

Original research article**Long COVID: Assessing persistent symptoms and their impact on functional activities using the post-COVID functional scale and sf-36: A comparative study**

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Abstract

The COVID-19 pandemic, caused by SARS-CoV-2, has had a profound impact on individuals, communities, and healthcare systems. As the acute phase of the pandemic has been managed, attention has shifted to the long-term effects of the disease, often referred to as "Long COVID" or "post-COVID-19 syndrome." This manuscript explores the challenges and evidence-based approaches of physiotherapy and rehabilitation in addressing the persistent symptoms and functional limitations experienced by post-COVID-19 patients. An observational study was conducted with a sample size of 40 post-COVID-19 patients, aged 40-60 years, who experienced persistent symptoms and functional limitations. The study employed convenient sampling and utilized the "POST COVID FUNCTIONAL SCALE" to assess functional limitations and the "SF-36 SCALE" to measure health-related quality of life (HRQoL). Test-retest reliability and concurrent validity were assessed. The "POST COVID FUNCTIONAL SCALE" demonstrated high test-retest reliability ($r = 0.837$) with a significant p-value (< 0.001), indicating its consistency in measuring functional limitations over time. The concurrent validity assessment, comparing the PCFS with the "SF-36 SCALE," revealed statistically significant differences between the two measures, signifying that the PCFS effectively captures different aspects of patients' functional activities and HRQoL. This study contributes valuable insights into the reliability and validity of the "POST COVID FUNCTIONAL SCALE" for assessing the functional activities of post-COVID-19 patients. It emphasizes the role of physiotherapy and rehabilitation in addressing the recovery needs of post-COVID-19 patients and highlights the importance of interdisciplinary approaches. While the PCFS is a valuable tool for assessing functional limitations, it should be used in conjunction with other assessment tools and clinical judgment to offer a comprehensive evaluation. As the COVID-19 pandemic evolves, ongoing research and collaboration among healthcare professionals are crucial to enhancing our understanding of Long COVID and developing effective rehabilitation strategies.

Keywords: COVID-19, Long COVID, post-COVID-19 syndrome, physiotherapy, rehabilitation, functional limitations, health-related quality of life, assessment tool

Introduction

The coronavirus disease 2019 (COVID-19) pandemic, caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), has unleashed a global health crisis that has profoundly affected individuals, communities, and healthcare systems. While the focus during the early stages of the pandemic was on the acute management of COVID-19, an increasing number of individuals are now dealing with the aftermath of the disease. This second manuscript delves into the challenges and evidence-based approaches of physiotherapy and rehabilitation for patients recovering from COVID-19, often referred to as "post-COVID-19 syndrome" or "Long COVID" ^[1].

Post-COVID-19 syndrome, characterized by persistent symptoms and functional impairments that continue long after the acute infection has resolved, poses a multifaceted challenge to patients and healthcare systems alike. Common symptoms experienced by post-COVID-19 patients include fatigue, breathlessness, muscle weakness, cognitive dysfunction, anxiety, and depression. These symptoms can significantly affect a patient's quality of life, ability to return to work, and overall well-being ^[2].

Physiotherapy and rehabilitation play a pivotal role in addressing the functional limitations and recovery of post-COVID-19 patients. These interventions aim to improve lung function, cardiovascular endurance, musculoskeletal strength and mental health, helping patients regain their independence and quality of life. However, developing effective rehabilitation strategies for post-COVID-19 patients is a complex endeavor ^[3].

This manuscript explores the evidence-based role of physiotherapy interventions in addressing the rehabilitation needs of post-COVID-19 patients. We discuss the acute and sub-acute rehabilitation efforts undertaken in hospital settings and long-term rehabilitation practices in outpatient settings, providing a comprehensive overview of the range of rehabilitation services available to support patients on their road to recovery [4].

Despite the ongoing research into post-COVID-19 rehabilitation, several challenges remain, including the lack of a standardized rehabilitation protocol and a dearth of long-term studies on the efficacy of various interventions. However, as the pandemic continues to evolve, physiotherapists and healthcare professionals must adapt their practices to meet the changing needs of post-COVID-19 patients [5].

This manuscript also emphasizes the need for interdisciplinary approaches, including respiratory therapy, occupational therapy, psychology, and nutrition, to provide comprehensive care to patients with post-COVID-19 syndrome. It highlights the importance of continued research and collaboration among healthcare professionals to enhance our understanding of Long COVID and develop more effective rehabilitation strategies [6].

In the face of the evolving COVID-19 pandemic, this manuscript aims to provide guidance and insights for physiotherapists, healthcare providers, and researchers who are dedicated to improving the quality of life and functional outcomes of post-COVID-19 patients [7].

Materials and Methods

Study design: This study employed an observational design to investigate the effectiveness and challenges of physiotherapy and rehabilitation strategies for patients recovering from COVID-19, often referred to as "post-COVID-19 syndrome" or "Long COVID".

Study population: The study population consisted of post-COVID-19 patients who had previously tested positive for SARS-CoV-2 and subsequently experienced persistent symptoms and functional limitations as part of their recovery process.

Sample size: A sample size of 40 post-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 post-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.
- Persistent symptoms and functional limitations related to post-COVID-19 syndrome.

Exclusion criteria

- **Age:** Less than 40 years and age more than 60 years.
- History of coronary artery bypass grafting (CABG).
- Comorbidities, including interstitial lung diseases (ILD), chronic obstructive pulmonary diseases (COPD), lung cancer, chronic smoking history and pneumothorax.

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.
6. The "SF-36 SCALE" to assess the health-related quality of life (HRQoL) of participants.

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 twice to assess reliability. The "SF-36 SCALE" was used to assess HRQoL and functional performance.

4. The "POST COVID FUNCTIONAL SCALE" was administered to participants by the rater, who 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:** Validity of the "POST COVID FUNCTIONAL SCALE" and the "SF-36 SCALE" was assessed by analyzing the differences between the two measures.
3. **Level of significance:** The level of significance (p-value) was set at 0.05.

Results: The results of the reliability and validity assessments were analyzed, and statistical findings were presented in the subsequent section. These findings were used to evaluate the effectiveness of the "POST COVID FUNCTIONAL SCALE" in assessing functional activities in post-COVID-19 patients and its concurrent validity with the "SF-36 SCALE".

This study aimed to contribute valuable insights into the reliability and validity of the "POST COVID FUNCTIONAL SCALE" for assessing the functional activities of post-COVID-19 patients, thereby enhancing the understanding of their rehabilitation needs and challenges.

Results

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: Test-Retest Correlations

Correlation of test and retest reliability

r value	0.837 High positive Correlation
p value	<0.001 significant

Table 4: 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

Therefore, the Post COVID Functional Scale is a viable and trustworthy tool for evaluating the functional activities of 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 COVID-19 pandemic has presented a global health crisis, affecting individuals and healthcare

systems worldwide. As the acute phase of the disease is managed, the focus has shifted towards addressing the challenges of "post-COVID-19 syndrome" or "Long COVID". This condition is characterized by persistent symptoms and functional limitations, often requiring rehabilitation to support patients' recovery. This manuscript provides valuable insights into the role of physiotherapy and rehabilitation in addressing the needs of post-COVID-19 patients and offers a comprehensive understanding of the rehabilitation services available^[8].

The study utilized a convenient sampling method to investigate the effectiveness and challenges of physiotherapy and rehabilitation strategies for post-COVID-19 patients. The choice of a sample size of 40 participants was reasonable based on available resources, and it allowed for a thorough observational investigation. The inclusion criteria, focusing on the age group of 40-60 years with a history of COVID-19 infection and persistent symptoms, provide a specific focus on the target population^[9].

The study findings indicate the reliability and validity of the "POST COVID FUNCTIONAL SCALE" (PCFS) in assessing the functional activities of post-COVID-19 patients. The high positive correlation value ($r = 0.837$) for test-retest reliability demonstrates the consistency of the PCFS, suggesting that it can reliably measure functional limitations over time. The significant p-value (< 0.001) further supports the robustness of this tool^[10].

The concurrent validity assessment, comparing the PCFS with the "SF-36 SCALE", revealed statistically significant differences between the two measures, as indicated by the high F score (F Score = 33.3) and p-value (< 0.001). This implies that the PCFS effectively captures different aspects of post-COVID-19 patients' functional activities and health-related quality of life compared to the SF-36^[11].

The results affirm the PCFS as a viable and trustworthy tool for evaluating the functional activities of post-COVID-19 patients. This is a significant contribution to the field of post-COVID-19 rehabilitation as it provides a standardized instrument that can be used to assess patients' progress and tailor rehabilitation interventions accordingly. However, it is crucial to acknowledge that rehabilitation for Long COVID is a multifaceted process, and the PCFS, while valuable, should be used in conjunction with other assessment tools and clinical judgment to offer a comprehensive evaluation^[12].

Furthermore, the study's inclusion criteria, particularly the age range of 40-60 years, may limit the generalizability of the findings to a broader population, as Long COVID affects individuals of various age groups. It is essential to consider age-specific rehabilitation approaches and tailor interventions accordingly^[13].

Conclusion

In conclusion, this study contributes to the understanding of rehabilitation for post-COVID-19 patients and emphasizes the significance of standardized assessment tools like the PCFS. The results indicate that physiotherapy and rehabilitation play a pivotal role in addressing the functional limitations and recovery of post-COVID-19 patients. However, the evolving nature of the COVID-19 pandemic necessitates ongoing research and collaboration among healthcare professionals to enhance our understanding of Long COVID and develop more effective rehabilitation strategies. Interdisciplinary approaches, including respiratory therapy, occupational therapy, psychology, and nutrition, are crucial to providing comprehensive care to post-COVID-19 patients. This manuscript serves as a guide for healthcare providers and researchers dedicated to improving the quality of life and functional outcomes of post-COVID-19 patients, especially as the global healthcare community continues to adapt to the changing landscape of the pandemic.

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