



Data Article

A dataset of the measurement of lower limb muscle strength with handheld dynamometry in patients undergoing hemodialysis

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ABSTRACT

The dataset presented in this article belongs to a test-retest reliability study of the assessment of lower limb muscle strength through handheld dynamometry in patients with End-Stage Renal Disease undergoing hemodialysis. The intervention was carried out at the Hospital de Manises, in Manises (Spain). The strength of different muscle groups in the lower limbs of participants undergoing hemodialysis was assessed at different points. The same researcher was in charge of doing all of the assessments, and a standardized protocol was followed to conduct the assessment. Data was collected during the dialysis sessions at different points of time. This dataset contains raw data obtained from those assessments. The analysis consisted in assessing the test-retest reliability, through the Intraclass Correlation Coefficient (ICC), of the measurement of strength in the lower limbs through hand-

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held dynamometry. Further analysis for this raw data could be to compare results obtained in this sample with results obtained in the assessment of similar samples, or to supply relevant scientific evidence to include the measurement of lower limb strength in patients undergoing hemodialysis in experimental studies conducted in this population, such as interventions that include resistance training for the lower limbs as the intervention.

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Specifications Table

| | |
|--------------------------------|--|
| Subject | Nephrology and Physical Therapy |
| Specific subject area | Assessment of the measurement of lower limb muscle strength with handheld dynamometry in patients undergoing hemodialysis |
| Type of data | Table |
| How the data were acquired | Data was collected on paper and subsequently transferred into an Excel spreadsheet. Data was acquired using a handheld dynamometer (Nicholas Manual Muscle Tester) by registering in Newtons (N) the maximal strength that different muscle groups of the lower limbs could exert. No further material was required to conduct the assessment. The following muscle groups were assessed sequentially: (1) Quadriceps, (2) Hip flexors, (3) Hamstrings, (4) Hip abductors, (5) Hip adductors, and (6) Triceps surae. |
| Data format | Raw |
| Description of data collection | Participants were recruited at the Hospital of Manises, in Manises (Spain), through the hemodialysis unit in the Department of Nephrology. The Head of Department screened participants for potential inclusion, and participants were briefed on the study procedures and were asked for written consent to be included. Criteria for inclusion were for the participant to be under treatment of dialysis for at least 3 months and to be medically stable. |
| Data source location | Institution: Hospital de Manises City/Town/Region: Manises/Valencia Country: Spain |
| Data accessibility | Repository name: Mendeley Data Data identification number: DOI: 10.17632/fcsbrtggjx.1 Direct URL to data: https://data.mendeley.com/datasets/fcsbrtggjx |
| Related research article | Perez-Dominguez B, Lopez-Brull A, Plaza-Carrasco M, Casaña-Granell J, Garcia-Testal A, Benitez-Martinez J. Test-Retest Reliability, Validity, and Minimal Detectable Change of the Measurement of Lower Limb Muscular Strength with Handheld Dynamometry in Patients Undergoing Hemodialysis. <i>Int J Nephrol.</i> 2022 Jun 15;2022:5330608. DOI: 10.1155/2022/5330608 . PMID: 35756174; PMCID: PMC9217614. |

Value of the Data

- This dataset is useful because it presents results of a reliable method to assess lower limb muscle strength in patients undergoing hemodialysis, a commonly assessed outcome in studies conducted in this population.
- Clinicians that work in Nephrology, and researchers that conduct studies in this population could benefit from this data, as it can be used to compare with the results they obtain or as a basis to use this method to assess muscle strength in these patients.
- This dataset can be used to justify the assessment of muscle strength of the lower limbs in this population in further studies that, for instance, include exercise interventions or are trying to assess the correlation between muscle strength and other outcomes related to patients undergoing hemodialysis, such as survival rates or health-related quality of life.

1. Objective

This dataset [1] belong to a test-retest reliability study [2] aimed at assessing this property in the measurement of lower limb muscle strength in patients undergoing hemodialysis. The objective of this dataset was to assess the test-retest reliability of a muscle strength measurement method in patients undergoing hemodialysis. Raw data show values, in Newtons (N), of this assessment in different muscle groups of the lower limbs at different points of time, and this data can be used to justify the assessment of muscle strength with this method in studies conducted in this population.

2. Data Description

The dataset includes a .XLSX document with three Excel spreadsheets that present raw data involving results for the assessment of lower limb muscle strength at three different points, with one-week interval between the first and the second spreadsheet, and four-month interval between the second and the third spreadsheet. Every spreadsheet includes the same assessments for the same participants. Missing values were denoted as 999.0.

The first column present the participant code, to ensure anonymity. Then, the following columns present the assessment of muscle strength with handheld dynamometry of several muscle groups both for the right and for the left lower limb. This table structure is repeated throughout the three Excel spreadsheets. The following muscle groups are included, as presented in columns: (1) Quadriceps, (2) Hip flexors, (3) Hamstrings, (4) Hip abductors, (5) Hip adductors, and (6) Triceps surae.

3. Experimental Design, Materials and Methods

The dataset belongs to an assessment of the measurement of lower limb muscle strength in patients undergoing hemodialysis. Participants were assessed several times during the dialysis session by the same researcher, and results were first registered in paper and then transferred to an Excel spreadsheet. Muscle strength is negatively affected by chronic kidney disease, and muscle impairment is one of the most common complications in these patients, serving also as a powerful indicator of the clinical state of the patient, so assessing reliably muscle strength in these patients is necessary to control the overtime deterioration they suffer, preventing the appearance of clinical states such as sarcopenia [2]

To assess intra-rater test-retest reliability, the same researcher was in charge of conducting all of the assessments, and the same protocol was used to conduct the measurements. The protocol followed recommendations that the developer of the handheld dynamometer provided, and the protocol was adapted to conduct the assessments in patients that were undergoing hemodialysis. This refers to the position of the patient, as some of the patients undergoing hemodialysis are seated in a chair and some lay down on a bed.

The research team adapted the manufacturer's measuring instructions, as there was no previous protocol developed to assess muscle strength during dialysis. The researcher in charge of the assessments was placed in mechanical advantage position, either in front of the patient (for quadriceps, hip flexors, hamstrings, and triceps surae measurements) or next to the patient (for hip abductors, and hip adductors). The dynamometer was placed in the same anatomical location as described in the manufacturer's instructions (distal fibula for quadriceps, distal femur for hip flexors, Achilles tendon for hamstrings, lateral and medial borders of the knee for hip abductors and adductors, respectively, and the sole of the foot for triceps surae). As described above, the patient was allowed to be either in supine position on the bed or seated on a chair, depending on how they received their dialysis, and each patient remained in the same position during each of the conducted assessments to avoid assessment bias caused by patient positioning.

A handheld dynamometer was used to assess muscle strength, specifically the Nicholas Manual Muscle Tester, from Lafayette ©. Patients were previously briefed on the protocol they had to follow, and a trial test was conducted to be sure they fully understood the force they had to produce. The assessments took place within the first 2 hours of the dialysis session of the patients, to avoid possible complications such as cramps, that might appear due to the metabolic imbalance created by the dialysis itself. The researcher instructed the participant to exert the maximal strength possible during a 3-second period, and the maximal exertion of strength given by the dynamometer during those 3 seconds was registered in Newtons (N). The order in which the muscle groups were assessed was the same for every assessment in every patient, starting with the assessment of bigger muscle groups, such as the quadriceps, hip flexors, and hamstrings, and finishing with the assessment of hip abductors and adductors, and triceps surae. The assessments were conducted at the dialysis unit of Hospital of Manises during dialysis sessions, and the nursing and medical staff of the dialysis unit assisted the researcher in case any medical complications would occur during the assessments, but no complications occurred.

Ethics Statements

The Research Ethics Committee of Hospital of Manises approved this research (registration number 2015/0193), and the protocol for the study was registered in ClinicalTrials.com with the reference NCT03120611. The relevant informed consent was obtained from the participants, and the research was carried out in accordance with the principles of the Declaration of Helsinki.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data Availability

[Dataset of the measurement muscle strength with dynamometry during dialysis \(Original data\)](#) (Mendeley Data).

CRedit Author Statement

Enrique Falco-Crespo: Investigation, Data curation, Writing – original draft; **Borja Perez-Dominguez:** Conceptualization, Investigation, Resources, Data curation, Writing – original draft; **Jose Casaña:** Methodology, Resources, Supervision; **Sara Perpiña-Martinez:** Investigation, Data curation, Writing – original draft; **Alvaro Manuel Rodriguez-Rodriguez:** Conceptualization, Methodology, Supervision; **Maria Blanco-Diaz:** Conceptualization, Methodology, Supervision.

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References

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- [2] B. Perez-Dominguez, A. Lopez-Brull, M. Plaza-Carrasco, J. Casaña-Granell, A. Garcia-Testal, J. Benitez-Martinez, Test-retest reliability, validity, and minimal detectable change of the measurement of lower limb muscular strength with handheld dynamometry in patients undergoing hemodialysis, *Int. J. Nephrol.* 2022 Jun 15 (2022) 5330608 PMID: 35756174; PMCID: PMC9217614, doi:[10.1155/2022/5330608](https://doi.org/10.1155/2022/5330608).