

Original research article

## Reliability And Validity Of The Post-Covid Functional Scale For Assessing Functional Activities In Post-COVID-19 Patients

<sup>1</sup>Dr. Nishi Maniar, <sup>2</sup>Dr. Sonam Soni (PT), <sup>3</sup>Dr. Sushil Kumar, <sup>4</sup>Dr. Jafar Khan

<sup>1</sup>M.PTh Scholar, Udaipur, Rajasthan, India

<sup>2</sup>Assistant Professor, Pacific College of Physiotherapy, Pacific Medical University, Udaipur, Rajasthan, India

<sup>3</sup>Associate Professor, Department of Respiratory Medicine, Pacific Medical university, Udaipur, Rajasthan, India

<sup>4</sup>Dean & HOD, Pacific College of Physiotherapy, Pacific Medical University, Udaipur, Rajasthan, India

### Corresponding Author:

Dr. Nishi Maniar

### Abstract

Long COVID, characterized by persistent symptoms following acute COVID-19, presents a growing challenge. To address this, a reliable and valid tool, the POST-COVID FUNCTIONAL SCALE (PCFS), has been developed to assess functional limitations in post-COVID-19 patients. This study aims to investigate the reliability and validity of the PCFS and its clinical implications. An observational study with 40 post-COVID-19 patients aged 40-60 was conducted. The PCFS, designed to categorize functional limitations, was administered at two time points, examining test-retest reliability. Concurrent validity was established by comparing PCFS results with the Short Form-36 (SF-36) questionnaire. Data analysis employed statistical tests, including correlation analysis and ANOVA. Test-retest analysis revealed a high positive correlation ( $r = 0.837$ ) between PCFS scores at two different time points, demonstrating the scale's reliability. A significant difference between groups ( $F = 33.3$ ,  $p < 0.001$ ) in the ANOVA indicates that PCFS and SF-36 measure distinct aspects of functional status, establishing concurrent validity. The POST-COVID FUNCTIONAL SCALE proves reliable and valid for assessing functional limitations in post-COVID-19 patients. Its ability to provide unique insights into the extent of impairment complements the SF-36's broader assessment of health-related quality of life. The PCFS equips healthcare providers with a valuable instrument for tailoring rehabilitation programs and interventions to enhance the recovery and overall quality of life of Long COVID patients.

**Keywords:** Long COVID, POST-COVID FUNCTIONAL SCALE (PCFS), reliability, validity, functional limitations, assessment tool, Short Form-36 (SF-36), recovery, rehabilitation, health-related quality of life

## Introduction

The emergence of the novel coronavirus disease 2019 (COVID-19) pandemic brought about a global health crisis, challenging healthcare systems and societies in unprecedented ways. While much attention has been rightfully focused on the acute phase of COVID-19, it has become increasingly evident that a significant proportion of individuals who have recovered from the acute infection continue to experience a range of persistent symptoms. This condition, often referred to as "Long COVID" or "post-acute sequelae of COVID-19 (PASC)," has raised concerns regarding its impact on the physical and mental well-being of affected individuals <sup>[1]</sup>.

As the world grapples with the consequences of Long COVID, the need for reliable and valid assessment tools to evaluate the functional activities and overall quality of life in post-COVID-19 patients has become paramount. The POST-COVID FUNCTIONAL SCALE (PCFS) is one such instrument developed to address this need. This manuscript explores the reliability and validity of the PCFS in assessing functional activities in individuals recovering from COVID-19 <sup>[2]</sup>.

Long COVID encompasses a wide range of symptoms, which may persist for months after the acute infection has resolved. These symptoms can include fatigue, breathlessness, cognitive impairments, and psychological distress, among others. Patients with Long COVID often face challenges in performing daily activities and returning to their pre-infection health status <sup>[3]</sup>.

The PCFS is designed to classify individuals based on their level of functional limitations, ranging from "No functional limitations" to "Severe functional limitations" and "Death". By utilizing this scale, healthcare professionals and researchers can gain insights into the extent of functional impairment experienced by post-COVID-19 patients <sup>[4]</sup>.

In this study, we assess the reliability of the PCFS by examining the consistency of scores obtained when the scale is administered to the same individuals at two different time points <sup>[5]</sup>.

Furthermore, we investigate the concurrent validity of the PCFS by comparing its results with those of the well-established Short Form-36 (SF-36) questionnaire, a widely used health-related quality of life assessment tool. This research aims to provide healthcare providers and researchers with a valuable instrument for evaluating the functional status of post-COVID-19 patients, thus enhancing our understanding of Long COVID and its long-term impact <sup>[6]</sup>.

## Materials and Methods

**Study design:** This study employed an observational design to assess the reliability and validity of the "POST COVID FUNCTIONAL SCALE" in evaluating the functional activities of patients recovering from COVID-19.

**Study population:** The study population consisted of COVID-19 patients who had tested positive for SARS-CoV-2 and subsequently recovered from the acute phase of the illness.

**Sample size:** A sample size of 40 COVID-19 patients was recruited for this study. This sample size was chosen based on available resources and the feasibility of conducting a thorough observational investigation.

**Sampling method:** Convenient sampling was utilized to select participants from the pool of COVID-19 patients who met the inclusion criteria. The convenient sampling method was chosen due to the accessibility of participants in the post-COVID-19 rehabilitation settings.

### **Inclusion criteria**

- **Age:** 40-60 years.
- Confirmed history of COVID-19 infection.
- Recovered from the acute phase of COVID-19.

**Materials:** The following materials and instruments were used for data collection:

1. Informed consent form
2. Standard writing materials, including pencils and pens
3. A 15 cm ruler
4. Chairs for conducting various physical assessments
5. The "POST COVID FUNCTIONAL SCALE" for assessing the level of functional limitations among post-COVID-19 patients.

### **Procedure**

1. **Ethical Approval:** Ethical approval was obtained from the relevant institutional review board or ethics committee before the commencement of the study.
2. **Informed Consent:** All participants were provided with a detailed explanation of the study's purpose and procedures. Informed consent forms were presented to participants, who were asked to sign the consent form if they were willing to participate.
3. **Data collection:** The selection of participants was performed using convenient sampling. Participants were explained the study's purpose and procedure, and the "POST COVID FUNCTIONAL SCALE" was administered to assess the level of functional limitations.
4. The "POST COVID FUNCTIONAL SCALE" was administered to participants and the rater asked participants a series of questions related to their functional limitations and symptoms. Participants' responses were recorded based on the provided scoring criteria.
5. **Statistical analysis:** Data obtained from the questionnaires were analyzed using the Statistical Package for the Social Sciences (SPSS) version 24.0 for Windows. Since the data was ordinal and non-parametric, statistical tests appropriate for such data were employed.

### **Statistical tests**

1. **Test-retest analysis:** To assess the reliability of the "POST COVID FUNCTIONAL SCALE," a test-retest analysis was conducted, and the correlation between test and retest scores was calculated.

2. **Validity assessment:** The validity of the "POST COVID FUNCTIONAL SCALE" was assessed by analyzing the agreement between the initial test scores and the retest scores.
3. **Level of significance:** The level of significance (p-value) was set at 0.05.

**Results**

**Table 1:** Characteristics of Participants

Characters	Mean	SD
Age	51.6	5.3

**Table 2:** Test-Retest values of PCFS Frequency Percentage

**Test**

0	11	27.5
1	16	40.0
2	10	25.0
3	3	7.5

**Retest**

0	13	32.5
1	17	42.5
2	9	22.5
3	1	2.5

**Table 3:** Validity of SF-36 and PCFS

	Sum of squares	Mean square	P value
Between groups	887.6	295.9	<0.001
Within groups	319.3	8.9	

\*F Score-33.3

So, the reliability and validity of Post COVID Functional Scale is reliable and valid to assess the functional activities in Post COVID patients.

**Ethical consideration**

The study was conducted in compliance with ethical guidelines, and after obtaining approval dated 29/08/2022, PMU/PMCH/IEC/2022/220. All the participants complete information and concern form at recruitment.

## Discussion

The discussion section of this manuscript focuses on the reliability and validity of the POST-COVID FUNCTIONAL SCALE (PCFS) in assessing functional activities in individuals recovering from COVID-19. The study aimed to address the pressing need for a reliable tool to evaluate the functional status and quality of life of post-COVID-19 patients, particularly those suffering from Long COVID <sup>[7]</sup>.

**Reliability of the PCFS:** The test-retest analysis conducted in this study revealed a high positive correlation between the test and retest scores of the PCFS. This high correlation (r value of 0.837) indicates that the PCFS is a reliable instrument for assessing the functional limitations of post-COVID-19 patients <sup>[8]</sup>. The scores remained consistent when the same individuals were assessed at two different time points, suggesting that the PCFS can be used to reliably track changes in functional status over time. These findings are consistent with the intended purpose of the PCFS, which is to classify individuals into different functional limitation categories, helping healthcare providers and researchers gain insights into the extent of impairment experienced by patients recovering from COVID-19 <sup>[9]</sup>.

**Validity of the PCFS:** In addition to assessing the reliability of the PCFS, this study examined its concurrent validity by comparing its results with those of the well-established Short Form-36 (SF-36) questionnaire. The validity assessment included an analysis of agreement between the initial test scores and the retest scores. The analysis of variance (ANOVA) revealed a significant difference between the groups, with a high F score of 33.3 and a p-value of less than 0.001. These results suggest that the PCFS and SF-36 questionnaire measure different aspects of post-COVID-19 patients' functional status. While the SF-36 assesses a broader range of health-related quality of life domains, the PCFS focuses specifically on functional limitations <sup>[10]</sup>. Therefore, the PCFS demonstrates concurrent validity by providing unique information that complements the SF-36 results.

**Clinical implications:** The results of this study have important clinical implications. They demonstrate that the POST-COVID FUNCTIONAL SCALE is a reliable and valid tool for assessing the functional activities of post-COVID-19 patients. Healthcare providers can use this instrument to gain a comprehensive understanding of the functional limitations experienced by patients who have recovered from the acute phase of COVID-19. By identifying the level of functional impairment, clinicians can tailor rehabilitation programs and interventions to meet the specific needs of patients, thereby improving their recovery and overall quality of life <sup>[11]</sup>.

**Limitations and Future directions:** It is essential to acknowledge the limitations of this study. The sample size of 40 participants, while practical, may not fully represent the diversity of individuals with Long COVID. Future research should consider larger and more diverse samples to validate the generalizability of these findings. Additionally, the study focused on the reliability and concurrent validity of the PCFS. Further research could explore predictive validity, sensitivity to change, and its utility in clinical decision-making <sup>[12]</sup>.

**Conclusion**

In conclusion, the POST-COVID FUNCTIONAL SCALE is a reliable and valid instrument for assessing the functional activities of individuals recovering from COVID-19. It offers a valuable tool for healthcare providers and researchers to better understand the functional limitations of post-COVID-19 patients, enhancing our ability to address the challenges posed by Long COVID and improve the overall well-being of these individuals.

**References**

1. Huang C, Huang L, Wang Y, *et al.* 6-month consequences of COVID-19 in patients discharged from hospital: a cohort study. *The Lancet.* 2021;397(10270):220-232.
2. Carfi A, Bernabei R, Landi F. Persistent Symptoms in Patients After Acute COVID-19. *JAMA.* 2020;324(6):603-605.
3. Nalbandian A, Sehgal K, Gupta A, *et al.* Post-acute COVID-19 syndrome. *Nature Medicine.* 2021;27(4):601-615.
4. Sudre CH, Murray B, Varsavsky T, *et al.* Attributes and predictors of long COVID. *Nature Medicine.* 2021;27(4):626-631.
5. Iqbal FM, Lam K, Sounderajah V, *et al.* Characteristics and predictors of acute and chronic post-COVID syndrome: A systematic review and meta-analysis. *E Clinical Medicine.* 2022;44:101-260.
6. Garrigues E, Janvier P, Kherabi Y, *et al.* Post-discharge persistent symptoms and health-related quality of life after hospitalization for COVID-19. *Journal of Infection.* 2020;81(6):e4-e6.
7. Jones KM, Mantell J, Barritt AW, Taylor J, McManus M. The reliability of the Post-COVID Functional Scale (PCFS) to measure functional changes following COVID-19. *Journal of Patient-Reported Outcomes.* 2022;6(1):20.
8. Ware JE, Sherbourne CD. The MOS 36-item short-form health survey (SF-36). I. Conceptual framework and item selection. *Medical Care.* 1992;30(6):473-483.
9. Ware JE, Snow KK, Kosinski M, Gandek B. SF-36 Health Survey: Manual and Interpretation Guide. The Health Institute, New England Medical Center, 1993.
10. Buysse DJ, Reynolds CF, Monk TH, Berman SR, Kupfer DJ. The Pittsburgh Sleep Quality Index: a new instrument for psychiatric practice and research. *Psychiatry Research.* 1989;28(2):193-213.
11. Bland JM, Altman DG. Statistical methods for assessing agreement between two methods of clinical measurement. *The Lancet.* 1986;327(8476):307-310.
12. Haley SM, McHorney CA, Ware Jr JE. Evaluation of the MOS SF-36 Physical Functioning Scale (PF-10): I. Unidimensionality and reproducibility of the Rasch item scale. *Journal of Clinical Epidemiology.* 1994;47(6):671-684.