# *Intra and inter-rater reliability study of the dynamometric measurements of the pelvic floor muscles*

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## INTRODUCTION

There are several methods for evaluating the PFM used by researchers. Among them, the vaginal dynamometry (Figure 1) has been studied for being an efficient tool for direct investigation of the female PFM strength (1).

However, for a tool to be used in clinical research, it is critical to conduct an analysis of its reproduction reliability. Without this, it is impossible to trust the collected data (2).

Thus, the aim of this study was to evaluate the intra and inter-rater reliability of maximum strength, average strength and endurance dynamometric measurements of the PFM.

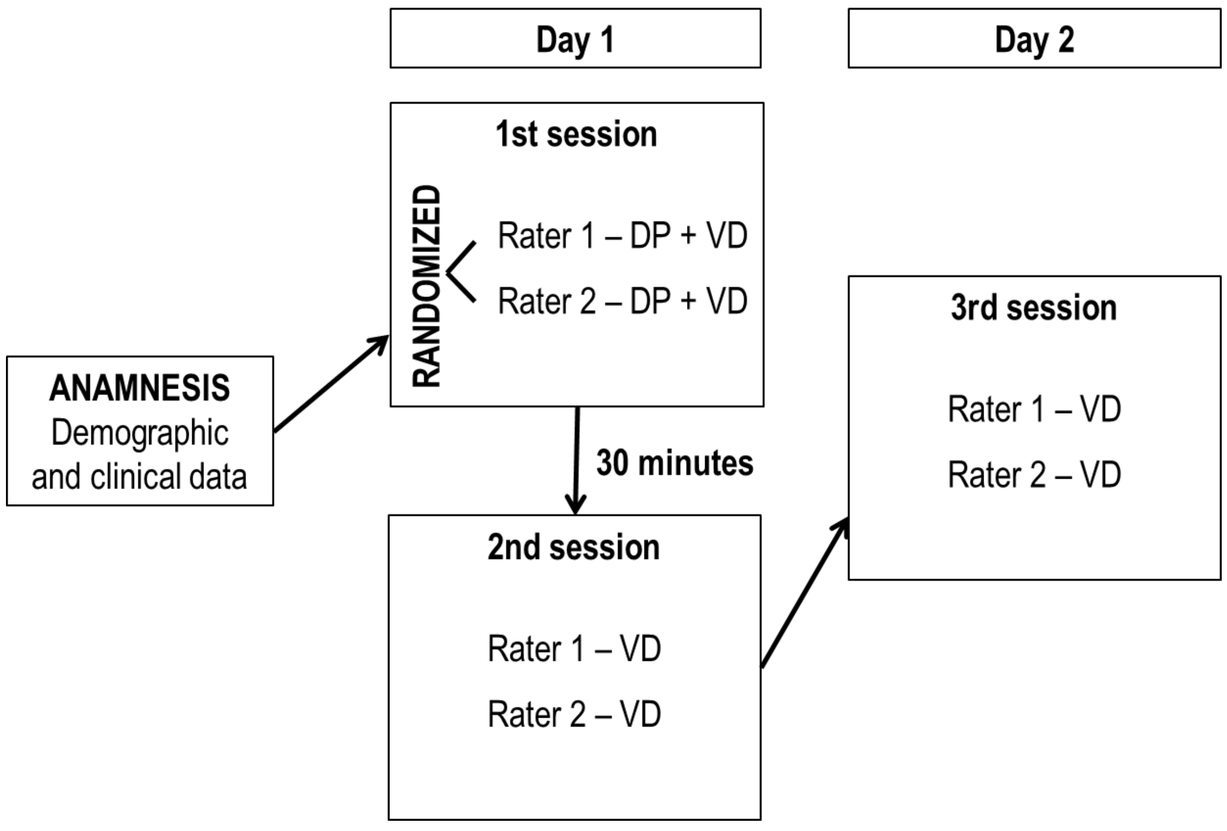



**Figure 1** – Vaginal dynamometer equipped with load cell.

## METHODS

A convenience sample of 18 female participants, nulliparous and no urogynecological complaints, aged between 19 and 31 participated in the study.

An interviewer questioned the participants about their demographic and clinical data. For all women PFM strength was evaluated and repeated in three successive sessions, according to Figure 2. The order was drawn among evaluators and the interviewer remained in the room to ensure that the same procedures were performed by the two examiners, as well as the examiners were blinded to the results obtained by each other.




Vaginal dynamometric data were analyzed using three parameters: *maximum strength* (kgf), *average strength* (kgf) and *endurance* (sec); and the intraclass correlation coefficient (ICC) was applied to estimate the reliability of the dynamometric measurements of the PFM, as excellent level to above 0.8 (3).

## RESULTS

The Tables 1 and 2 presents the intra and inter-rater reliability for the PFM dynamometric measurements.

| | Rater 1 | | | | | Rater 2 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Dynamometric measurements** | 1ª session M(SD) | 2ª session M(SD) | 3ª session M(SD) | Intra-rater reliability * (ICC) | Level** | 1ª session M(SD) | 2ª session M(SD) | 3ª session M(SD) | Intra-rater reliability * (ICC) | Level** |
| **Maximum strength** | 1.01 (0.5) | 1.03 (0.6) | 1.07 (0.6) | 0.96 | Excellent | 1.06 (0.6) | 1.11 (0.6) | 1.11 (0.7) | 0.95 | Excellent |
| **Average strength** | 0.41 (0.2) | 0.42 (0.2) | 0.45 (0.3) | 0.96 | Excellent | 0.45 (0.2) | 0.46 (0.2) | 0.49 (0.3) | 0.94 | Excellent |
| **Endurance** | 3.9 (1.7) | 3.95 (2.0) | 3.99 (2.2) | 0.88 | Excellent | 3.87 (2.1) | 4.21 (2.4) | 4.58 (2.1) | 0.86 | Excellent |

**Table 1**: Intra-rater reliability of the PFM dynamometric measurements.

| **Dynamometric measurements** | **Rater 1** M(SD) | **Rater 2** M(SD) | **Inter-rater reliability*** | **Level**** |
|---|---|---|---|---|
| Maximum strength | 1.04 (0.03) | 09 (0.03) | 0.96 | Excellent |
| Average strength | 0.43 (0.02) | 0,47 (0.02) | 0.97 | Excellent |
| Endurance | 3.95 (0.05) | 4,22 (0.36) | 0.92 | Excellent |

**Table 2**: Inter-rater reliability of the PFM dynamometric measurements.

## CONCLUSION

The PFM strength measured by the vaginal dynamometer equipped with a load cell, showed an excellent intra and inter-rater reliability for *"maximum strength"*, *"average strength"* and *"endurance"* dynamometric measurements, proving to be a reliable instrument to use in clinical research.

## REFERENCES

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