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Psychometric properties of the European Portuguese version of the London Chest Activities of Daily Living

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ABSTRACT

Introduction: Assessing the capacity for activities of daily living in chronic obstructive pulmonary disease patients allows us to determine the limitations imposed by the disease. Prior to this study, the version of the London Chest Activities of Daily Living commonly used in Portugal was the Brazilian adaptation.

Objective: To translate, adapt, and validate the London Chest Activities of Daily Living for the European Portuguese population and culture.

Methodology: Translation and cultural adaptation of the London Chest Activities of Daily Living was performed, followed by a multicentric cross-sectional study for validation. A rehabilitation nurse administered the London Chest Activities of Daily Living-European Portuguese and 50% of participants were invited to repeat it two weeks later for reliability. The results of the London Chest Activities of Daily Living- European Portuguese were compared with those of the one-minute sit-to-stand test and the St. George Respiratory Questionnaire for concurrent validity purposes.

Results: 107 participants diagnosed with chronic obstructive pulmonary disease were enrolled; 80 (74.8%) were male, and the mean age was 67.8±7.9 years. A statistically significant negative correlation was found between the one-minute sit-to-stand and the London Chest Activities of Daily Living-European Portuguese total score (r=-0.281, p=0.004), and a significant correlation was found with each of the St. George's Respiratory Questionnaire domains, as well as with the total score (symptoms: r=0.230, p=0.017; activity: r=0.428, p<0.001; impact: r=0.341, p<0.001; total: r=0.416, p<0.001). The internal consistency obtained was 0.901, and the intraclass correlation coefficient was 0.898.

Conclusion: The European Portuguese version of the London Chest Activities of Daily Living has good psychometric properties and can be considered equivalent to the original English version, in terms of psychometric properties. These results support the use of this instrument both in clinical and research settings to evaluate the impact of chronic obstructive pulmonary disease on activities of daily living.

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RESUMO

Introdução: A avaliação da capacidade para as actividades da vida diária em doentes com doença pulmonar obstrutiva crónica permite determinar as limitações impostas pela doença. Até à realização deste estudo, a versão do London Chest Activities of Daily Living comumente utilizada em Portugal era a adaptação brasileira.

Objetivo: Traduzir, adaptar e vali-dar a London Chest Activities of Daily Living para a população e cultura portuguesa europeia.

Metodologia: Foi efectuada a tradução e adaptação cultural da London Chest Activities of Daily Living, seguida de um estudo transversal multicêntrico para validação. A London Chest Activities of Daily Living-Português Europeu foi administrada por um enfermeiro de reabilitação e 50% dos participantes foram convidados a repeti-la duas semanas mais tarde, para verificar a sua fiabilidade. Os resultados da London Chest Activities of Daily Living-Português Europeu foram comparados com os do teste sit-to-stand de um minuto e com o St. George Respiratory Questionnaire para efeitos de validade concorrente.

Resultados: Foram incluídos 107 participantes com diagnóstico de doença pulmonar obstrutiva crónica; 80 (74,8%) eram do sexo masculino e a idade média era de 67,8±7,9 anos. Foi encontrada uma correlação negativa estatisticamente significativa entre o sit-to-stand de um minuto e a pontuação total do London Chest Activities of Daily Living-Português Europeu (r=-0,281, p=0,004), e uma correlação significativa com cada um dos domínios do St. George's Respiratory Questionnaire, bem como com a pontuação total (sintomas: r=0,230, p=0,017; atividade: r=0,428, p<0,001; impacto: r=0,341, p<0,001; total: r=0,416, p<0,001). A consistência interna obtida foi de 0,901 e o coeficiente de correlação intraclasse foi de 0,898.

Conclusões: A versão em português europeu do London Chest Activities of Daily Living tem boas propriedades psicométricas e pode ser considerada equivalente à versão original em inglês, em termos de propriedades psicométricas. Estes resultados apoiam a utilização deste instrumento tanto em contextos clínicos como de investigação para avaliar o impacto da doença pulmonar obstrutiva crónica nas atividades de vida diária.

Introduction

Respiratory diseases are currently the third leading cause of death worldwide.[1] Among respiratory diseases, chronic obstructive pulmonary disease (COPD) has the most significant impact on mortality,[2,3] being one of the leading causes of morbidity, number of years lived with disability and years of life lost adjusted for disability worldwide.[1] COPD is characterised by persistent respiratory symptoms and progressive airflow obstruction due to airway and/or alveoli changes, usually caused by exposure to harmful particles or gases, combined with individual factors, including events influencing lung development in childhood and genetics.[4] Smoking remains one of the main risk factors for developing COPD,[5] along with occupational exposure to harmful respiratory agents and environmental pollution.[6] In addition to these determinants, we may cite the significant economic burden that the management of COPD patients places on health systems.[7,8] Also, we should consider the high impact on the quality of life of these patients,[9] and their ability to carry out activities of daily living (ADL),[10] with significant repercussions on their families.[11]

The assessment of ADL capacity in COPD patients makes it possible to determine the limitations imposed by the disease.[12] With this goal, Portuguese guidelines for assessing the outcomes obtained by patients in respiratory rehabilitation programs in primary health care recommend using the London Chest Activities of Daily Living Scale (LCADL)[13] to determine gains in the ability to perform ADL.[14] Before this study, the version in use and referenced in these guidelines was written in Brazilian Portuguese.[15] No known European Portuguese version was validated for the Portuguese population.

LCADL was developed to assess the level of dyspnoea when performing ADL in patients with COPD.[13] The first question is whether participants live alone or with others. Next is a set of 15 items evaluated on a six-point Likert scale, which can be 0 ('I wouldn't do it anyway'), 1 ('I do not get breathless'), 2 ('I get moderately breathless'), 3 ('I get very breathless'), 4 ('I can't do this anymore') and 5 ('someone else does it for me'). It also has four dimensions, namely self-care (items 1 to 4), household chores (items 5

to 10), physical activity (items 11 and 12) and leisure (items 13 to 15). It has an additional multiple-choice question ('a lot', 'a little' or 'not at all') about how much breathing affects the patient's normal ADL. A single score is calculated for each dimension and in aggregate, that can be a maximum of 45 points, with higher scores indicating more significant limitations in performing ADL.

There is no sufficiently established consensus for the process of translation and cultural adaptation of self-reported health assessment and measurement instruments[16,17] and, although debatable.[18,19] evidence suggests that there might be cultural specificities in the performance of ADL with an impact on the results obtained when using measurement instruments.[20,21] Therefore, developing and testing a version in European Portuguese is required for methodological and scientific rigour.

Therefore, this study aimed to translate, adapt, and validate the LCADL instrument for assessing ADL limitations in COPD patients for the Portuguese population and culture.

Methodology

In the first phase – cross-cultural adaptation – LCADL was translated and culturally adapted to European Portuguese, following the Patient-Reported Outcome Consortium guidelines.[17] In the second phase – measurement properties' evaluation – the validity and reliability were tested in different clinical settings[22]. Concerning ethical and legal issues, authorisation was requested and granted by the authors of the LCADL.

Outpatients from three healthcare institutions were invited to participate in the validation study. Inclusion criteria were a) clinical diagnosis of COPD; b) age 18 years or older; c) no functional limitation in performing ADL (e.g., neurological, orthopaedic, or rheumatic); d) no history of severe or unstable heart disease; and e) patients being able to understand the instructions and perform the activities or tasks measured by the instruments used.

For data collection, non-probabilistic convenience sampling included outpatients from three hospitals (two from the Northern region and one from the Centre region) who met the inclusion criteria, from September 2022 to September 2023. As for the data collection instruments, in addition to the LCADL obtained in the first stage, we collected the following clinical and sociodemographic data: age, sex, body mass index (BMI), educational level, forced expiratory volume in 1 second (FEV1) and the COPD grade according to the Global Initiative for Chronic Obstructive Pulmonary Disease (GOLD). The one-minute sit-to-stand test[23] and the St. George Respiratory Questionnaire (SGRQ) – Portuguese version[24] were also used to determine concurrent validity.

The one-minute sit-to-stand test[23] is a functional capacity test that can be carried out in a small space with few resources. This test assesses the number of times a person can stand up and sit down in one minute, in a chair without arms and with no help of their upper limbs.

The SGRQ is an instrument that measures the impact on general health, daily life, and perceived well-being in COPD patients.[24] A score of zero indicates the best possible health condition, and 100 corresponds to the worst, i.e. higher values suggest more significant limitations. The scores for each domain and the total score were calculated and weighted using a spreadsheet software program provided by the authors of the SGRQ.

At least half of the participants from one of the data collection centres were invited to repeat the application of LCADL to calculate test-retest reliability within a two-week interval. A rehabilitation nurse carried out data collection.

Descriptive and inferential statistics were used to process the data using the IBM SPSS version 26. The Spearman correlation coefficient and Chi-square were used to calculate correlations and test independency between instrument scores and clinical variables. Cronbach's alpha was used to calculate internal consistency, and the ICC for the test-retest, with a significance level of 0.05.

No established consensus for sample size calculation for measurement tools validation exists.[25] The sample size used in the original validation study was 60[26]; however, we followed the minimum of 100 defended by COSMIN.[27]

The ethics committees authorised this study at all the participating institutions: no. I26793-202208; no. 14.OBS|2022; no. 232/22. All procedures for informed consent were complied with and informed consent was obtained from all participants.

Results

Phase I – Translation and Cross-cultural adaptation

The LCADL was translated from English into European Portuguese by two independent translators, and the two versions were then reconciled by the principal investigator using a consensus procedure. This version was then back-translated into English by a native English-speaking translator and compared with the original version, resulting in equivalent versions. A further comparative analysis between the European Portuguese and the Brazilian Portuguese versions was then carried out. This comparison reveals some inconsistencies due to the grammatical differences between the two variants of Portuguese. These inconsistencies have to do mainly with current vocabulary at the lexical level (for example, the expression "drying yourself" was translated into Brazilian Portuguese as "enxugar-se" and as "secar o corpo" in European Portuguese), and with phrases and sentences structure, at the syntactic level (for example, differences in pronoun placement and in the use of the gerund and infinitive of the verbs). The European Portuguese version was then presented and discussed with

five rehabilitation nurse experts in this field, for face validity. The suggestions made did not alter the tool's content. Cognitive interviews were then carried out in person with three patients who met the inclusion criteria to understand how they processed and answered the questions in the instrument. No changes resulted from these cognitive interviews. The final version (LCADL-PT) was then used for validation in three different clinical contexts.

Phase II – Measurement properties

In the validation process, 107 participants were enrolled. Table 1 presents the participants' characteristics and the various scores obtained in the clinical variables and the domains from SGRQ and LCADL. This same table also presents the various scores from the clinical variables and the domains from SGRQ and LCADL. Most patients were male (74.8%), with a mean age of 67.8 years and a low education level (79.2%). The majority were living with someone (84.1%) and reported a moderate health status (60.7%). On average, the participants showed a BMI of 26.6 (overweight), an FEV1 of 46.5% (severe) and could sit to stand in 1 minute almost 18 times. The GOLD scores were mainly split between moderate and very severe, and most participants (96.3%) reported a little or a lot of impact of dyspnea in their ADL. Regarding the SGRQ, the most severe limitations were in the activities and, based on LCADL, domestic activities.

Table 1. Sample sociodemographic and clinical characteristics and SGRQ and LCADL scores (n=107)

Setting	Hospital 1 Hospital 2 Hospital 3	47 (43.9%) 40 (37.4%) 20 (18.7%)
Sex	Male Female	80 (74.8%) 27 (25.2%)
Age	Mean ± sd (Min – max)	67.8 ± 7.9 (46 – 86)
Education level	Low Medium Higher missing	84 (79.2%) 15 (14.2%) 7 (6.6%) 1
Living alone	Yes No	17 (15.9%) 90 (84.1%)
BMI	Mean ± sd (Min – max)	26.6 ± 5.1 (16.4 – 41.5)
Sit-to-stand 1 minute	Mean ± sd (Min – max) Missing	17.9 ± 6.5 (1.0-36.0) 1
FEV_1 (%)	Mean ± sd (Min – max) missing	46.5 ± 18.2 (17.0 – 95.0) 1
GOLD score	A: mild ($FEV_1 \geq 80\%$) B: moderate ($50\% \leq FEV_1 < 80\%$) C: severe ($30\% \leq FEV_1 < 50\%$) D: very severe ($FEV_1 < 30\%$) missing	16 (15.5%) 36 (35.0%) 16 (13.1%) 35 (34.0%) 4
Self-assessment health	Good Moderate Bad Very bad	10 (9.3%) 65 (60.7%) 28 (26.2%) 4 (3.7%)
Impact of dyspnea in ADL	Not at all A little A lot	4 (3.7%) 58 (54.2%) 45 (42.1%)
SGRQ		
Symptoms	Mean ± sd (Min – max)	49.1 ± 21.6 (0,0 - 86.4)
Activities	Mean ± sd (Min – max)	70.0 ± 20.5 (0.0 - 100.0)
Impact	Mean ± sd (Min – max)	19,9 ± 17.5 (0.0 - 91.1)
Total	Mean ± sd (Min – max)	50.6 ± 17.5 (9.0 - 85.5)
LCADL		
Self-care	Mean ± sd (Min – max)	14.8 ± 11.5 (4.0-59.0)
Domestic activities	Mean ± sd (Min – max)	9.5 ± 9.8 (0.0-30.0)
Physical activities	Mean ± sd (Min – max)	5.0 ± 1.6 (2.0-10.0)
Leisure	Mean ± sd (Min – max)	5.0 ± 2.4 (0.0-12.0)
Total	Mean ± sd (Min – max)	27.1 ± 13.1 (6.0-64.0)

As for the correlation analysis, a statistically significant negative correlation was found between the results of the one-minute sit-to-stand and the LCADL-PT total score (r=-0.281; p=0.004). Significant correlations were also found between the LCADL-PT and each of the SGRQ domains (symptoms: r=0.230, p=0.017; activity: r=0.428, p<0.001; impact: r=0.341, p<0.001), as well as the total score (r=0.416, p<0.001).

Moreover, data show a statistical dependency between the LCADL question on the extent to which breathing affects the patient's normal ADL and the SGRQ question on the participant's perception of their current state of health (χ^2=52.6; p<0.001). The participants also evidenced a dependency between the perception of health status and the score obtained on the LCADL-PT (χ^2=18.1; p<0.001). On the other hand, the one-minute sit-to-stand test and the SGRQ were negatively correlated (r=-0.318; p<0.001).

Finally, no significant dependency was detected between the LCADL-PT and the GOLD classification (χ^2=5.15; p=0.161), and no correlations were found with FEV1 (r=-0.015; p=0.881), BMI (r=0.011; p=0.922), or age (r=0.011; p=0.921).

Analysing the reliability of the LCADL-PT revealed excellent internal consistency, with a Cronbach's α value of 0.901. Regarding the test-retest, 26 participants from Hospital 2 repeated the LCADL 15 days later, and an intraclass correlation coefficient value of 0.898 was obtained.

Discussion

The LCADL was developed to assess ADL limitations in COPD patients. Our results suggest that the European Portuguese version is valid and reliable for patients with this

condition. It correlates well with SGRQ domains and the total score, as in the original version.[13] Similarly, a correlation was found with functional capacity. However, we did not use the Shuttle Walking Test, as implemented by the original authors. Also, in the original validation, no correlation was found with FEV_1. The internal consistency value showed excellent internal consistency (α=0.901 vs α=0.980).

In addition, when comparing the Portuguese versions (European and Brazilian), both correlated significantly with all the domains of the SGRQ and the total score. LCADL-PT shows correlation scores ranging between 0.230 and 0.428 (p<0.017) for each domain, and total score, and the Brazilian version showed higher scores.[15] However, this was not the case in the original version,[13] and in the validation for other languages and cultures of the LCADL that showed statistically significant correlation values with the SGRQ,[28–30] corroborating the results now obtained.

The Six Minute Walk Test (6MWT) was also used to validate functional capacity in the Brazilian Portuguese version, showing a correlation between the results obtained when the LCADL was applied and the 6MWT.[15] In the research developed by Ozalevli and colleagues,[31] the results showed a strong correlation between the one-minute sit-to-stand test and the 6MWT, concluding that the sit-to-stand is capable of adequately assessing the functional capacity of COPD patients, producing less haemodynamic stress, and can be used as an alternative to the 6MWT. The evidence supports the one-minute sit-to-stand test for assessing functional capacity in different clinical populations,[32,33] particularly when time and space are limited. The correlation found with the LCADL-PT and the SGRQ strengthens the available evidence. Therefore, the one-minute sit-to-stand test is an alternative to other functional capacity tests when there are time and/or space constraints. As with the European Portuguese version, there was no significant correlation between FEV1 and BMI in the Brazilian Portuguese version.[15]

Regarding internal consistency, the results obtained for the European Portuguese version showed greater internal consistency than that found for the Brazilian Portuguese version15 (α=0.901 vs α=0.86), both lower than in the original version (α=0.98)13. The intraclass correlation found a coefficient of 0.898, which cannot be compared with the original or Brazilian Portuguese versions, as they did not calculate it.

The results of this study suggest that there are no cultural differences in the assessment of ADL ability. The studies conducted by Tirodkar et colleagues[20] and Dubbelman and colleagues[21] indicate that cultural differences may be reflected in measuring ADLs. Translating and culturally adapting existing tools is becoming increasingly frequent. It is quicker and less expensive than developing and validating a new one, allowing international comparisons. Conflicting evidence on cultural and ethnic aspects must be thoroughly investigated; otherwise, the measurement may not be reliable in translated tools. Measurement accuracy is paramount in health outcomes assessment, mainly those resulting from research on the effectiveness of therapeutic interventions.

Following international guidelines, the number of participants in this study is higher than in the original validation and the Brazilian Portuguese version. Furthermore, it was developed in different clinical settings. Nevertheless, this study has limitations, namely the use of the sit-to-stand as a measure of functional capacity in COPD patients, which, despite being duly supported by evidence, did not allow for comparison with the results of other studies relating this test to the LCADL-PT.

Conclusion

The findings suggest that, despite the lexical and syntactic differences between the European and the Brazilian Portuguese versions, LCADL-PT is equally valid and reliable compared to the original version. These results strengthen the evidence already available regarding the validity and reliability of the LCADL in assessing limitations in ADL in patients with COPD. Using LCADL-PT in research developed in Portugal to measure the effectiveness of respiratory rehabilitation programmes will provide culturally adapted, valid and reliable evidence on the outcomes of these programmes.

Various assessment tools are available in different languages. Developing assessment tools can be time-consuming and resource-intensive. However, it is possible to make them more easily accessible in clinical practice by translating, adapting, and validating the existing tools developed in other languages. These results strengthen the evidence supporting the translation and cultural adaptation of measurement tools as a valid and reliable method.

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Data availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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