Pain and depression in patients with spinal cord injuries

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ABSTRACT

Spinal cord injury (SCI) causes many health-related problems and affects not only patient's physical condition but also other aspects of his life, such as mood and quality of life.

Chronic pain is a common and important complication seen in patients with SCI. As pain is known to affect various activities of the individual, such as recreational and occupational status, sleep quality and sexuality, pain seems to play an important role in quality of life, mood and rehabilitation. In addition, chronic pain and psychological disorders are closely linked, affecting the physical and psychosocial function of the patient. Similarly, various studies have shown that a significant proportion of patients with SCI suffer from depression while at the same time it has been shown that chronic pain is associated with depressive symptoms in these patients.

The purpose of this study is to conduct a literature review concerning the relationship between pain and depression in patients with SCI. From the 27 studies included in this paper, we can safely conclude that pain and depression are strongly connected although the nature of this connection is still to be clarified.

KEYWORDS: SCI, depression, pain

Introduction

Spinal cord injury (SCI) is a life-changing condition that can have life-threatening complications since it causes paralysis, aesthetic loss and consequently damage to a wide range of body functions (1). The annual incidence of spinal cord injuries in the United States is 54 cases per one million while in Greece these rates are 33.6 cases per million people (2,3). The main causes leading to spinal cord injuries include road accidents, falls and accidents during sports activities (4).

International Association for the Study of Pain (IASP) describes pain as "an unpleasant sensory or emotional experience associated with actual or potential tissue damage, or described in terms of such damage". Pain is quite common in individuals with SCI, although its prevalence varies significantly (5,6). About 70-80% of SCI patients report experiencing some kind of pain (7), while almost half of them describe it as severe with effects on daily functioning, occupational activities and basic needs such as sleep, quality of life and mood (8). The pain may be constant over time and in some cases worsens (9). It is therefore worth noting that pain,

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among other complications, is consistently associated with lower quality of life in these patients (10). There are three types of pain connected to SCI: nociceptive, neuropathic, or visceral (11). Some studies showed that pain prevalence is higher five years post injury than at six months, thus highlighting the importance of treating pain in long-term (12). However, few pharmacological treatments are effective for this purpose, especially for neuropathic pain (13).

Spinal cord injury can affect both physically and psychologically the individual. Therefore, it's quite common for SCI patients to develop mental health problems such as depression and/or anxiety (14). In more detail, it has been shown that the one quarter to one third of individuals with spinal cord injuries develop depression at some point after injury (15). Depression is a common secondary condition after spinal cord injury that occurs in cases of poor health, reduced functionality and high mortality rates. It is also associated with psychological problems caused by injury, such as perceived low quality of life and increased stress (16). Depression is well studied in SCI patients. Prevalence of depression in this patient group varies from 11% to 37% (17). The corresponding percentage in Greece was found to be 18.2% (18). Severe depression is the most common psychological condition associated with spinal cord injury and is estimated to be experienced by 30% of patients. The presence of depression is associated with increased length of hospital-stay and secondary medical conditions, as well as decreased social reintegration, quality of life, and self-care (19,20). There are many different factors that can be associated with depression, such as, stressful life events, such as a serious injury, personal characteristics, environmental factors, such as social support and personal safety, genetic factors, medical conditions and some medicines (20).

Pain includes aesthetic, cognitive and mainly emotional aspects. The emotional component of pain includes feelings of discomfort, sadness, anxiety, and depression in response to a painful stimulus, and in this case, chronic pain. Pain and depression are frequent secondary complications in patients with spinal cord injuries having an effect on the patient wellbeing (21). Clinically, the coexistence of pain and depressive symptoms has been measured by researchers at 52-59%. Depression may affect the onset of disability or chronic pain, according to studies (22-24).

Pain and depression, and the systems through which they are regulated, share common biological pathways and neurotransmitter mechanisms. Thus, it is not surprising that pain has been shown to impair the effectiveness of treatment for depression (25). Moreover, depression and pain can affect the recovery process of the patient due to many reasons.

The aim of this paper is to review the existing literature to specify the connection between pain and depression in patients with SCI. For this purpose, we conducted a literature review, using temporal criteria in order to access the literature of the last 30 years (from 1986 to 2022). Only papers that were published in English were included in this study. The keywords that were used included spinal cord injury, depression, and pain.

Discussion

The search of the databases demonstrated 8994 papers. Our search revealed 25 studies in total. In more detail, the majority of the studies included investigated the effect of depression and pain in patients with traumatic and non-traumatic SCI (17 studies), while 7 studies focused on traumatic SCI patients and one on individuals with chronic SCI (Figure 1).

The first ever study that examined the psycho-social aspects of chronic pain in patients with SCI was conducted in 1980 (26). Their results demonstrated that patients with chronic pain were more prone to depression in comparison to subjects that did not experienced pain. This study was the first reporting the importance that psycho-social variants play in the comprehension of pain in SCI individuals. A cross-sectional study conducted by Ataoglu et al., (2012) assessing the role of pain in quality of life as well as depression in 140 patients with spinal cord injuries, showed that patients with chronic pain had higher depression rates in comparison to patients with no chronic pain (27). Another cross-sectional study that investigated the correlation of pain and depression in 44 patients with traumatic SCI manifested a positive connection between pain intensity and depression (p=.001), suggesting that the long-term emotional distress is significantly influenced by pain (28).

A study that examined the relationship between pain and depression in traumatic SCI patients at a rehabil-

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itation center, demonstrated correlation between pain and depression at discharge and that changes in pain affected depression levels more than depression affecting pain (29).

Craig et al., (1994), investigating the determinants that can lead to depression after spinal cord injuries, showed that pain was a significant variant correlated to depression ($p<.01$) (30). Another study investigating the psychological determinants of pain among patients with SCI demonstrated that depressive symptoms were more common in patients that experienced pain than in patients without pain (31). Molton et al., (2009) in a study of 130 SCI patients reported similar results (32). A longitudinal study concerning depression in SCI patients also showed that pain was one of the risk factors of developing depression (33). In addition, Kennedy and Hasson (2017) investigating the connection between depression and pain during SCI rehabilitation (34), reported that both have an additive effect.

A cross-sectional study investigating the role that pain can play in the development of depressive symptoms as well as in quality of life in SCI patients (35) showed that there is a connection between pain and depression in these patients. Simultaneously, a study conducted by the same research group described the relationships between usual pain intensity, mood, disability and both pain and SCI-related psychological factors, such as depression and anxiety in a rehabilitation center (7). Their results confirmed a significant connection between pain and depression in these subjects, suggesting that pain-related psychological factors are important in the clinical practice after spinal cord injury. An earlier cross-sectional study that investigated life satisfaction in 230 SCI patients regarding pain, demonstrated that lower levels of life satisfaction were reported in individuals with pain, while higher levels of depression and anxiety can be used as predictors (36). Therefore, the association between depression and pain suggests that the long-term emotional distress that these patients experience is significantly influenced by the experience of pain as well.

A survey regarding chronic pain after SCI including 216 patients, showed that chronic pain played a great role in developing depressive symptoms (43% of the subjects) (37). A cohort study examined depression in 801 patients with spinal cord injuries as well as the risk factors for developing depression over time (38). Many factors were significantly associated with major depression in these patients and pain was one of them. A similar study that investigated the role of psychological factors in pain activity and depressive symptoms in 70 adults with SCI, concluded that pain and depression are positively associated (39). Furthermore, two studies examining the correlates of chronic pain in SCI men showed that chronic pain was associated with more depressive symptoms (40,41). Another study aiming to identify the role of pain in ambulation and depressive symptoms detected significant relationship between pain and depressive symptoms in patients after SCI (42).

Since daily fluctuation in pain acceptance and the effect that pain has in physical and psychological aspects of life in SCI patients has not been examined, Kim et al., (2020) studied these factors in 124 SCI individuals with chronic pain (43). Their results demonstrated that pain acceptance was correlated to pain intensity and depressive symptoms among other. Moreover, Cuff et al., (2014) (24) demonstrated that pain interference and pain intensity are related to depression in SCI patients.

Although all the studies stressed the importance of pain to SCI, there were few of them that did not find any connection between pain and depression in these patients. Specifically, the results of a study that examined the depressive symptoms in patients with acute spinal cord injuries showed that although the two thirds of the subjects experienced pain, there was a very low correlation between the two variants (44). In addition, a study that examined the psychological characteristics of 45 SCI patients and pain in a pain management center also failed to detect associations between pain and depression (45). An early study that tried to clarify the phychosocial factors in chronic pain in SCI patients manifested that depression did not have a significant impact on pain interference in these patients (46). Also, Tate et al., (2013) conducted a cross-sectional study that examined the connection between pain and depression in SCI patients in a rehabilitation center (47). Their findings suggest that there is no connection between depressive symptoms and pain in this study cohort upon admission, similar to those of a previous study (29).

Wollaars et al., (2007) studied the role of psycholog-

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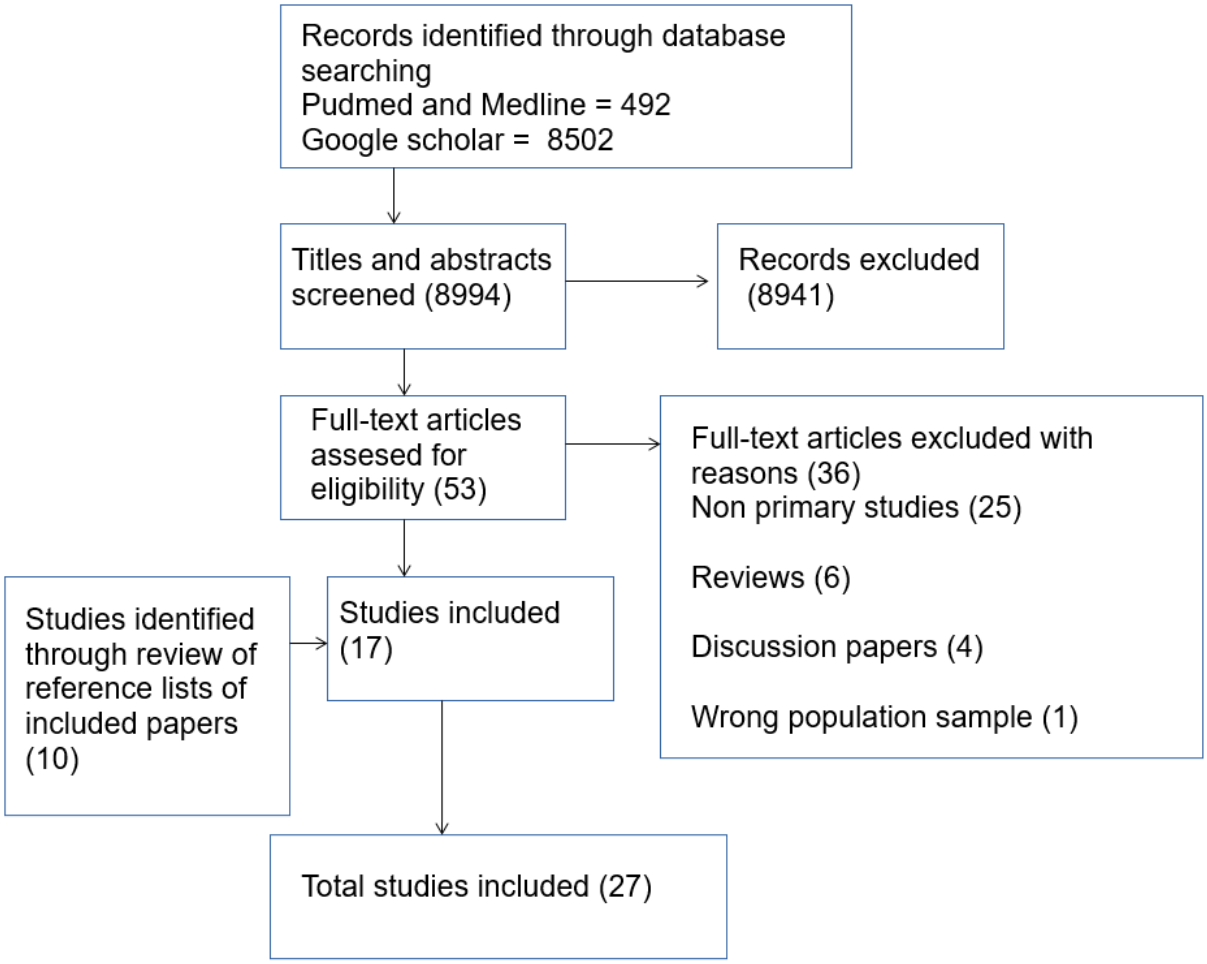

Figure1: Flowchart

ic determinants on SCI pain in 575 patients (48). Depression was not associated with pain in the regression analysis of this study. The authors concluded that the quality of life is more dependent of psychologic variables like dealing with pain and SCI, than of pain and the injury itself. Moreover, in a study that included 37 patients with chronic spinal cord injuries no statistically significant connection was found between clinical factors, such as pain and psychological distress (49). Last, Matin et al., (2015) evaluated the role of fatigue, depression and neuropathic pain among 30 Iranian SCI patients (50). They showed that although patients who had lost their ability to walk demonstrated fatigue and depressive mood more often, pain was not associated neither with fatigue nor with depression in these patients.

A lot of studies have demonstrated that pain is quite common after SCI injury. However, there are not so many studies that explore its effects on quality of life as well as mood. Depression and pain are quite common in SCI patients and seem to have a negative effect on quality of life for these patients. However, our search revealed few studies (7 studies) that showed no statistically significant correlation between the two determinants (44-50). This may be due to various reasons. In the studies conducted by Hassanpour et al., (2012) and Shin et al., (2012) the results can be interpreted by the relatively early observation time window used in these studies. Another reason in some studies (44-45, 49), was that the small sample size was not sufficient to draw safe conclusions. Also, in the study conducted by Tate et al., their results may suggest that symptoms

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could develop later during the course of rehabilitation but are unlikely to be present when patients first enter the unit. Moreover, sample variation may also explain these findings (47). The design of the study conducted by Wollaars et al., (2007) may be the reason why there was no correlation between pain and depression in these patients (48). The reason of the controversies found in the study of Matin et al (use of subjective pain assessment, in which expression of pain severity by depressed or stressed individuals) may be underestimated or exaggerated (50).

The correlation between pain and depression in patients with SCI is confirmed by many studies in the literature. For instance, a systematic review that investigated the determinants of pain in individuals with spinal cord injuries demonstrated a positive connection between pain and depression (51). Also, the results of a systematic review and meta-analysis that was conducted in the Iranian population showed clearly that there is high prevalence of pain as well as depression among patients with SCI (52). These results were confirmed by another meta-analysis conducted by Tran et al., (2016) (53). Literature reviews investigating depression and pain comorbidity concluded that depressed patients experienced more pain in comparison to non-depressed patients and also (54,55).

Pain affects different aspects of the person's daily life and moreover can have an effect on the mental health (56). SCI patients that experience pain believe that their disability has a negative influence on their lives due to pain. Therefore, this negative view may have as a result the depressive symptomatology in addition to pain (30). The recent literature has shown new light into the understanding of the pain–depression relationship and hence, many researchers support that pain and depression should be treated simultaneously (57,58). Many methods have been proposed for the treatment of depression and pain in these patients. In more detail, mindfulness, self-management and directed rehabilitation are some of them. However, all of these methods did not provide clear data on their effectiveness in patients with SCI, emphasizing the need for additional studies in that field (57,59,60). Since depression and pain often occur at the same time, comprehending the common mechanisms that are linked with depression and pain is of great importance to develop an effective treatment for both of them. There are common factors involved in both depression and pain (55). Targeting these shared mechanisms may manifest an increased result for these patients. Therefore, more research must be done towards the factors that affect the mechanisms in order to treat pain and depression.

In conclusion, this literature review demonstrated that pain and depression affect significantly patients with spinal cord injury. Therefore, it is of great importance that health care professionals should pay attention not only to the clinical examination but also to a pain management strategy by the use of psychosocial interventions in order to address not only chronic pain but also depression in individuals with SCI. Many researchers have suggested that SCI patients who experience pain should be treated in a multidisciplinary setting where there is a combination of pharmacological, physical and psychological therapies. By determining who is at risk for these symptoms, clinicians can adopt treatments that prevent these from becoming chronic conditions. Early detection and treatment both of the determinants can lead to reduced costs both for the patients and the health system of each country.

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