at the 4-year follow-up [27].

To the best of our knowledge, this is the first study to investigate the association between kinesiophobia and the clinical course of acute LBP in older adults using the FABQ. Aasdahl et al. [28] in a cohort study stated that FABQ is not a good measure of fear-avoidance beliefs about physical activity, and the predictive property of the FABQ is most likely related to expectations rather than fear [28]. On the other hand, our findings show that kinesiophobia evaluated with the FABQ is a significant prognostic factor and we recommend using the instrument to measure fear-avoidance beliefs in acute conditions. Basler et al. [29] investigated the validity of FABQ in older individuals. They divided the participants into groups with LBP (n = 103, 71.4±5.2 years) and without pain complaints (n = 59, 71.1±4.7 years). The results were consistent with those described for the younger adult population. Thus, the instrument was validated for use in the older population [29].

The older adults had moderate pain at baseline, with a significant difference observed between groups. They showed a rapid improvement in the first six weeks, followed by minor improvements in the succeeding months. This pattern is similar to the course of LBP with other populations [30]. However, a significant difference between groups remained during the follow-up period.

The group of non-kinesiophobic patients had a pain score reduction of 1.3 points, which is within the range of the minimal clinically significant differences for patients with acute pain according to data published in a meta-analysis (0.4-4 on a scale of 10) [31]. This aspect highlights how psychological factors affect pain experience. The kinesiophobia model proposes that negative beliefs culminate in catastrophic responses. If the patients interpret the pain stimulus as threatening, they became hypervigilant in pain monitoring, worsening the results [32].

Some authors discuss changes in the brain tissue as a result of continued pain stimulation in patients with LBP [33]. In a study of patients with LBP, it was identified a 1.3cm³ reduction in gray matter density for each year that a patient experienced pain [34]. In a survey of 29 participants with LBP, it was concluded that the change in the gray matter was associated with the catastrophization and low tolerance to pain [35]. Atrophy of the gray matter was also related to the transition from acute to chronic pain [36]. A study by Larson et al. [37] with 433 older adults showed an association between chronic pain and high levels of kinesiophobia. The authors concluded that possible interventions to kinesiophobia in the older adults should aim to reduce the pain intensity and strengthen health beliefs [37].

Patients need to be informed that pain can be perpetuated by negative beliefs that may lead to disability. Sions et al. [38] examined the association between FABQ-Phys, disability (*Oswestry Disability Questionnaire*, *Quebec Back Pain Disability Scale*), and the summary of the physical component of the *Medical Outcomes Study 36-Item Short Form Survey* in older adults with LBP (n = 107, 79.7±5.7 years). The authors found that the FABQ-Phys score independently explained 3-6% of the functionality results. In a survey of patients with chronic LBP (n = 55, mean age 46.4±14.8 years) [38]. Chung et al. [39] found a significant correlation between the FABQ-Phys and Roland Morris Questionnaire (r = 0.32) and the *Oswestry Disability Questionnaire* (r = 0.19) [39]. In a recent publication by our research group, the

authors identified that worsened kinesiophobia, poor physical and mental health, stiffness of the lumbar spine, low self-efficacy during falls, difficulty in sleeping, higher BMI, greater pain intensity, sex, and worse functional mobility were significantly associated with disability [40]. The aforementioned studies reinforce that distorted thoughts play a central role in determining adverse health outcomes.

Individuals with kinesiophobia have an excessive, irrational, and debilitating fear of movement that results in feelings of vulnerability to pain and an addictive cycle of disuse, deconditioning, disability, and depression [41]. Our findings reinforce the need to examine psychosocial factors in patients with acute LBP.

We highlight the limitation of external validity since females compose the majority of the sample. Besides, LBP is self-reported, but this type of assessment is common due to the subjectivity of LBP and it is well accepted in epidemiological studies. Another limitation in this study is missing values. However, we also emphasize the study use of the GEE model which allowed the correction of individuals' observations over time and accommodated unbalanced data from the missing data [42]. Lastly, the treatment received during the course of the study was not standardized. After the inclusion procedure, the patients were free to contact other health professionals. Among the strengths of the study are the adequate sample size, the homogeneity of groups, and the extensive 12-month follow-up period.

Conclusion

Kinesiophobic older adults have a worse clinical course of acute LBP. Independently, kinesiophobia is a significant prognostic factor. These findings suggest the importance of screening for psychosocial factors in the management of older patients with pain complaints.

Contributors

D. C. Felício contributed in the conceptualization of the study, data curation, formal analysis, methodology, writing-original draft, writing-review and editing the text. J. Elias Filho contributed in the formal analysis of the study, methodology, writing-original draft, writing-review and editing the text. D. S. Pereira contributed in the conceptualization of the study, data curation, formal analysis, and writing-original draft. B. Z. Queiroz contributed in the data curation, formal analysis, and writing-original draft. A. A. O. Leopoldino and V. T. M. Rocha contributed in the conceptualization, data curation, formal analysis, methodology writing-review and editing the text. L. S. M. Pereira contributed in the conceptualization of the study, formal analysis, methodology, writing-original draft, writing-review, and editing the text. All authors approved the final version of the text for publication.

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Acknowledgments

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Resumo

O estudo teve como objetivo investigar a evolução da intensidade da dor lombar (DL) ao longo de 12 meses em idosos com e sem cinesiofobia. Este foi um estudo multicêntrico internacional. A intensidade da DL foi avaliada com a Numerical Pain Scale *na linha de base e ao longo de 5 períodos de seguimento. As crenças e os medos dos pacientes foram medidos com o* Fear-Avoidance Beliefs Questionnaire. *O estudo incluiu 532 idosos (sem cinesiofobia = 227; com cinesiofobia = 305). Os idosos apresentavam dor moderada na linha de base, com uma diferença significativa entre os grupos. Os participantes mostraram melhora rápida nas primeiras seis semanas, seguida por melhoras menores nos meses seguintes. Entretanto, persistiu uma diferença significativa entre os grupos durante o período de seguimento. A cinesiofobia é um fator prognóstico importante e independente. Os achados sugerem a importância da triagem de fatores psicossociais no manejo de pacientes idosos com DL. Implicações práticas: os pacientes devem ser advertidos que a dor pode ser perpetuada por comportamentos inadequados de evitação, podendo à incapacidade no longo prazo.*

Dor Lombar; Idoso; Medo

Resumen

El objetivo fue investigar el curso de la intensidad del dolor lumbar (LBP), durante un período de 12 meses, en personas ancianas con y sin quinesofobia. Se trata de un estudio multicéntrico internacional. La intensidad del LBP se evaluó usando la Escala Numérica de Dolor *en una base de referencia y sobre 5 períodos de seguimiento. Con el fin de medir las creencias y temores de los pacientes, usamos el* Fear-Avoidance Beliefs Questionnaire. *El estudio incluyó a 532 ancianos (no quinesofóbicos = 227; quinesofóbicos = 305). Los ancianos sufrieron un dolor moderado en la base de referencia, con una significativa diferencia observada entre grupos. Los participantes mostraron una rápida mejora durante las 6 primeras semanas, seguidas por mejoras menores en los meses siguientes. No obstante, se mantuvo una diferencia significativa entre grupos durante el período de seguimiento. Independientemente, la quinesofobia es un factor pronóstico importante. Estos resultados sugieren la importancia de monitorear factores psicosociales en la gestión de pacientes ancianos con LBP. Implicaciones clínicas: los pacientes necesitan ser avisados de que el dolor puede perpetuarse por comportamientos inapropiados de prevención que quizás más tarde conduzcan a la discapacidad.*

Dolor de la Región Lumbar; Anciano; Miedo