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Review Article

Physiotherapy Section

A Narrative Review of Anatomy and Clinical Biopsychosocial Assessment of Sacroiliac Joint Pain

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ABSTRACT

Sacroiliac Joint (SIJ) pain is a severe disorder that affects 15% to 25% of individuals having axially low back pain (LBP). The most common causes of depressive symptoms are fear of movement, pain catastrophising, stress, and nervous system sensitisation. Recent research has shown that radiological imaging, are inadequate for diagnosing SIJ pain. For immersive and patient centred experiences, a comprehensive professional Biopsychosocial (BPS) physiotherapy evaluation is suggested. A new biopsychosocial model has been proposed that acknowledges all critical health and disease factors and promotes the interaction of biological, psychological, and social influences, but moves further than a narrow perspective. Psychosocial influences on well-being have generated an interest in physician services, physiotherapy evaluation, and implementation in a more systematic approach to a patient. This method is used to determine the current pain mechanism (predominant nociceptive, neuropathic, or non neuropathic central sensitisation pain) as well as the underlying pain mechanism. Patient's biopsychosocial variables can establish and maintain sacroiliac discomfort. For a better plan of therapy to manage SIJ dysfunction, the biopsychosocial clinical assessment takes precedence over the examination of sacroiliac joint discomfort alone.

Keywords: Lower back pain, Nervous system sensitisation, Pain catastrophising, Physiotherapy

INTRODUCTION

Back pain has been described as a sickness looking for a disease [1]. Low back pain (LBP) is one of the most common health problems in the world [2]. LBP is a chronic condition that can have a negative impact on a person's social life and family, and can even result in disability [3]. The sacroiliac joint (SIJ), which is thought to be a common source of LBP, has attracted the attention of doctors, and it is thought to be involved in 15% of all LBP cases [4]. In recent times, 70% to 80% of people will experience Pelvic Girdle Pain (PGP) at some point in their lives. The SIJ has sparked interest because of its direct involvement in PGP and lumbopelvic pain, but it remains underused as a source of mechanical lower back pain [5]. Despite the lack of a clear cause, extensive research on the underlying pathology has been carried out since 1990. SIJ dysfunction is now widely acknowledged as being extremely difficult to diagnose, owing to symptoms that is frequently confused with other lumbar spine disorders [6]. Until treating a SIJ disorder, it is recommended that a wide variety of clinical and radiological tests be performed to rule out other spine pathologies [7]. The ability to understand the anatomy, clinical appearance, physical challenges, and treatment options will help increase the chances of a positive diagnosis and improve the quality of life [8]. Although the fact that treatment trials, systematic reviews, and position statements, including those from the World Health Organisation (WHO), strongly advocate using the biopsychosocial (BPS) model to advise evaluation and management of LBP [9]. This review aimed to look into the anatomy of the SIJ, as well as clinical BPS assessment and physiotherapy practice.

ANATOMY OF THE SIJ IN FUNCTION

A deep diarthrodial joint is formed by the sacrum and two innominate of the pelvises [10]. Between the articular surfaces is a fibrous capsule that surrounds a joint area filled with synovial fluid. The articular surface is made up of two C-shaped layers that are both powerful [11]. The three bones of the pelvis, the ilium, ischium, and pubis, fuse to form each innominate [12]. The SIJ has a 17.5 cm^2 approximate thickness and is the largest axial joint in the body [8]. The SIJ's uniqueness arises because it is lined by different types of cartilage: hyaline cartilage on the region of the sacrum and fibrocartilage on the iliac surface. The ilium (0.5 mm) has a thinner cartilage layer than the sacrum (3 mm) [13]. Only the outer portion of the junction between the sacrum and ilium is a true synovial joint; the remainder is a complex web of ligamentous connections. Since the posterior capsule is the SI ligamentous structure, it is more widespread dorsally, serving as a connecting band between the sacrum and the ilia when it is absent or underdeveloped. The basic function of the ligamentous system is to limit the motion throughout all planes of motion. Women's ligaments are weaker, allowing for the movement required during pregnancy [10].

Vleeming A et al., provide a general description of the SIJ anatomy and function in 2012 [14]. It is responsible for transferring load and motion from the spine to the lower limbs, as well as absorbing mechanical and torsional stresses in the pelvic region [7]. About 35 muscles bind to the sacrum or innominate, and their primary function is to provide joint support rather than to produce movements [15]. A matrix of muscles supports the SIJ and helps distribute localised muscular impulses to the pelvis. The muscles additionally aid in the stability of the junctional structures. Ever since latissimus dorsi, gluteus maximus, and piriformis, as well as the biceps femoris, are functionally bound to the SIJ ligament via the thoracolumbar fascia, such movements unnecessarily impact on physical function.

Changes in SIJ Function with Ageing

Age related alterations in the SIJ started in adolescence and continued throughout life. During adolescence, the iliac surface gets harder and shiner, and fibrous plaques develop in some areas [10]. Surface defects, curving shape, fibrillation, and chondrocyte clumping are all signs of these shifts, which intensify in the third and fourth weeks with existence. The sacrum portion of the spine takes 10 to 20 years long to degenerate than the iliac surface.

Joint motion can be severely reduced as the capsule becomes progressively collagenous in the sixth decade. By the eighth decade of life, erosive and plaque development is inescapable and common [16].

Function and Biomechanics

The SIJ's relatively flat form, combined with its ligament, transfers significant bending moments and compression loads; however, the joint lacks shear load stability [17]. The SIJ can define motion in many body planes with rotational, longitudinal, and symmetrical movement [6]. Surface friction coefficient, hip joint force, and muscle or ligament force, however, depending on the complex structure of ligaments and muscles around the pelvic area. According to Hammer N et al, pelvic stability is depending on the SIJ cartilage and ligament. Increased stiffness values in the SIJ cartilage and interosseous ligament, as well as the iliolumbar ligament, anterior sacroiliac ligament, and posterior sacroiliac ligament, reduced motion, with the interosseous ligament undergoing the most pain. At the acetabulum and ilium, these ligaments helped pass loads horizontally. Increased sacrospinous and sacrotuberous ligament stiffness, on the other hand, had the opposite effect, rising pelvic motion. They also made it easier to pass vertical loads and then translate the sacrum. Furthermore, ligament strains were stronger in the standing position than in the sitting position [18]. Without grooves and ridges, the SIJ surfaces have a friction coefficient of around 0.4. The transversus abdominis and pelvic floor muscles (levator ani and coccygeus muscles) play a significant role in SIJ stability by increasing the compression load across the SIJ and thus resisting shear loads [19]. Nutation and counternutation, which correspond to the anterior sacral tilt and posterior sacral tilt, respectively, are the motions of the ilium with a connection to the sacrum. Counternutation of the joint is prevented by the sacrotuberous and sacrospinous ligaments [7]. Because of its superficial position, which places asymmetric stress on the SIJ men unnecessarily, feel pain in this area. Flattening the lumbar lordosis reduces SIJ nutation, which is undesirable [14].

THE SOURCE OF SIJ PAIN

SIJ pain can be caused by pathological changes and accidents unique to various SIJ structures. Capsular and ligamentous stress, hypomobility or musculature, external compression or shearing pressures or macrofractures, injury, and irritation are all factors to consider [10]. By a process of axial loading and sudden rotation caused by SIJ [20].

The SIJ pain can also be due to injuries to the pelvis caused by falling directly on them, as well as collisions in activities or when driving [21]. Another possible cause of SIJ pain is Limb Length Difference (LLD). The mechanical alignment of the SIJs becomes progressively imbalanced as a result of the length difference, resulting in unequal load distribution over both SIJ [17]. Several hormonal and biomechanical changes are caused by ligament laxity that arise during pregnancy. Increased uterine and breast mass, which causes anterior with centre of gravity displacement, is one of the most common musculoskeletal changes [22].

DIAGNOSIS OF SIJ PAIN

Le Huec JC et al., in 2020 stated that most patients with SIJ dysfunction feel a sense in the L5-S1 nerve distribution, which is similar to the pain from various sources such as lumbar intervertebral disc degeneration, lumbar posterior facet joint discomfort, hip discomfort, muscular pain (piriformis syndrome), and osteoporotic sacral fracture [7]. The Gillet Test, the standing forward flexion test, and the seated forward flexion test was all included in the investigation of SIJ mobility. All tests were evaluated and these are commonly used to assess SIJ [7,23]. The SIJ is likely to cause discomfort during clinical testing. However, because of the wide range of incorrect outcomes, the use of provocative techniques alone is difficult [2].

According to Le Huec JC et al., in 2020 clinical investigations should next be confirmed with an infiltrative test. Infiltration or fluoroscopy guided intra-articular injections guided by the C-arm or Computed Tomography (CT) scan in the lower part of SIJ. SIJ dysfunction can be diagnosed and treated by injecting local anaesthetic and corticosteroids into the lower section of the SIJ. The implementation of a full clinical examination based according to the International Association for the Study of Pain, the essential diagnostic for the identification of SIJ dysfunction involves combining provocative procedures and infiltration [7]. Falowski S et al., reported in 2020 the poor sensitivity of imaging, where X-rays, computed tomography, and magnetic resonance provide some information about abnormalities but are not always specific, tends to the difficulties of diagnosis. Because the diagnosis of this joint is difficult to profile adequately on radiographic images, sacroiliitis radiographic findings are frequently ambiguous. The most sensitive imaging technology is Magnetic Resonance Imaging (MRI) [24].

CLINICAL ASSESSMENT

Biopsychosocial Model

Gwendolen state that Engel, who argued against the reductionist biological concept of disease and for concurrent inclusion of behavioural, psychological, and social elements in comprehending people's medical illnesses, proposed the biopsychosocial model in 1977. This conceptual approach was first proposed in the field of psychiatry, but it swiftly spread to other medical professions. With considerable effectiveness, the approach has fueled the expansion of multidisciplinary rehabilitation programmes, particularly but not solely for chronic LBP [25].

As specified by Sanders T et al., in 2017 the National Institute for Health and Clinical Excellence has advocated more use of the biopsychosocial model for treating of patients with LBP, in addition to early detection and treatment of symptoms. In essence, a patient centred healer, the biopsychosocial approach considers the patients as a whole, their social, cultural, and environmental context that determines an individual's response to sickness [26].

How to Treat the BPS Model in Clinical Assessment

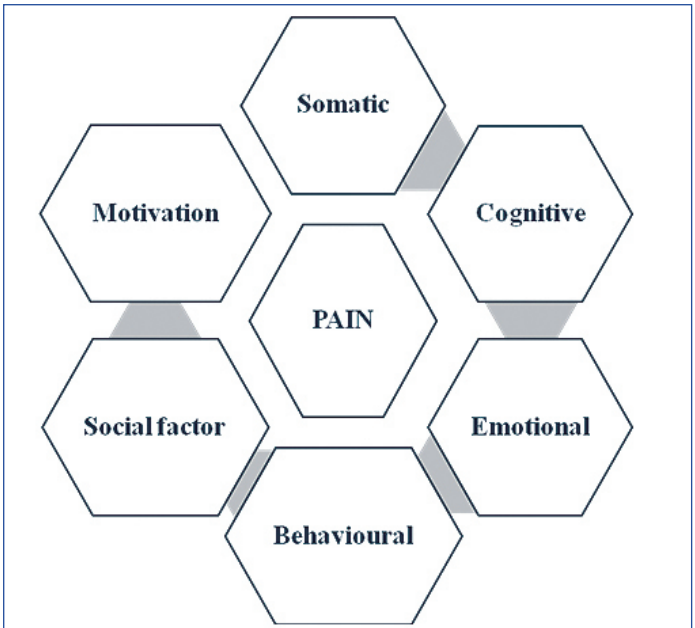
To make this possible the biopsychosocial intake of patients with chronic pain, PSCEBSM model is suggested that is the following: (Pain- Somatic and Medical factors-Cognitive factors-Emotional factors- Behavioural factors- Social factors and Motivation) [Table/Fig-1].

- **P-Type of Pain**

Assessment done on the basis of the type of pain classified as the following:

Nociceptive pain: Damage to body tissue in six to eight weeks and pain reduces as the natural healing processes. Recurrent pain is often accompanied by swelling, haematomas, skin discoloration, and other clinical signs. Sharp, throbbing pain is one way to quantify pain [27].

Neuropathic pain: Neuropathic pain affects 7% to 10% of the general population and caused by a lesion or disease of the somatosensory system, which includes peripheral fibres. Numerous causes of neuropathic pain have been identified, and its prevalence is expected to rise as the world population grows, diabetes mellitus becomes more common, and cancer prognosis improves following treatment. Indeed, neuropathic pain has been linked to an imbalance of excitatory and inhibitory somatosensory activation, as well as changes in ion channels and variability as far as how pain messages are processed in the central nervous



[Table/Fig-1]: PSCEBSM model.

system (CNS) [28]. Pain and sensory impairment are related neuroanatomically. Neuropathic pain is selectively described as burning, shooting, or pricking pain [28].

Non neuropathic Central Sensitisation (CS) pain: Evidence has emerged recently suggesting that patients with chronic pain have a nearly irreversible condition of hyperexcitability in the central nervous system, described as non neuropathic central sensation pain. Wijma AJ et al., state CS as an amplification of neuronal signals inside the CNS that causes pain hypersensitivity. There's also no sign of a lesion, damage, or sickness of the neural system. Diagnostic examinations revealed no results. Pain is segmentally and neuroanatomically independent of the primary source of nociception. There are several areas of hyperalgesia outside and distant from the symptomatic area, and pain is most commonly reported as vague and dull [28].

• S- Somatic and Medical Factors

Because of injury, CS refers to an increase in the excitability of neurons in the spinal dorsal horn that occurs and lasts significantly longer than the inducing nociceptive input. Other past or present conditions that unnecessarily influence CS, impermissibility or disuse of body parts, changing movement patterns, exercise ability, strength and muscle tension/tonus during movement are all physical and medical factors that may be present in people with CS [29].

• C- Cognition and Perception

Physical therapists are well-known members of the multidisciplinary treatment team, and they play a crucial role in rehabilitation. For individuals with chronic LBP limitations, there are a variety of cognitive behavioural treatment approaches accessible, and physical therapists use a number of them. The treatment theory can help with clinical treatment selection in cognitive behavioural pain rehabilitation and aid in a better comprehension of research findings [30].

• E- Emotional Factors

E Bushnell MC et al., explained in the therapy, attentional and emotional factors influence pain perception. The severity of pain is increased when you concentrate and experience. Bad mood enhances the perceived unpleasantness of pain without changing its intensity. Pain ratings and a spinal nociceptive reflex were both affected by emotional valence in the same way. Pain was minimised while the reflex was increased as a result of the attention. As a result, it appears that multiple systems are implicated in pain regulation by attention and emotion [31].

• B-Behavioural Factors

Chronic pain refers to short trauma related pain symptoms and suffering that have lasted longer than predicted and have defied more conservative and typical healthcare management measures. Before going over numerous options, several conceptual concerns are essential to any therapeutic approach. There is a need to address the issue of pain. In the management of chronic pain, traditional healthcare is combined with behavioural healthcare approaches [32].

• S- Social Factors

Social relationships can influence coping strategies. The use of social referencing is one method. That is, people look to others for guidance on how to cope appropriately in a specific scenario. Social relationships also impact on coping because they provide direct information about the efficacy of various coping strategies. In general, research shows that people who are more satisfied with assistance are also more adaptive to coping strategies in stressful situations [33].

• M- Motivation

Marlatt GA model is based on social cognitive psychology and includes a conceptual model of relapse as well as a set of cognitive and behavioural strategies to prevent or limit relapse episodes for a detailed description of the development, theoretical underpinnings, and treatment components [34]. It was designed to help patients learn newly learned abilities that would reduce the likelihood of an initial relapse or recurrence, as well as prevent minor lapses from becoming full fledged relapses. The issue of possible lapses and relapses is not ignored in the model, nor is it attributed to treatment management programme or patient failures. Pain recovery programme should include such gaps and relapses as an important component [35, 36].

Biopsychosocial clinical assessment tool: A clinical categorisation approach was made in conjunction with a physiotherapist, based on diagnosis screening categories that were compared to international teams of specialists and therapeutic suggestions. Facts on the clinical classification instrument, such as illness, positive outlook in life, and fear avoidance, can be obtained. Catastrophising, anxiety, and depression are all descriptive words while thinking about beliefs. In clinical biopsychosocial assessments, scales was utilised.

OUTCOME MEASURES

Fear Avoidance Beliefs

Waddell G et al., developed the Fear Avoidance Beliefs Questionnaire (FABQ) in response to the introduction of the biopsychosocial model of LBP [36]. After adjusting for other relevant characteristics, the FABQ explains distinct levels of variance in employment loss and disability. The FABQ can be used to measure a subject's thoughts about how physical exercise and job affect their LBP. It is made up of 16 different items. On a seven-point Likert scale, patients assess their confidence for each sentence [37]. When assessing patients with PGP, the reliability [ICC- 0.97] and validity are good indicators of mental well-being, but the validity was unclear [38,39].

Beck Depression Inventory

This was utilised to assess depression related symptoms and attitudes. There are 21 items on the scale, with a total score ranging from 0 to 63. This evaluation is utilised in the biopsychosocial model [40].

Pain Catastrophising Scale (PCS)

This was used to evaluate the participant catastrophic thoughts of pain. The PCS is a 13 item questionnaire designed to measure the three components of pain related catastrophisation, rumination, magnification, and helplessness, with an unique score ranging from 0 to 52 [41]. When assessing patients with PGP, the reliability [ICC- 0.97] and validity are good indicators of mental well-being, but the validity was unclear [42,43].

Depression and Somatisation

People who suffer from chronic pain frequently describe greater bodily/somatic awareness. This study used the Distress and Risk Assessment Method (DRAM) to evaluate psychological distress linked to depression and somatisation. This same clinical biopsychosocial performance is tested and use all [44].

CONCLUSION(S)

It can be concluded that SIJ pain remains a significant issue for therapists, owing to the complexity of diagnosis, the disorder's distinctiveness, and the technical hurdles of treatment. There are currently no well-designed studies evaluating clinical biopsychosocial assessment in SIJ pain, which should involve an assessment of various assessment methods coordinated by the patients.

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