

The effect of depression in hospitalization and rehabilitation of patients with spinal cord injury

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ABSTRACT

Spinal cord injury (SCI) is a rare condition, however its consequences might be devastating, since it affects patients' physical function as well as psychological well-being. Therefore, it is not surprising for patients with SCI to develop mental health problems, such as depression and/or anxiety. Depressive symptoms include agitation, restlessness, fatigue, changes in appetite, helplessness, loss of interest as well as problems in sleeping. The presence of depression has been connected with extended length of hospitalization and development of secondary medical complications, as well as reduced quality of life (QOL) and self-efficacy. The purpose of this review is to investigate the existing literature to identify the effect of depression on hospitalization and rehabilitation in patients with SCI. From the 31 studies included in this paper, it is obvious that SCI patients with depression have longer periods of hospitalization and/or rehabilitation as well as worse functional outcomes. Moreover, it was shown that SCI individuals with depressive symptoms frequently develop other secondary medical complications which subsequently affect the length of stay and the rehabilitation outcomes. Acknowledging these facts can improve diagnosis and intervention, which may also improve the patient's recovery outcome.

KEY WORDS: SCI, depression, hospitalization, rehabilitation

Introduction

Spinal cord injury (SCI) is a devastating injury that can lead to severe secondary health problems [1]. According to a WHO report SCI can lead to major injury as well as disability [2]. The incidence of SCI in developed countries varies from 10.4 to 83 per million people per year [3]. More specifically, the incidence rates that have been reported in the USA range from 28 to 55 per million people [4]. From those, about 10,000 represent new cases of SCI patients. Published reports showed that SCI incidence in the rest of the world varies, and it seems that the rates are lower than those observed in the United States. Analytically, the

incidence rates varied 25 to 59 per million people per year with an average of 40 cases per million people. However, it was noted that the incident rate progressively increased in several countries, such as Norway, where from 6.2 per million it was increased to 26.3 per million people over the last 50 years [5].

Spinal cord injury influences both patients' physical function and psychological condition. Many studies have demonstrated that patients post SCI manifest low subjective well-being, participation in life and quality of life (QOL) [6-8]. As a result, it is quite common for patients with SCI to present a number of mental health problems,

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such as depression and/or anxiety [9]. One of the most studied psychological factors among patients with SCI is depression [10]. It represents a frequent secondary condition following spinal cord injury [7]. It has been associated with psychological problems caused by injury, such as perceived low quality of life and increased stress. Severe depression is the most common psychological condition associated with spinal cord injury and is estimated to be experienced by 11% to 37% of patients, depending on the method used for the diagnosis, which is significantly higher compared to the depression rates reported to other medical conditions [11,12]. In a recent study conducted in Greece, it was estimated that 18.2% of the SCI patients included had depression, which is a relatively low percentage [13].

The symptoms of depression vary from agitation and restlessness to fatigue, change in appetite and helplessness. Some patients have also reported loss of interest as well as problems in sleeping [14].

Moreover, it is not uncommon for SCI patients with depression to also develop other comorbid psychiatric illnesses that can increase the visits to the healthcare facilities and also lead to extended hospitalization and worse rehabilitation outcome [7]. The presence of depression can affect severely patient's daily activities and therefore is associated quality of life (QoL) [15]. High levels of depression are reported to lead to poor QoL, which subsequently can result in premature mortality for the individual [16].

The presence of depression is associated with increased periods of hospitalization and secondary medical conditions, as well as reduced social reintegration, quality of life, and self-care efforts [9]. The development of depression also seems to affect, among other things, the way a person copes with any medical complications [17]. Many factors have been connected to depression and its symptoms such as such as age, gender and socioeconomic status [10, 11]. Additionally, it has been demonstrated that quadriplegic SCI patients have significantly higher prevalence depression rates, which can be explained by the fact that these patients show limited physical ability and greater dependence on others [11].

There were many studies indicating that almost all SCI patients will develop depression at some point in their life [18]. However, later studies have shown that this is not always the truth [15,18,19]. At the same time, there are many

factors that can affect the development of depression in these patients. These include pain, medication, isolation, medical complications, and post-traumatic stress disorder [9,20-22]. Depression can, however, affect the recovery process of the patient due to negative expectations, social withdrawal and reduced energy. Hence, depression can affect the patient's stay at the hospital and their rehabilitation.

The aim of this paper is to review the existing literature in order to specify the effect of depression on hospitalization and hence on rehabilitation in patients with spinal cord injuries. This knowledge can improve significantly diagnosis and intervention, which may also improve the patient's recovery outcome.

A literature review was conducted in a scientific publication resource; the MEDLINE (PubMed) (<https://www.ncbi.nlm.nih.gov/pubmed>). Temporal criteria were applied in order to access the literature of the last 37 years (from 1983 to 2020). In the research were included only articles published in English language. The keywords applied regarded spinal cord injury, depression, hospitalization and rehabilitation. The search of the databases returned 8554 articles. Publications that did not match the research criteria were excluded from the study. The final number of articles included was 31.

Discussion

The association between spinal cord injury and depression has been studied largely. The purpose of this study is to investigate the existing literature regarding the effect that depression has on the hospitalization as well as the rehabilitation of SCI patients.

The number of relevant studies revealed was 31 in total. In more detail, 17 studies were investigating the effect of depression on the hospitalization and 14 on the rehabilitation process.

There are many factors affecting the length of stay (LOS) in patients with SCI, such as demographic agents, secondary health complications due to spinal cord injury as well as hospital related agents [23-25]. Regarding the role of depression in LOS for SCI patients, we discovered 4 studies on this subject. Specifically, Malec and Niemeyer focused their research in finding a correlation between depression and length of stay among 28 patients with spinal cord injury. They concluded that depressed SCI patients tend

to require longer length of stay in comparison to non-depressed [26]. Similar results were also reported by Elliot and Frank, who have associated depressive symptoms with extended length of stay as well as higher costs [10]. Another study investigating the psychological symptoms during rehabilitation, demonstrated that depression significantly prolonged hospitalization for SCI patients compared to patients with no or other psychological conditions [27]. However, the results of a retrospective survey showed no difference on the length of stay between SCI patients with depression and those without any psychological imbalance [28].

A negative connection between levels of depression and rehabilitation results for SCI patients has been described by several authors. An early study conducted by Lawson, showed that the SCI patients with lower depression levels had also better results during rehabilitation [29]. The author concluded that depression was detrimental to the patient's rehabilitation process. In addition, another study revealed that the presence of depressive symptoms is associated with the functional outcome, although this fact is not always reflected on the relevant scores [30]. In a study that was conducted in Saudi Arabia, researchers investigated the possible predictors for functional outcome for patients with traumatic SCI [23]. Their results showed that patients with depression and/or anxiety were more prone to worse outcomes. The results of a similar study in a rehabilitation center in Singapore, also validated that depression led to poorer functional outcomes in SCI patients [31]. A longitudinal study conducted by Kennedy and Rogers, showed that depression was negatively associated with worse functional independence [32]. A recent qualitative study showed the importance of good mood to better self-management and therefore adjustment of patients with traumatic SCI, leading to better functional capability [33]. The results from other similar studies also strengthen the point of view that depression affects the patient's self-management which by extension results in difficulties during hospitalization and rehabilitation [34-37]. Other studies have also concluded that SCI patients with depressive symptoms develop a number of difficulties during their rehabilitation process, thus they cannot obtain the best functional outcome [38,39]. Specifically, it was reported that SCI patients with high levels of depression might manifest problems in the attendance of

therapies, in the exercise of effective problem-solving and interpersonal skills as well as in the adherence of medical treatments.

As far as functional capability is concerned other studies, however, report contradictory results. Specifically, depressive symptoms have also been investigated in 140 SCI patients that live in the community by Fuhrer et al. The researchers manifested that there was not a statistically significant connection between depression and functional outcomes for these patients [40]. Similarly, another study that included 36 patients with spinal cord injury showed that the prevalence of depression was much higher in these patients 6 months after the injury [41]. Moreover, it was demonstrated that patients with worse functional outcomes showed lower depression levels than other SCI patients.

It is not uncommon for SCI patients to develop health complications such as pressure ulcers (PUs), urinary tract infections (UTIs), respiratory tract infections, chronic pain etc. [42,43]. There are many studies that suggest that depression among SCI patients can lead to health complications which subsequently prolong the length of stay in the healthcare facility and lead to poor functional capability. Herrick et al., in their study, showed that depression was one of the determinants that led SCI patients to manifest health complications [44]. These findings are in accordance with the results obtained by an earlier study [26]. An empirical study has similarly found that SCI patients with high depression levels are at greater risk to develop several health complications during rehabilitation [45]. Furthermore, a study that investigated the relationship between mental health problems and medical complications in 466 SCI patients manifested that individual with depression (21%) were more prone to develop a variety of medical complications such as pressure ulcers, urinary tract infections and pain [46]. Other studies also, have shown that depression in SCI patients can lead to health deterioration and pain [19,47-50]. Moreover, the results of another study evaluating depression levels and quality of life for SCI patients showed that depression was strongly linked to pain as well as patient's health status [51]. A cross-sectional study analyzing factors affecting the development of severe neurogenic bowel dysfunction in SCI patients showed that SCI patients with depression were more prone to have this condition in comparison to SCI

patients who did not have depression [52]. Anderson et al., conducted an interview survey including SCI adults injured during childhood. They concluded that although depression was not statically associated with demographic factors, it was linked to a series of medical complications [11]. Moreover, pressure ulcers have also been identified as a strong predictor of depression among patients with spinal cord injuries; however, a study conducted by Gelis et al., provided little evidence that depression can work as a potential risk factor for pressure ulcers [53,54].

Depression is quite frequent, although not always necessary, for patients with SCI, affecting both the hospitalization and the rehabilitation process of these patients with various ways. In this review we examined the literature for the effect of depression on hospitalization and rehabilitation of patients with SCI. In more detail, after our search we found few studies investigating the role of depression on length of stay of SCI patients in healthcare facilities [10,26-28]. All these studies, with the exception of the study conducted by Arango-Lasprilla et al., concluded that depression was an important factor that prolonged significantly the LOS of SCI patients. However, the results of other studies that investigated how depression affects LOS, have shown that patients with depressive symptoms have significantly longer LOS in comparison to patients without depression [55-57]. We must highlight, moreover, that although recent literature is full of studies that examine the factors that affect LOS for individuals with SCI, depression or other psychological determinants are rarely included. Therefore, it is difficult to come to safe conclusions. It is important that more studies to be conducted on this subject.

Many SCI patients can develop depression during the rehabilitation process. It has been declared by many researches that self-efficacy plays a fundamental role to rehabilitation since it is considered a major component of this process, which can subsequently lead to better health outcomes [33-58]. Therefore, SCI patients that present low self-efficacy and self-management are more prone to develop depressive symptoms. There are many studies that support that there is a direct connection between depression and worse functional outcomes for these patients. Specifically, the majority of studies that were included in this review suggest that SCI patients with depression had significantly poorer functional capabilities in comparison

to SCI patients that did not develop depression. Two studies did not agree with the above-mentioned results. In fact, in the study conducted by Fuhrer et al., this can be mainly explained by the fact that the number of patients that were included was small and therefore their results cannot be representative [40]. In the other study that showed contradictory results, apart from the fact that the number of patients included was small, an additional limitation was that the survey was conducted with patients that were recently injured (only 6 months after injury), and thus they hoped to have better outcomes in the near future [41].

Although there were many early studies that acknowledged the role of secondary health complications, such as UTIs and PUs, to the development of depression in patients with SCI, there are not many studies that investigated whether the development of depression was due to these complications or the other way around [44,53]. Regarding this topic, all studies included in our review, showed significant results that reinforced the point of view that depression can lead to the development of secondary health complications. In the majority, these medical complications not only interrupt the individual's activities but also keep them in isolation while they increase the clinical severity of their already burdened health status. In addition to that, during the last decade there is a growing interest for studies investigating the role of depression on chronically ill patients, such as diabetes [59-61]. The studies concerning the association of depression and health complications, try to create a conceptual model to explain the way that depression could lead to the development of short-term health complications [62]. However, more studies are required to thoroughly understand and describe the responsible mechanism.

Empirical research showed that depression is not a universal phenomenon or a necessary precursor of adaptation to SCI [9-12,45]. Indeed, these studies suggest that about one-third of patients with SCI experience depressive symptoms, and that the presence of depression can be used as a predictor of poor adjustment to the injury. Also, another study suggested that depression levels increase gradually 48 weeks after the injury [26]. This fact can explain the higher depression levels that are observed in newly injured SCI patients, which gradually decline. Moreover, these surveys make progress towards the functional diagnosis of post-SCI depression as well as the use


of credible criteria for diagnosis, since the detection of depression in SCI patients is connected with several methodological issues that make the interpretation difficult [66]. In addition, the significant correlations that have been reported between depression and medical complications by these studies, suggest that depressive symptoms can be used as a tool to detect patients with preventable health complications from those admitted for routine examinations or for other reasons.

Since depression has such an effect on hospitalization as well as rehabilitation of SCI patients, many researchers suggest the administration of antidepressant medication, especially for patients that have severe symptoms [63]. However, it was demonstrated that the usage of antidepressant medications by SCI patients not only extended significantly the length of stay but also led to worse functional outcomes [64]. One possible explanation for this may be that the use of antidepressants may interfere with the recovery of the nervous system that occurs during rehabilitation, especially when this takes place relatively early after the injury. Another explanation might be that the patient may have some untreated symptoms that limit the effectiveness of rehabilitation, and this fact subsequently leads to the administration of antidepressants.

In a prospective study that investigated the association between several health factors and the mortality risk of SCI patients, it was shown that depression was one major health predictor among surgeries, infections as well as fractures [67]. Therefore, it is of the utmost importance both for the rehabilitation and for the general health of the individuals with SCI to early detect and treat depression to obtain optimal results [65]. Also, it is suggested by the majority of the studies included that SCI depression tar-

geted interventions should aim at factors as self-management and self-efficacy to improve depressive symptoms in these patients. Hence, these interventions can also improve other outcomes such as medical complications and QOL of the individual with SCI.

It has been reported by several studies that during the rehabilitation process of SCI patients it is of great importance to minimize patients' psychological distress, which can also help to develop better self-management behavior [26]. Furthermore, it was demonstrated that some SCI patients, during the first three months post injury, were more prone to develop depressive symptoms that disrupt their daily activities [68].

In conclusion, this review manifested that depression affects significantly both hospitalization and rehabilitation of patients with spinal cord injury. In more detail, the studies that met our inclusion criteria showed that depression played an important role on prolonging LOS of SCI individuals in health-care facilities, which by result increased costs both for patients and the health-care system. Moreover, it was demonstrated a strong connection between depression and secondary health complications, mainly urinary tract infections and pulcer ulcers, which also decrease patient's quality of life. At last, depression was found to be associated with poorer functional outcomes for patients with SCI. Therefore, it is necessary that health professional should seriously considered these aspects that depression has on individuals with spinal cord injuries to have appropriate treatment as well as better functional capabilities. Simultaneously, early detection and treatment of depressive symptoms can lead to reduced costs both for the patients and the health system of each country. 

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