

## Walking related performance fatigability in persons with knee osteoarthritis; an important yet neglected outcome

Muhammad Osama,<sup>1</sup> Muhammad Naveed Babur,<sup>2</sup> Furqan Ahmed Siddiqi<sup>3</sup>

Madam, walking related disability is the most common functional disability with a prevalence of 13.7%,<sup>1</sup> and knee osteoarthritis is a relatively common progressive degenerative joint disorder which is manifested in terms of impaired physical functioning, especially walking related disability.<sup>2-5</sup> Knee osteoarthritis is found to be the 4th leading cause of disability in women and 8th in men worldwide,<sup>2</sup> with a prevalence of 37/1000 and mean age of 58±3 years in Pakistan, being higher in Northern areas, with a greater female to male ratio (4:1).<sup>3,4</sup> Pain and fatigue are thought to be the most common causes of walking related disability and fear of movement in persons with knee osteoarthritis.<sup>3,5,6</sup> Even though pain

important to be addressed in terms of reducing walking related disability in patients with knee osteoarthritis. Numerous methods exist for quantifying walking related performance fatigability,<sup>10</sup> the validity and reliability of which have been established in patients with neuromuscular disorders, but not for patients with knee osteoarthritis except for one developed by Murphy et al,<sup>11</sup> signifying the lack of attention being paid to assessment and management of performance fatigability in knee osteoarthritis. Five different methods of measuring walking related performance fatigability using 6 minute walk test (6MWT)<sup>10</sup> have been identified in the literature (Table), for which the validity and day to day reliability

**Table:** Different formulas identified in the literature for measuring walking related performance fatigability using 6MWT.

Author	Formula
Leone et al <sup>12</sup> (2016)	$\left[ \frac{(\text{Distance walked in sixth minute} - \text{Distance walked in first minute})}{\text{Distance walked in first minute}} \right] \times 100$
Barbosa et al <sup>6</sup> (2016)	$\left[ \frac{\text{Mean walking speed in sixth minute} / \text{Mean walking speed in first minute}}{6 \text{ Minute walking distance}} \right] \times 1000$
Murphy et al <sup>11</sup> (2017)	$\left[ \frac{\text{Mean walking speed over sixth minute} / \text{Mean walking speed over second minute}}{6 \text{ Minute walking distance}} \right] \times 1000$
Burschka et al <sup>13</sup> (2017)	$\frac{[(-5 \times D1) + (-3 \times D2) + (-1 \times D3) + (1 \times D4) + (3 \times D5) + (5 \times D6)]}{70}$
Jordan et al <sup>14</sup> (2018)	$\frac{[(-5 \times D1) + (-3 \times D2) + (-1 \times D3) + (5 \times D4) + (3 \times D5) + (1 \times D6)]}{70}$

management is the primary concern of knee osteoarthritis treatment,<sup>5</sup> walking related performance fatigability has been ignored both in terms of research and clinical practice. However, research has shown that impaired biomechanics including reduced stride length, gait velocity and knee range of motion as well as increased ground reaction force, knee adduction movement, and ankle varus movement,<sup>7,8</sup> increase the energy expenditure during walking,<sup>7</sup> which may eventually result in an increase in perceived and performance fatigue.<sup>9</sup> This increase in fatigue is thus very

was established by Feel FV et al in 2019 in patients with Multiple Sclerosis, but no such study has been conducted for patients with knee osteoarthritis. Concerning the high prevalence of knee osteoarthritis worldwide, and its significant contribution towards walking related disability and impaired physical functioning, it is imperative to compare and establish the validity and reliability of quantitative objective measures for walking related performance fatigability in patients with knee osteoarthritis. This can prove to be valuable in terms of assessment, management and in predicting prognosis in patients with knee osteoarthritis and in improving their physical functioning and quality of life.

**Keywords:** Fatigability, Fatigue, Knee, Muscle fatigue, Osteoarthritis, Performance fatigue, Reliability, Validity, Walking.

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<sup>1,3</sup>Foundation University Institute of Rehabilitation Sciences, Foundation University, Islamabad, <sup>2</sup>Isra Institute of Rehabilitation Sciences, Isra University, Islamabad, Pakistan.

**Correspondence:** Muhammad Osama. Email: osamadpt@gmail.com

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