Chronic Pain and Functional Mobility - Relationships and Impact on the Quality of Life of the Elderly

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Abstract. Introduction: Individual ageing is defined as a progressive process of change. Chronic pain is more than a sensory event because it involves emotional and behavioural responses. It causes consequences at a psychological, social, and economic level and a physical level with limitations in mobility. Limitations may result in a decrease in functional capacity and social participation, affecting the quality of life of the elderly. Materials and Methods: Observational, cross-sectional, correlational and comparative study, with a sample of 48 elderly people. This sample was divided into two subgroups, the group with chronic pain ($n = 31$) and without chronic pain ($n = 17$). The Numerical Pain Scale (NPS) was applied to assess the intensity of chronic pain, the Time up and go (TUG) test to assess functional mobility and a quality of life (QoL) scale WHOQOL-Bref. The data collected was analysed using the SPSS programme. Results: Statistically significant differences were found in QoL's "Physical" domain between individuals with and without chronic pain ($p = 0.032$). No statistically significant differences were found in the TUG values between the sample subgroups ($p = 0.126$). A negative correlation was observed between the maximum intensity of chronic pain and the physical domain of QoL ($r = -0.505$). No statistically significant correlations were found between the maximum pain intensity and the TUG values, nor between the TUG values and the QL domains. Conclusion: It was not possible to verify that chronic pain influences functional mobility in elderly people. However, chronic pain was shown to have a negative impact on the physical domain of QL.

Keywords: Chronic pain · Functional mobility · Quality of life · Elderly

1 Introduction

Portugal is the fourth country in the European Union with the highest percentage of elderly people [1]. In 2015, around 20% of the Portuguese population was aged 65 years or more, and projections predict that in 2060 it will reach 29% [2].

Individual ageing should be understood as a natural, dynamic, progressive and irreversible process that occurs throughout the individual's life [3]. It is influenced by biological, social, economic, cultural, environmental and historical factors, thus being defined

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as a progressive process of biopsychosocial change of the individual throughout the life cycle [4]. It is associated with normal physiological changes that affect the human body, its systems and organs, and several changes may occur that affect functionality, mobility and health [5, 6]. It is characterised by the high incidence of chronic and degenerative diseases, often associated with chronic pain [7]. Changes in balance, strength, and cardiovascular status are common and generally associated with reduced social interactions, resulting in limitations in social participation [8, 9].

In Portugal, in age groups above 65 years old, the prevalence is between 55.9 and 62.5% and chronic pain is one of the main reasons for seeking healthcare and has a tremendous financial impact, increasing healthcare costs [10–14]. It is related to limitations in mobility [14, 15], difficulties in performing activities of daily living [15], increased risk of falling and fractures, cognitive deficits [14] and a decrease in quality of life in elderly individuals [10, 14–16]. In addition to the pain itself, these individuals commonly experience fatigue, anxiety, depression, sleep disturbance and social isolation [13, 17–20].

Both ageing [6] and chronic pain are related to changes in mobility [14, 15]. Mobility limitations are impairments in movement that affect between one third and half of the people aged over 65 years [21–24], limiting the ability of individuals to move around in different environments in order to perform functional tasks and activities of daily living at home, at work and in the community [25].

The risk factors most commonly associated with mobility limitation include advanced age, low physical activity levels, obesity, impaired strength or balance, and chronic diseases. Mobility limitations can cause serious physical, psychological and social consequences for the elderly and are often the first observable indicator of declining functionality [26]. These limitations may result in a decrease in quality of life and psychosocial health, with reduced social participation, leading to isolation and loneliness of the elderly individual [23–29].

The WHO defines the quality of life as "an individual's perception of their position in life in the context of the cultural and value system in which they live and concerning their goals, expectations, standards and concerns" (p. 28). It contemplates the influence of physical and psychological health, level of independence, social relationships, personal beliefs and its relation with characteristics of the environment [30].

The following are considered predictors of worse quality of life: being female, comorbidities, overweight, sedentary behaviour, mobility limitations, the existence of previous falls, chronic pain, dependence in daily life activities, taking multiple medications, unfavourable economic conditions, depression, isolation and loneliness [14, 23, 29, 31–36].

Therefore, the objective of this study is to assess the relationship between chronic pain, mobility and its impact on the quality of life of elderly people.

2 Materials and Methods

2.1 Type of Study, Sample and Ethical Aspects

This study is an observational, cross-sectional, correlational and comparative study that took place between July 2020 and June 2021. The sample is non-probability, consisting

of 48 elderly people living in the community or institutionalised in municipalities of the interior of Portugal.

The study obtained a positive opinion from the Ethics Committee of the Polytechnic Institute of Castelo Branco (Opinion Project No. 180 /CE-IPCB/2020).

2.2 Inclusion and Exclusion Criteria

The inclusion criteria were age 65 years or over, ability to walk independently and signing the Free Informed Consent Form.

Exclusion criteria were the pain caused by oncological situations, progressive neurological changes, history of fracture or surgery or prosthesis in the lower limbs in the last six months and MMSE score indicating moderate or severe cognitive impairment.

2.3 Procedures

After the completion of the informed consent by the participants, sociodemographic data were collected, as well as information regarding the presence, duration, location and intensity of pain, assessed through the Numerical Pain Scale (NPS). A cognitive function assessment questionnaire, the Mini-Mental State Examination (MMSE), was also applied to verify the exclusion criteria.

The World Health Organization's Abbreviated Quality of Life Assessment Tool (WHOQOL-Bref) and functional mobility assessed the quality of life using the Timed Up and Go test (TUG).

2.4 Instruments

The measures used to refer to the assessment of cognitive function through the MMSE, pain intensity through the Numerical Pain Scale, quality of life through the WHOQOL-Bref and functional mobility through the TUG test.

The MMSE is a valid test for cognitive function and allows distinguishing between subjects with and without cognitive disorders [37]. Performance on the MMSE is influenced by age and education, and cut-off values have been defined according to literacy [38].

The NPS is considered a valid and reliable scale for measuring pain intensity [39, 40]. Individuals with chronic pain prefer the NPS to other measures of pain intensity, given its easy understanding and execution [41, 42].

In the TUG test, the individual has to stand up from a chair, walk a distance of 3 m, return to the chair, and sit down again [43]. It is used to quantify functional mobility, a reliable and valid test for this purpose [43]. The normative values are divided into three age groups (60–69, 70–79 and 80–99 years) [44] and allow the identification of elderly people with deficits in mobility and its determinants such as strength and balance [44].

The WHOQOL-Bref consists of 26 questions, 2 of which refer to the general perception of health and the remaining 24 are organised into four domains: Physical, Psychological, Social Relationships and Environment [45]. It is an instrument with good temporal stability, appropriate to assess the individual's perception of quality of life, presents

acceptable internal consistency values, and has good discriminative power [45]. The score is comparable to that used in the WHOQOL-100 [46]. Higher scores correspond to a better quality of life [45].

2.5 Statistical Analysis

Statistical data analysis and processing were performed using the Statistical Package for the Social Sciences, version 24.0 for Windows (SPSS Inc.).

The frequency distribution was performed for the analysis and description of the sample. Spearman's non-parametric correlation test was used to correlate the variables.

The Mann-Whitney test was used to verify the statistically significant differences between the group with chronic pain and the group without chronic pain regarding the number of medicines taken, age, BMI, functional mobility test - TUG and the quality of life scale - WHOQOL-Bref. The statistical significance value determined was $p \leq 0.05$.

3 Results

3.1 Characterisation of the Sample

The mean age of participants was 81.33 ± 8.46 years (between 65 and 95 years), mostly female (68.8%), widowers (60.4%), with no education (37.5%) and residing in a nursing home (62.5%).

Regarding mobility, 31 participants had mobility problems, 18 used walking aids, and 11 reported having fallen in the last three months (Table 1).

Regarding the presence of pain, 34 (70.8%) reported pain and, of these, 31 had chronic pain. According to these data, participants were divided into two groups (Table 2), one with chronic pain and another without pain. In the group with chronic pain predominate women (80.6%), residents in a nursing home (67.7%) and with mobility problems (77.4%).

When comparing one group with the other, it is possible to verify that the group with chronic pain has a higher percentage of individuals who use walking aids, with a higher number of falls and who reveal practising less physical activity than those without chronic pain. In addition, it shows a higher mean in terms of age and number of medications taken per day, although without statistically significant differences for both age ($p = 0.698$) and medication ($p = 0.805$).

3.2 Scores Obtained in the Measurement Instruments

Through Table 3 it is possible to verify that the minimum pain intensity presents an average of 4.10 points in the NPS and the maximum an average of 6.52. The average number of medications taken per day is 7.11 ± 3.73 (between 0 and 16).

When analysing the scores by subgroups of the sample (Table 4), those with chronic pain have lower scores in the "Physical", "Psychological" and "Environmental" domains and this difference is more notable in the "Physical" domain, where this group has a mean score of 54.95 points compared to 67.02 in the group without chronic pain. On the

Table 1. Sample characterization (n = 48)

		Mean ± SD	N (%)
Age (Years)		81.33 ± 8.46	–
Gender	Women	–	33 (68,8%)
Marital status	Single	–	7 (14,6%)
	Married	–	9 (18,8%)
	Widow	–	29 (60,4%)
	Divorced	–	3 (6,3%)
Level of schooling	No schooling	–	18 (37,5%)
	Less than 4 years	–	14 (29,2%)
	4 years (1st cycle)	–	12 (25,0%)
	6 years (2nd cycle)	–	2 (4,2%)
	9 years (3rd cycle)	–	2 (4,2%)
BMI categories	Underweight	–	1 (2,1%)
	Overweight	–	23 (47,9%)
	Obese class I	–	9 (18,8%)
	Obese class II	–	3 (6,3%)
	Healthy	–	12 (25,0%)
Medication		7.00 ± 4.00	–
Smoking	Yes	–	2 (4,2%)
	No	–	42 (87,5%)
	Ex-smoker	–	4 (8,3%)
Mobility problems	Yes	–	31 (64,6%)
Walking aid users	Yes	–	18 (37,5%)
Falls (last 3 monts)	No	–	37 (77,1%)
Falls number		1,27 ± 0,65	18 (100%)
Regular physical activity	Yes	–	25 (52,1%)
Physical activity before Covid-19	More	–	24 (50,0%)
Pain	Yes	–	34 (70,8%)
Chronic Pain	Yes	–	31 (91,2%)

other hand, in the "Social" domain, the group with chronic pain shows a higher score (67.47) than the group without chronic pain (60.78).

Between groups, regarding the WHOQOL-Bref, statistically significant differences were found ($p = 0.032$) in the "Physical" domain of quality of life (Table 4). It may be inferred that the individuals in the sample who do not have chronic pain present a better

Table 2. Sub-samples characterization

		Chronic pain (n = 31)		No chronic pain (n = 17)	
		Mean ± SD	N (%)	Mean ± SD	N (%)
Age (years)		81.97 ± 7.16	–	80.18 ± 10,59	–
Gender	Men	–	6 (19,4%)	–	9 (52,9%)
	Women	–	25 (80,6%)	–	8 (47,1%)
BMI (Kg/m^2)		27.15 ± 4.49	–	28.40 ± 3.9	–
Medication		7.11 ± 3.73	–	6.81 ± 4,56	–
Smoking	Yes	–	1 (3,2%)	–	1 (5,9%)
	No	–	29 (93,5%)	–	13(76.5%)
	Ex-smoker	–	1 (3,2%)	–	3 (17.6%)
Residence	Nursing home	–	21 (67,7%)	–	9 (52,9%)
	Day center	–	4 (12,9%)	–	4 (23,5%)
	Community	–	6 (19.4%)	–	4 (23,5%)
Mobility problems	Yes	–	24 (77,4%)	–	7 (41,2%)
	No	–	7 (22,6%)	–	10(58,8%)
Walking aid users	Yes	–	15 (48,4%)	–	3 (17,6%)
	No	–	16 (51,6%)	–	14(82,4%)
Falls (last 3 monts)	Yes	–	9 (29%)	–	2 (11,8%)
	No	–	22 (71,0%)	–	15(88,2%)
Regular physical activity	Yes	–	15 (48,4%)	–	10(58,8%)
	No	–	16 (51,6%)	–	7 (41,2%)
Physical activity before Covid-19	Yes	–	15 (48,4%)	–	9 (52,9%)
	No	–	16 (51,6%)	–	8 (47,1%)

Table 3. Chronic pain characterization (n = 31)

		N (%)	Mean ± DP	Minimum	Maximum
Pain location	Upper limb	6 (19,4%)	–	–	–
	Lower limb	11 (35,5%)	–	–	–
	Trunk	14 (45,2%)	–	–	–
Minimum pain intensity		–	4.10 ± 1.97	0	8
Maximum pain intensity		–	6.52 ± 1.96	3	10
Medication		–	7.11 ± 3.73	0	16

Table 4. WHOQOL-Bref results in pain sub-samples

	Chronic pain (n = 31)			No chronic pain (n = 17)			*p*
	Mean ± SD	Minimum	Maximum	Mean ± SD	Minimum	Maximum	
Physical health	54.95 ± 17.90	21.43	85.71	67.02 ± 14.03	46.43	96.43	0,032*
Psychological health	61.29 ± 17.02	20.83	87.50	67.40 ± 18.00	29.17	100.00	0,278
Social relationships	67.47 ± 14.96	25.00	100.00	60.78 ± 11.70	50.00	83.33	0,054
Environmental health	62.80 ± 16.04	25.00	90.63	67.83 ± 13.43	43.75	93.75	0,418
General health	53.23 ± 21.64	0.00	100.00	64.71 ± 17.81	25.00	100.00	0,054

quality of life in this domain. As regards the other domains, no statistically significant differences were found.

As for functional mobility of the sample, Table 5 shows that there was meantime in the TUG of 19.19 ± 13.76. When the times were analysed by age (Table 5), all means were above the normative values for each age group. Regarding the TUG values, it was verified that nursing home residents present a higher meantime.

Table 5. TUG time by age and residence

TUG (seconds)		N	Mean ± SD	Minimum	Maximum
Sample		48	19.19 ± 13.76	7.54	59.89
Age (years)	60–69	6	9.78 ± 1.56	7.80	12.60
	70–79	13	13.98 ± 6.80	7.54	26.50
	80–99	29	23.47 ± 15.72	9.28	59.89
Residence	Nursing home	30	24.33 ± 15.14	8.32	59.89
	Day center	8	11.60 ± 3.89	7.54	20.10
	Community	10	9.84 ± 1.72	7.77	12.60

As to the TUG values for individuals with chronic pain, the average was 21.71 ± 15.56, while this number was much lower for individuals without chronic pain, around 14.59 ± 8.23 (Table 6). In both groups, the averages are higher than the normative values of the TUG in all age groups.

3.3 Correlations of the Variables Under Study

Table 7 shows a negative correlation with statistical significance between the maximum intensity of chronic pain and the physical domain of quality of life ($r = -0.505$) and a negative correlation between medication and the psychological ($r = -0.386$) and social ($r = -0.376$) domains of the quality of life scale - WHOQOL-Bref. There was also a positive correlation with statistical significance between the number of medications taken and the times performed in TUG ($r = 0.377$) and between age and the times performed in TUG ($r = 0.463$). No statistically significant correlations were found between maximum pain intensity and the functional mobility measure (TUG), nor any other quality of life domain besides the physical one. The TUG values also showed no relationship with the various quality of life domains.

4 Discussion

The present study aimed at assessing the relationship between chronic pain functional mobility and its impact on the quality of life of elderly individuals.

The analysis of the results showed that most elderly individuals with chronic pain are female [80.6%], as in other studies [16, 47, 48]. Reasons for women having lower

Table 6. *TUG* time by sub-samples

	Chronic PAIN (n = 31)			No chronic pain (n = 17)			p
	Mean ± SD	Minimum	Maximum	Mean ± SD	Minimum	Maximum	
TUG (seconds)	21.71 ± 15.56	7,54	59,89	14.59 ± 8.23	7,80	37,00	0,126

Table 7. *Spearman* correlations

		Pain intens.	Medication (nº drugs)	Age	*TUG*	WHOQOL-Bref domains				
						Phys. health	Psych. health	Social relat	Environ. health	General health
Pain intensity	Correl. coeff	1,000	−,146	,071	,227	−,505**	−,324	,173	−,081	−,109
	Sig		,459	,705	,220	,004	,075	,351	,663	,558
Medication (nº drugs)	Correl. coeff	−,146	1,000	,051	,377*	−,321	−,386*	−,376*	−,363	−,176
	Sig	,459		,795	,048	,096	,042	,048	,058	,369
Age	Correl. coeff	,071	,051	1,000	,463**	−,148	,029	,203	,177	,243
	Sig	,705	,795		,009	,426	,875	,274	,341	,187
TUG	Correl. coeff	,227	,377*	,463**	1,000	−,320	−,208	−,072	−,294	,047
	Sig	,220	,048	,009		,080	,262	,702	,108	,801
Phys. health	Correl. coeff	−,505**	−,321	−,148	−,320	1,000	,750**	,315	,416*	,440*
	Sig	,004	,096	,426	,080		,000	,085	,020	,013
Psych. health	Correl. coeff	−,324	−,386*	,029	−,208	,750**	1,000	,475**	,661**	,497**
	Sig	,075	,042	,875	,262	,000		,007	,000	,004
Social relat	Correl. coeff	,173	−,376*	,203	−,072	,315	,475**	1,000	,412*	,304
	Sig	,351	,048	,274	,702	,085	,007		,021	,096
Environ. health	Correl. coeff	−,081	−,363	,177	−,294	,416*	,661**	,412*	1,000	,418*
	Sig	,663	,058	,341	,108	,020	,000	,021		,019
General health	Correl. coeff	−,109	−,176	,243	,047	,440*	,497**	,304	,418*	1,000
	Sig	,558	,369	,187	,801	,013	,004	,096	,019	

pain thresholds and tolerance and a tendency to feel greater intensity and discomfort with pain are explanations for this result [47, 49]. Also, maladaptive coping strategies may lead to chronic pain [47]. Chronic pain syndromes such as migraine, headache, low back pain, neck and knee pain are also more prevalent in women [50, 51].

It was also possible to verify that most individuals with chronic pain (67.7%) reside in nursing homes, being an expected result since more than 80% of the elderly residing in nursing homes report chronic pain [48].

Regarding age and the number of medications taken per day, although a higher mean was found in the group with chronic pain than those without chronic pain, these differences are not statistically significant. However, other studies report that taking medication is associated with pain [36] and that advancing age increases the likelihood of the onset of chronic pain [52].

One of the aims of this study was to understand the relationship between chronic pain and functional mobility. According to the literature, chronic pain is associated with changes in mobility [14, 15, 53]. According to the TUG, Stubbs et al. found that individuals with chronic musculoskeletal pain had more mobility limitations [14]. One explanation is that it is suggested that nervous system mechanisms associated with age-related mobility impairments may be accelerated by the presence of pain [54]. It is also proposed that chronic pain promotes changes in cognition and, consequently, limitations in mobility, namely through its interference with selective attention, and may act as a form of distraction during gait [55]. Factors such as musculoskeletal pathologies and pain-related depression may also contribute to limitations in mobility [15, 55]. Another possible cause is the belief that elderly people with pain stop performing certain activities for fear of its onset and exacerbation, thus becoming less physically active, which promotes their physical deconditioning and results in a cycle of pain permanence and disability [56, 57].

Thus, it would be expected that individuals with chronic pain would present greater mobility deficits compared to those without chronic pain; however, this was not verified. No statistically significant differences were observed to prove this premise in this study.

Furthermore, it was expected that individuals who reached higher pain intensities would perform higher TUG times, presenting greater mobility limitations. However, these effects were not observed. This may be explained because pain intensity alone does not encompass the heterogeneity and complexity of the pain problem in the elderly [58]. In this regard, one study concluded that pain distribution rather than intensity was shown to be more strongly associated with mobility limitations and disability [15].

One of the unexpected findings found in this study was that, although the mean of the TUG when checked without being by age subgroups was higher in the group with chronic pain, when analysing these values by age groups, in the 70–79 years old range the mean of the TUG was shown to be higher in individuals without chronic pain. This result is probably a consequence of the small sample size, mainly concerning the individuals without chronic pain and a higher value of the standard deviation of the TUG times, which possibly indicates that there are one or more subjects with very high values that may have contributed to this result.

Regarding the influence of chronic pain on the quality of life of the elderly, the hypothesis raised was that chronic pain negatively influences the quality of life, as referenced in several studies [14, 18, 59].

In the present study, this was verified: individuals with chronic pain presented lower scores in the "Physical", "Psychological", and "Environmental" domains of the WHOQOL-Bref. However, when comparing the groups, only in the physical domain were there statistically significant differences, which agrees with another study [60].

Regarding the relationship between the maximum intensity of chronic pain experienced by these individuals and QoL, a negative correlation with statistical significance was only found in the physical domain of the WHOQOL-Bref, showing that individuals who experience higher pain intensity have a lower quality of life in the physical domain. This was also observed in the study by Tse et al., where the physical component of quality of life correlated negatively with pain intensity [60].

In the study of Cunha et al., a weak correlation was found between pain intensity, assessed through the VAS and the physical and psychological domains and no correlation was found in the social and environmental domains. Possible justifications for these results are that the instrument used, the VAS is unidimensional and assesses only pain intensity [36]. Although pain intensity has some effect on the quality of life, it does not solely explain the relationship between chronic pain and quality of life and leads individuals with chronic pain to have a lower QoL compared to individuals without pain, since many other factors are involved, such as social support, coping strategies, pain catastrophising and depression [59, 61].

Concerning the relationship between functional mobility and quality of life, no statistically significant correlations were found between the TUG values and the various domains of the WHOQOL-Bref in individuals with chronic pain. However, it is proposed that changes in functional mobility may interfere with the quality of life, both in its physical and mental domains [14, 31, 33], leading to a decrease in social participation, promoting isolation and loneliness of the elderly individual [23]. It is also suggested that mainly those who experience pain in the lower limbs, namely knees and hips, have more limitations in mobility, which in turn increases the risk of falls and disability to perform activities of daily living, leading to a reduction in quality of life [60]. Despite this, in this study, there were no statistically significant differences in the distribution of the TUG values between the group of subjects with chronic pain in the lower limbs and individuals with chronic pain in other locations.

4.1 Limitations of the Study

The limitations of this study are that the sample was of convenience and small, conditioned by the fact that it was carried out in a pandemic period.

In addition, some individuals revealed some difficulties in understanding some questions of the WHOQOL-Bref, which may be due to the low levels of education in the sample.

The Numerical Pain Scale was used to assess pain, but this scale only assesses its intensity. It would have been interesting to assess other dimensions of pain.

5 Conclusion

In this study, it was not possible to verify that chronic pain influences functional mobility in elderly individuals.

Chronic pain negatively impacted the quality of life, mainly in the physical domain. In addition, the maximum intensity of pain correlated negatively with this same domain of QoL.

Functional mobility in the elderly with chronic pain was not associated with the quality of life in its domains.

It will be essential to understand the relationship between these same variables in a larger sample and with fewer differences between them in future studies. In addition, it is crucial to understand the impact of chronic pain on the mobility and quality of life of the elderly, taking into account other aspects of pain besides its intensity, namely its emotional, affective and behavioural dimensions, its impact on ADLs and the factors which aggravate/relieve it.

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