

Spasticity and pain: the effect on quality of life in individuals with spinal cord injury

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ABSTRACT

The following article is a literature review on how spasticity and pain affect the quality of life in individuals with spinal cord injury (SCI). Spinal cord injury affects a patient's life in many ways, particularly following initial trauma, to confront numerous secondary health conditions. Spasticity and pain represent major SCI complications. Another significant factor for persons with spinal cord injury is the quality of their life and how it is affected by spasticity and pain. Patients with SCI demonstrate lower quality of life than the general population but there also seems to exist a negative correlation among pain, spasticity and quality of life. Patients that experience pain or/and spasticity have lower quality of life as it is indicated by some studies. In addition, there is a possibility that spasticity and pain correlate in a bilateral way via common neural mechanisms. However, quality of life is affected by many factors and it is difficult to conduct specific results without further research.

KEYWORDS: spinal cord injury, pain, spasticity, quality of life, life satisfaction

Introduction

During the last decades, with the progress in medicine and rehabilitation, patients with spinal cord injury (SCI) demonstrate higher survival rate and life expectancy than before [1-5]. Following initial post-injury phase, people with SCI have to come up against secondary health issues, with the most common being loss of locomotor function and sensation, pressure ulcers, bladder and bowel disorders, sexual and autonomic dysfunction, pain and spasticity [3,5-7].

Up to 70% of SCI patients develop spasticity within the first year after injury [6,8]. Spasticity has been defined by Pandyan et al. to be 'a disordered sensorimotor control resulting from an upper motor neuron lesion,

presenting as intermittent or sustained involuntary activation of muscles' [9]. Spasticity can create difficulties in patients' everyday life and activities, causing mobility and transfer disorders, contractures, pain, hygiene and personal care problems, as well as health care systems' economic burden [1,8,10,11]. However, spasticity can present several benefits including improved circulation, prevention of thrombosis and muscle weakness and facilitation of daily activities [11,12].

Pain has also a high prevalence in patients with SCI, approximately 67% of them experience pain [4,5,6,13-18]. The most common types of pain are nociceptive (musculoskeletal), neuropathic and visceral [5,6,17,19], but in most cases, patients present pain of more than

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one aetiology [17,18,20]. Pain interferes with patients' everyday activities, sexuality, sleep, mood and has a negative psychosocial impact, leading to a higher risk of depression [14-18,20]. Although, neuropathic and nociceptive pain demonstrate no significant difference in prevalence, neuropathic pain is described by the patients as more severe [5,6,14,18,21].

It has been shown that in SCI patients, pain and spasticity overlap and this can be explained as they both result from central neuroplastic changes following SCI. Spasms or excessive tone may cause pain and both of them can be evoked by non-harmful stimuli. Moreover, SCI patients with pain tend to present spasticity symptoms compared with those who does not have pain [6,22].

Patients with SCI have lower quality of life (QoL) than the general population [3,5,6,8,16,23]. To provide SCI patients optimal treatment, one has to understand how major secondary problems, such as pain and spasticity affect the quality of their life.

The database used for this literature review was PubMed. From the 630 titles and abstracts that were screened 602 articles were excluded. The remaining 28 articles were assessed for eligibility and 6 of them were excluded, 3 of them because they were descriptive studies, 1 because it was a discussion paper, 1 because it had poor patient perception and 1 because it had small sample. There were 2 more studies included, that were identified through review of the reference lists of included articles. The total number of papers that were included in the synthesis for this literature review are 24.

Discussion

Pain

Studies associating pain and quality of life demonstrate variable results. Richardson et al. and Gibbs et al. have found correlation between pain and quality of life, but it was not significant for neither of them [13,14]. Wollars et al. found that there is no strong evidence to support that pain itself affects the quality of life, but they suggested that dealing with pain, as a psychological factor, negatively relates with quality of life [17]. Another interesting finding was that of Norma A. Erosa et al. Their findings didn't relate pain directly with the quality of life. Pain had an influence on SCI patients' mobility and that mobility levels affected patients' life satisfaction [24].

The results of Hassanijrdehi et al. showed that patients with pain reported more discomfort than those without pain. They also found that for those with lumbar pain along with those with shoulder pain, the feeling of discomfort was greater and that the lumbar pain group had a significantly higher influence in daily life. These were the only domains of quality of life that were found significant. However, this study had some limitations, as the sample size was rather small and consisted only by male patients [19].

Burke et al. and N. Nagoshi et al. found that among SCI patients with pain, the ones with neuropathic pain had greater reductions in some quality of life domains. Burke et al. showed that SCI patients who didn't report pain had quality of life similar to the general population while those who reported severe pain had the lowest quality of life, independently of pain type [5,15].

It is interesting to assess pain-predictors of SCI patients, in long term. J.D. Putzke et al. designed two studies to evaluate the predictors of pain and impact of pain in the quality of life in SCI patients. They examined these factors at year one post-injury and at year two post-injury and found the associations and predictors for pain and QoL. Initially, there seemed to be a reduction, from year 1 to year 2, in interference with day-to-day activities secondary to pain from 71% to 63%. Furthermore, the results at year 2 showed that the patients who didn't report a change in pain between year 1 and 2, didn't present a change in self-reported QoL as well. In contrast, patients who reported change in pain at year 2, demonstrated changes in self-reported QoL. In the cases that pain interference resolved, there was an increase in QoL, while those presenting pain showed a decrease in QoL. The QoL domains that showed the highest associations with pain were life satisfaction, physical health and mental health [4].

There are also other studies that indicate an indirect association between pain and life satisfaction. C.M.C. van Leeuwen et al. reported that less pain was associated with higher life satisfaction but there also seems to be a connection between pain and functional independence in relation to life satisfaction. A patient with high functional independence and/or low pain has a higher life satisfaction score than a patient with low functional independence and/or high pain [25]. R. Müller et al. and E. Ataoglu et al. also indicated that pain had a neg-

ative effect in some domains of QoL. However, R. Müller et al. emphasized that participation and social support seem to protect patients from the negative effects of pain on mental health and QoL [16,20].

Spasticity

The results of Vural et al. suggest that there is a negative association between severity of spasticity and QoL, particularly for physical health and social relationship items [12]. In accordance to Vural et al., a systematic review from K. Milinis and C. A. Young indicated that spasticity has worse influence on QoL's physical components than mental health. They also express the probability that spasticity may have an impact on QoL via related conditions such as fatigue, depression, anxiety and pain [10].

Findings of Westerkam et al. also reveal that spasticity is negatively correlated with life satisfaction and quality of life. Another finding was that perceptions of spasticity were related to psychological outcomes and suggested that there is a possibility, that psychological factors might have an impact on spasticity itself and that this relationship might be bidirectional [12].

Not many studies have categorized spasticity to detect specific relations among spasms, stiffness, clonus and QoL. W. B. McKay et al. performed this categorization and concluded that although both spasms and stiffness had a negative impact on participation in daily activities and quality of life, patients indicated stiffness to be the most problematic factor of spasticity in comparison to spasms and clonus. Stiffness was also more prevalent and had the worst influence in daily activities and psychological agitation [8].

Pain and spasticity

There are a few studies that have examined the relationship between pain and spasticity, whether this relationship is bilateral and the way these factors influence quality of life. J. J. E. Adriaansen et al. revealed an association between musculoskeletal pain, spasticity and QoL. However, these associations were weak. One reason for that was that patients who had experienced those secondary health conditions for a long time, had gotten accustomed to them, therefore they no longer influence their QoL. Another interesting finding was that, in this study, only musculoskeletal pain appears to be

associated (weekly) with QoL but neuropathic pain does not [23]. On the contrary, Noonan et al. indicated that neither pain, nor spasticity were associated with QoL and only patients with neuropathic pain appeared to be significantly more dissatisfied with their condition [2].

SR. Andersen et al. revealed that patients with spasticity had lower satisfaction with physical health than those without spasticity, while patients with pain had lower satisfaction, not only with physical health but also with mental health. Additionally, interference with pain was related with decreased QoL, but spasticity was not. Neuropathic pain in particular was found to be more severe and had greater interference in QoL. This study in addition examined the relationship between pain and spasticity and it appears that individuals with pain had higher spasticity prevalence than those without. Possibly this happened because spasticity could provoke musculoskeletal pain and because it is believed that pain and spasticity share common neurological origin [6].

In accordance with SR. Andersen et al., J. A. Tibbett et al. also found a relationship between painful spasticity and chronic pain and suggested that painful spasticity may depend on mechanisms alike to those of neuropathic pain. SCI patients who develop neuropathic pain are believed to have higher chances to experience spasticity, than those with non-neuropathic pain [22]. In agreement with the previous study, W.B. McKay et al. demonstrated that pain and spasticity appear to be related and there is a possibility that they share common neural mechanisms. One justification for that is, that several treatments for one of them are also effective for the other [8].


Quality of life

Many studies have investigated the association between secondary health conditions following SCI and quality of life. However, it is very difficult to define exactly what affects patients' quality of life, as it is influenced by numerous factors, not only physical but also psychosocial. Another difficulty is that although there are several tools measuring QoL, only limited studies apply identical tools, thus making comparison among different studies non-significant. In addition, as it is stated by Noonan et al., there are two terms used to describe patients' condition, "quality of life" and "life satisfaction"

and it is not known whether these two are equivalent and compatible [2].

An interesting fact about life satisfaction was reported by C.M.C. van Leeuwen et al., in their study conducted in three stages (when a patient is discharged from inpatient rehabilitation, two years after discharge and five years after discharge). They detected no changes in mean life satisfaction, between discharge and at year 2 after discharge, however there were small but significant increases in life satisfaction between 2 years and 5 years after discharge [25]. This is also supported by S. Jorgensen et al. who mentioned that life satisfaction remains relatively the same for a long time after injury and may even increase as the patient lives longer with SCI [3]. There is a possibility, that patients living for a long time after their injury tend to get used to their current health situation and things that used to annoy and discomfort them don't affect their life satisfaction

anymore.

Pain and spasticity seem to play an important role in SCI patients' quality of life. However, there is no agreement among studies. It is possible that pain and spasticity interact not only in relation with QoL, but also with one another in a bilateral way. These correlations may be either direct or via other factors such as psychological or social. Either way, it is important to understand SCI patients and what impacts their QoL, especially the first years after injury to help them cope with their problems. Therefore, it is essential that surveys continue to be conducted, ideally gold standard tools to be found, so that we can learn more about these relations and as a result, how to treat people more efficiently and according to their specific needs. 

Conflict of interest

The authors declared no conflict of interest.

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