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Pain And Various Pain Management Methods In Medicine And Dentistry

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Abstract:

Pain is a multidimensional experience that affects a large part of the world's population. This effect is greater on women, the elderly, rural residents, and socioeconomically disadvantaged groups. Considering the progress of medical and dental sciences, pain management is considered as a complex experience both biologically and psychologically. Hence it remains a challenge that has not been fully resolved.

This article researches about various methods of pain management, including physiotherapy, psychological management, pharmacological approaches include NSAIDs, opioids, anticonvulsants, and etc., each targeting various pain mechanisms. In addition, developments in nanotechnology and artificial intelligence is included too. It should be noted that challenges including addiction and side effects of drugs still exist and the need for innovation in this field is evident.

Among the important findings are the integrated approaches that are a combination of drug, physiotherapy, and psychological treatments that lead to comprehensive pain management. This research combines the findings of relevant studies and emphasizes the importance of a multifaceted approach to pain management. It is necessary that future research focuses on optimizing integrated approaches and increasing patient education in order to improve the quality of self-care in the target population, and better pain management outcomes.

Keywords:

Pain, Management, Drugs, Psychological, Physiotherapy

Introduction

Pain is defined as an unpleasant human experience with various unknown aspects[1]. The results of a research show that 28% of people in different countries suffer from pain conditions, so that women, the elderly, people living in rural areas and groups with income inequality suffer the most. On the other hand, a different and actually inverse relationship was also observed, and that was that the higher the life expectancy in a population, results in a lower probability of experiencing the pain[2]. Also In a study conducted in the United States, approximately 126 million people reported experiencing pain in the past three months, of which 25.3 million suffer from chronic pain every day[3]. Due to the pain complexities, science a definitive solution has not yet been found to its management. Pain can be seen as a biological and psychological response to physical and mental trauma, which always brings new challenges to researchers in the path of research and discovery[4,5].

Until today, with advances in the fields of brain imaging, psychological sedation techniques, nanotechnology sciences, artificial intelligence, etc., human has been able to gain deeper insights in the direction of pain recognition and management, especially with the achievement of nanotechnology science, by using Nano drugs[6,7]. Such advancements made it possible to reach the exact location of the pain and deliver predetermined amounts of drugs to the target tissues, in order to minimize side effects and maximize the effectiveness of the drug. Also theuses of artificial intelligence, amazingly improved the ability of pain prediction and management[8,9]. There are also various methods including acupuncture in traditional medicine, the use of drugs in modern medicine, new techniques including transcranial magnetic stimulation (TMS) etc., which relieve pain by using biophysical and biochemical frameworks, which of course have advantages and disadvantages[10,11].

This article deals with pain management by presenting a new perspective on various methods of pain control, people's experiences of it, psychological and social effects, scientific advances in this field as well as examining the future perspectives and looking for answers such as whether it is possible to definitively managed the pain, as well as to make out up to what position artificial intelligence reach in the future in this regard[12,13].

Pharmacological management of pain in medicine and dentistry

In a study that was conducted with the aim of identifying common drugs in pain management and their mechanisms of action, these results showed that using a multifaceted approach that includes pain suppressant drugs, can improve pain relief and reduce side effects[14].

1. Analgesic drugs:

- A. Non-steroidal anti-inflammatory drugs (NSAIDs): These drugs, which include ibuprofen, naproxen, etc., are commonly used to control mild to moderate pain[15].
- b. Opioids: drugs such as oxycodone, fentanyl, etc., are used to control severe and chronic pain. These drugs reduce the feeling of pain by affecting the opioid receptors in the brain and spinal cord[16].
- c. Anticonvulsants: Gabapentin, pregabalin, etc. are used for neural and chronic pain, which, by affecting the nervous system, reduce the abnormal activities in the nerves, and help reduce pain[17,18].
- d. Antidepressants: These drugs are from the family of tricyclics, an example of which is amitriptyline. Antidepressants such as duloxetine control chronic pain by inhibiting the reuptake of serotonin and norepinephrine (SNRIs) by altering chemical levels in the brain[19,20].

2. Advanced drug administration methods in pain management:

In a study which has been published in 2022, which provides information on the advancements of nanotechnology in the management of acute and chronic pain, it was found that the use of nanotechnology in drug therapy not only leads to better pain control, but also reduces side effects. Also, advanced Nano systems have been very effective and important in the rapid diagnosis of diseases and accurate measurement of pain[22].

- a. Nano drugs: These drugs can reach the pain point and deliver a certain amount of drug to the target tissues[23].
- b. Drug injection pumps: They are used to manage cancer or chronic pain, in such a way that the drug is continuously injected, with certain doses, to the pain site[24].
- c. Software based on artificial intelligence: they are used in predicting and managing pain, so that they analyze pain patterns and provide suitable solutions in this regard[25].

3. Challenges:

- a. Addictiveness: This issue is one of the most serious challenges that requires new approaches for prevention or control[26].
- b. Drug side effects: Almost all painkillers have side effects which may sometimes be permanent, so it requires new approaches to get rid of it[27].

Physiotherapy management of pain:

Physiotherapy effectively relieves pain and is one of those types of non-medication pain management. This treatment method includes sports exercises, manual techniques, physical treatments, and patient education[28], which are discussed below.

1. Sports exercises: It is an essential part of physiotherapy that helps in pain management by increasing flexibility, increasing blood flow, strengthening body muscles, and releasing endorphins[29].
2. Manual techniques: includes manipulation, mobilization, etc., which are considered very helpful in reducing pain[30].
3. Patient education: it educates about how to perform exercises correctly, strategies to prevent possible injuries in the future, etc., which can be useful in reducing pain and preventing its recurrence[31,32].

Psychological management:

Since pain has the ability to cause emotional distress, depression and anxiety, psychological management including mindfulness, relaxation techniques, etc., are considered essential in this regard[33,34]. In a research conducted by Robert S White et al. on 578 elderly people, it was concluded that there is a relationship between stress and increased pain[35]. Physiological management can help patients to gain the ability to cope with it, and on the other hand, mindfulness techniques can reduce stress and anxiety following pain to a great extent[36].

Integrative approaches to pain management:

In order to manage pain with an integrated approach, a combination of drug, physical as well as physiotherapy management, and psychological treatments are needed, which are considered for each person who needs pain management according to the diagnosis of the therapist[37,38].

Materials and methods:

This review study evaluates various studies which were published in pubmed about pain management methods and approaches, specially which were found to be more related to medicine and dentistry, and also determines the effectiveness of various treatments.

Discussion:

By analyzing various approaches regarding pain management, it is concluded that there is still no consensus among therapists in any of the related professions, meaning that every country, every treatment system and every profession consider their own approach. Pain is a multifaceted and even complex experience, including acute, chronic, nervous, psychological, etc., and according to its etiology, proper management is needed, not according to the personal choice and favorite method of the therapist[39,40,41].

Medication management:

In such management, relief is often quick. However, the long-term use of such management leads to problems such as addiction and side effects, hence they are mostly used for short-term pain[42,43].

Physical treatments and physiotherapy:

Other methods of pain management are physical therapy, sports exercises, and etc., that increase muscle strength and reduce tension. therefore unlike medication management, they do not lead to addiction[44,45].

Pain management through physiotherapy:

The use of methods such as cognitive-behavioral therapy (CBT), the use of hypnosis, mindfulness, and etc., have reduced pain and improved the quality of life, and on the other hand, reduce the need for painkillers[46,47].

Combination of various methods:

The best results in managing pain are obtained when we use a combination of several treatment methods, including drug therapy, physical therapy, and psychological techniques[48,49].

Conclusion and Recommendations :

Pain management is a multifaceted and complex category that is not possible with only a single and unilateral approach. It is achieved by combination of various drug, physiotherapy, and psychological management.

In order to be improved in this regard in the future researches, it is necessary to develop pain management strategies in such a way that individual preferences play a lesser role in it, and therapists need to bring the patients to a higher level in self-care and self-management knowledge.

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