

Fatigue Following Spinal Cord Injury

Executive Summary

Fatigue Definitions and Consequences

Fatigue is generally defined as feelings of tiredness, lack of energy, low motivation, difficulty in concentrating, or an increased perception of effort disproportionate to attempted activities ([Anton et al. 2017](#); [Hammell et al. 2009](#)). It is important to distinguish between peripheral muscle fatigue, that is, fatigue that comes after exercise, and global fatigue ([Barat et al. 2006](#)). There is comprehensive research on the pathophysiology of peripheral muscle fatigue ([Ibitoye et al. 2016](#)), as well as interventions to reduce muscle tiredness associated with doing specific activities ([Hoogenes et al. 2021](#)). However, global fatigue remains an understudied issue in SCI and is often undermentioned and/or underestimated during medical interviews ([Anton et al. 2017](#); [Fawkes-Kirby et al. 2008](#); [Jensen et al. 2007](#)). Thus, global fatigue is the focus of this chapter.

For people with SCI, living with fatigue can be overwhelming, causing a profound negative impact ([Wijesuriya et al. 2012](#)). In people with SCI, fatigue has been negatively associated with social integration and productive activity ([Wijesuriya et al. 2012](#)), social participation ([Kuzu et al. 2022](#)), quality of life ([Christofi et al. 2023](#); [Craig et al. 2008](#)), psychological functioning ([van Diemen et al. 2016](#)), participation in life activities, mobility, and wheelchair use ([Smith et al. 2016](#); [Saunders et al. 2013](#); [McCull et al. 2003](#)). Moreover, fatigue may contribute to functional decline and loss of independence in people with SCI living in the community and in those aging with SCI ([Alschuler et al. 2013](#); [Moher et al. 2009](#)).

Fatigue Measurement

Research in this area is highly heterogeneous in the assessment of fatigue given its multidimensional nature ([Onate-Figuérez et al. 2023](#)). Measurement of fatigue could be performed via objective methods such as fatiguing tasks or subjective measures like self-reports to describe the perception of fatigue ([Onate-Figuérez et al. 2023](#)).

All the studies included in the present chapter have assessed fatigue through different self-reporting methods. The most common fatigue self-report used was the Fatigue Severity Scale, which is a unique outcome measure validated in people with SCI ([Anton et al. 2008](#)), and it has recently been recommended for research use in people with stroke ([English et al. 2023](#)). These self-reports also serve to evaluate perceived fatigue intensity or its effect on the participants' lives ([Onate-Figuérez et al. 2023](#)).

Fatigue Management

Despite fatigue affecting more than a half of people living with SCI ([Fawkes-Kirby et al. 2008](#)), only seven RCTs and ten lower-level quality studies have evaluated the effectiveness of interventions to address fatigue in this population.

According to the research evidence of different interventions for the treatment of fatigue in people with SCI, exercise-based interventions are the interventions with stronger quality (and quantity) of evidence for the improvement in fatigue in people with chronic SCI. However, there is no consensus on the type or dosage of exercise that will be more effective in reducing fatigue in people with SCI.

On the other hand, other interventions such as pharmacological interventions (e.g., CME and baclofen), massage therapy interventions (e.g., reflexology massage, Swedish massage, broad compression massage, and healing touch), fatigue self-management and behavioral interventions promoting an active lifestyle, and the use of some assistive devices (e.g., Segway or exoskeleton) for performing rehabilitation programs, seem to not provide a

significant effect on fatigue outcomes in people with SCI. According to one low-level quality study (pre-post study), partnering wheelchair users with SCI and a service dog for nine months, provided a significantly large effects on fatigue.

It should be noted fatigue was not the primary outcome measure for most of the studies included. These studies found positive effects in other outcome measures such as pain, physical activity levels, or spasticity that were beyond the content of this chapter; however, are noted in the discussion of each intervention method.

Ideal Fatigue Treatment for People with SCI

Due to the limited literature on fatigue interventions and the multifactorial nature of global fatigue, it is difficult to recommend one ideal treatment protocol in people with SCI. However, some previous research has highlighted certain things that would be useful to address:

- Having a better understanding of which factors are most strongly associated with fatigue is key to designing strategic research focus to determine causality and therefore establish preventive and therapeutic interventions. [Onate-Figuérez et al. \(2023\)](#) conducted a systematic review and meta-analysis to investigate the association between fatigue and clinical and demographic variables in people with SCI. A direct association was found between fatigue and nine factors (sorted by largest to smallest effect size): self-efficacy, anxiety, stress, depression, pain, participation, analgesic medication, assistive devices, physical activity, lesion level, incomplete SCI, and medication ([Onate-Figuérez et al. 2023](#)).
- It has been suggested that the management of fatigue in people with neurological disorders like SCI and multiple sclerosis requires a multidisciplinary team and approach ([Smith et al. 2016](#); [Hourihan 2015](#)).
 - A physiatrist or family doctor can conduct a thorough physical exam and medical history to determine potential causes of fatigue (such as pain, sleep, or medications).
 - Structured physical activity and/or exercise is indicated to treat fatigue in people with multiple sclerosis, and in the general population. Physical therapists or other professionals prescribing exercise should be aware of the person's fatigue status and levels of exercise should be moderate and increased gradually ([Rosenthal et al. 2008](#); [Hourihan 2015](#); [Heine et al. 2015](#)).
 - Previous research has identified that psychological factors like stress, anxiety, and depression contribute substantially to fatigue in people with SCI, suggesting that an evidence-based mental health therapy such as cognitive-behavioral intervention or the prescription of selective serotonin reuptake inhibitors, such as fluoxetine, paroxetine, or sertraline, could be considered as part of any fatigue treatment in appropriate patients ([Craig et al. 2013](#); [Rosenthal et al. 2008](#); [Onate-Figuérez et al. 2023](#)). Researchers have posited that cognitive-behavioral therapy could be useful in helping people lessen the effects of chronic pain on depressive moods, and might help in establishing more attributions of self-efficacy, in that the person with SCI has some control over their body and their health ([Craig et al. 2012](#); [Craig et al. 2013](#)).

Gaps in the Literature

- Fatigue as a multifactorial construct: Despite fatigue being prevalent in people with SCI, the limited number of studies where fatigue is a primary or secondary outcome measure could be due to its multifactorial nature including the influence of co-morbidities.
- Relationship between sleep factors and fatigue in SCI: None of the included RCTs investigated or measured sleep quality or the presence of sleep disorders in participants.

- Relationship between medications and fatigue in SCI: None of the RCTs included discussed the effects of medications or established at baseline what medications participants were currently taking.