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Stem Cell Therapies in Dentistry and Their Impact on Psychological Health (An Overview)

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Abstract

Dental science has succeeded in using stem cells in advanced treatment methods with a creative approach compared to what was in the past. This has not only improved the treatment of oral and dental diseases, but has also created various advantages for the psychological aspect of man.

It was from 1980 onwards that embryonic stem cells were used, and after that, pluripotent stem cells, which goes back to 2006. Also, mesenchymal stem cells, which can be obtained from bone marrow, fat, etc., were able to restore the health of the orodental region, especially the gingiva and periodontium tissues in patients, who are often seen with psychological issues including anxiety, depression, etc.

In addition, stem cell therapies hold promise for treating diseases such as age-related jaw bone loss or tooth loss by differentiating MSCs into osteoblasts.

Therapies in dentistry which are based on stem cells do not only seek physical health, but benefits both physical as well as mental health and create an overall better conditions for the patient.

When the recovery period is shorter and faster, more peace of mind is created for the patients which is accompanied with an improved overall situation as compared to the traditional therapeutic methods.

Keywords: stem cell, dental, psychological

Introduction

Ever since the stem cells therapy has entered the dental profession, it has caused transformation and improvement this field in the regard of various management criteria[1].

Especially by discovering embryonic stem cells (ES) in mice, researchers have been able to achieve significant success in the differentiation of cells and tissues. In 1981, cells were isolated professionally and successfully, and convincing measures were taken to differentiate them into different types of cells and subsequently the desired tissues. After that, in 1998, promising work was done on human ES cells[2].

In 2006, researchers achieved the ability to reprogram adult cells to re-progress into induced pluripotent stem cells, thus solving the ambiguities and challenges in the field of ethical problems[3].

MSCs, derived from bone marrow or adipose tissue, can help regenerate damaged periodontal tissues[4]. Periodontal diseases, which are common dental problems, are closely related to mental depression[5]. Recent research has shown that periodontitis increases the risk of depression, anxiety and other psychoses and for this reason, today the periodontium is known as a structure that can strongly affect the mental health of a person[6].

Researchers were also able to solve major challenges in the fields of dental treatment by advancing in this profession, for example, managing and even treating jawbone in patients, which generally occurs due to old age or tooth loss, by using stem cells. One of the other advances in this science was that by extracting mesenchymal stem cells (MSCs), which can be obtained from bone marrow or fat and even other tissues, they turn them into bone cells, i.e. osteoblasts. And the hopeful news is that a significant amount of success has been achieved in this area[7].

Regarding the regeneration of tooth tissues and structures, it was shown in a study that stem cells have the potential to be used to treat dental pulp damage and promote the regeneration of its blood vessels and nerves. Researchers isolated two types of stem cells from dog tooth pulp and found that these cells can promote blood flow, regenerate blood vessels and nerves in animal models. When these cells were transplanted into necrotized dog teeth, both groups of cells completely regenerated the tooth pulp with blood vessels and nerves within 14 days. One group of cells also gave rise to new dentin. These results indicate the high potential of stem cells in the regeneration of dental tissues[8]. Among the diseases which may not be directly associated with dentistry field, Slzheimer's can be named, in such a way that a study in 2017 which had been done by Parul Bali et al, it was concluded that stem cells may be a way to treat Alzheimer's disease. Primary research showed that transplanting stem cells into the brain can help improve the symptoms of this disease[9]. Another such disease is Parkinson's, which is associated with loss of dopamine-producing neurons and causes movement problems. Currently, the available drugs are not fully effective and may cause side effects. But excitement and hope among

researchers about using stem cells to replace lost neurons and possibly treat Parkinson's without unwanted consequences is increasing. Although progress in this direction is slow, promising clinical trials are in sight, but the research results have given hope that the treatment approach with stem cells for Parkinson's will probably come true in the near future[10].

According to these findings, we find that treatments based on stem cells can have significant effects on the overall health of the body[11], and consequently on the mental health of people[12]. Therefore, the psychological effects of stem cell treatment should not be ignored. Many patients with dental problems suffer from anxiety and stress caused by dental treatments[13]. Treatment with stem cells, due to the reduction of pain and recovery time, can improve the treatment experience of patients and give them more peace psychologically[14].

Treatment with stem cells in dentistry is recognized as one of the greatest scientific achievements in recent years[15].

These methods, relying on the ability to regenerate and restore dental tissues, not only improve the oral and dental health of patients, but also have positive psychological effects[16,17].

Examples of dental diseases with negative psychological effects and possibility of their management with stem cells:

Loss of teeth due to injury, disease or congenital abnormalities can cause significant psychological and physiological problems for patients. Replacing lost teeth with prostheses or implants often does not bring satisfactory results because they are weaker than natural teeth both in terms of endurance and beauty. Bone loss in the jaw can lead to issues such as affecting a person’s appearance and ability to eat[18].

How stem cell therapies in dentistry enhance psychological health:

1. Cell regeneration: stem cells can differentiate into odontoblast cells and regenerate tooth dentin and pulp. The use of growth factors such as TGF-β1 and BMP-2 increases cell proliferation and leads to more durable dental structures. In this type of recovery, patients will need less frequent consumption and visits to their dentist, which in turn can prevent issues such as stress and stress caused by it[19,20].

2. The ability to use stem cells in surgical treatments: the use of stem cells in treatments that

require surgical interventions can significantly reduce the damage of surgery and the pain that the patient suffers afterwards. It is obvious that less pain brings more positive psychological conditions for patients.[21,22].

3. Better cope with the situation psychologically: during the recovery period, cytokines, growth factors, etc. are released, causing changes in immune responses and causing anti-inflammatory effects. This is considered an advantage that causes both oral health and dental health. Therefore, this will improve the overall health of the body as well, and the health of the body will also lead to more mental health, which can include less anxiety, better coping with psychological conditions during the recovery period, etc[23,24].

4. Better pain management: since in treatments based on stem cells, the need for less invasive methods and subsequently the intensity of pain and the consequent reduction of anxiety, distraction, etc., the patient will experience a more favorable psychological state after the treatment process[25].

5. Increasing self-esteem:

a: Since the compensation of missing teeth requires artificial teeth replacement in order to achieve esthetic appearance in the traditional methods specially for the anterior teeth, it may be potent to cause oral microbial imbalance as well as bad breath. But the potentiality of stem cells in regenerating natural teeth may solve this issue which may lead to increasing self-confidence and self-esteem[26,27,28].

b: Since missing teeth or the inappropriate appearance of some teeth or even damaged gums can target and reduce a person's self-esteem, relying on stem cell therapy that naturally and From the nature of the body tissue itself, it can lead to the restoration of teeth and gums, which seems to be a suitable solution to improve self-confidence and self-esteem[18,27,28].

6. More successful social interactions: Since the proper condition and health of the mouth and teeth increase self-confidence in people and subsequently improve social interactions, in stem cell-based treatments when a person is aware of its benefits and chooses it. slow down and subsequently experience good conditions during the recovery period, the minimum is that at that point in time he will also experience a better quality of life. Also, during the recovery period, the patient will have more successful social interactions because due to less swelling, the patient will be able to talk in order to communicate and interact with people in a better way[25.28,29].

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