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COMBINATION OF STEM CELL & PRP THERAPY IN HEALTHY AGING FOR OSTEOARTHRITIS

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ABSTRACT
Osteoarthritis is the most common inflammation of the joints, with symptoms of joint pain when moving, stiffness, especially in the morning, weakening of the muscles around the problematic joint, sound when the joint is moved, and swelling in the joint area. The absence of treatment that can eliminate Osteoarthritis has led to an increasing demand for more effective treatment. In fact, common disease is age-related, and global statistics show that it is a significant health problem and financial burden on health and social welfare systems globally. This study aims to explain and analyze the effectiveness of combination therapy of stem cells and PRP in the treatment of Osteoarthritis. The research method used is a case study where combination therapy of stem cells and PRP offers the potential to modify the natural recovery of knee Osteoarthritis using stem cell-based technology. Stem cell therapy was given to 9 Osteoarthritis patients aged over 50 years, most of whom were female, who were proven to tend to improve their condition after undergoing stem cell therapy with PRP at the Vinski Regenerative Center and were able to carry out their daily activities again.

Keywords: Stem Cell, PRP, Osteoarthritis, Joint, Stem Cell Therapy, Vinski Regenerative Centre.

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INTRODUCTION

Osteoarthritis (OA) is the most common joint disorder, affecting over 528 million people globally (Yao et al., 2023); (World Health Organization (WHO), 2023). It causes significant disability, loss of function, and decreased quality of life, especially in aging populations. OA places enormous burdens on healthcare systems; total medical costs related to OA in the United States alone were estimated at $460 billion in 2019 (Lo et al., 2021). OA is characterized by the progressive thinning of joint cartilage, accompanied by the formation of new bone in the subchondral trabeculae and the formation of new cartilage and bone at the edges of the joints (osteophytes) (Yao et al., 2023) (World Health Organization (WHO), 2023).

The surface of the joint is covered with soft and smooth cartilage. Cartilage is a greasy layer on the surface of hard bones that plays a vital role as a lubricant and shock absorber. The tissue that covers the joints is coated with synovial fluid, which is a fluid that lubricates the joints. As we age, the water content in cartilage thins, and other changes occur, making it susceptible to injury. This cartilage can become worn out due to the trauma of heavy exercise or due to our daily activities, which put pressure on the joints for years and cause them to undergo a degenerative process. Thus, as age increases and the intensity of physical activity carried out, especially by joints that bear heavy loads, the risk of complaints of joint pain or OA increases (Yao et al., 2023). People who suffer from OA usually find it difficult to move their joints, and their movement becomes limited due to a decrease in the function of cartilage to support the body. This can hinder someone's productivity.

OA not only attacks older people but can also attack younger people (World Health Organization (WHO), 2023). OA is a non-inflammatory, degenerative joint disease. Cartilage functions to line each end of the bones that form joints so that joints can move freely without pain. Hence, if the cartilage thins, the ends of the bones are no longer covered by cartilage and will rub directly together, causing pain.

Traditional treatments like joint replacement surgery and pain medications often provide incomplete and temporary relief. Despite the high prevalence and disease burden, our understanding of OA's underlying mechanisms remains limited. Still, no cure can effectively slow disease progression (Yao et al., 2023). The chronic inflammatory process causes gradual deterioration of cartilage and bone tissues until the joint can no longer move properly. The exact triggers that initiate inflammation are unknown, though genetic factors, inflammation cascades, and microtraumas accumulate over time. Researchers in this case study wanted to investigate and analyze how effective stem cell and PRP combination therapy is in the treatment of Osteoarthritis with Stem Cells compared to conventional drug-based therapy and the need for efforts to advance our understanding of this therapeutic approach, we conducted a comprehensive investigation into the potential advantages of these quantum stem cells. Novel approaches like cell-based therapies aim to address fundamental pathways driving pathogenesis. Stem cell therapy is one promising alternative widely used to treat OA, given mesenchymal stem cells' multilineage potential for tissue repair and anti-inflammatory properties (Harrell et al., 2019). These cells can rebuild cartilage that has become thin in joints. Small trials have already reported reduced pain and improved knee cartilage volume and mobility after stem cell injections. However, challenges around optimizing cell potency and the limited availability of autologous cells remain. Combinations with platelet-rich plasma (PRP) may enhance efficacy, though more robust randomized controlled trials are needed.

Types of Osteoarthritis (OA)

Primary

The cause is unknown due to the natural aging process. It occurs after the age of 45 years. The exact cause is unknown, but it attacks slowly but surely and can affect many joints. It usually affects the knee and hip joints but can also affect other joints, such as the back and fingers (Yao et al., 2023). Primary knee OA has a preference for the medial tibiofemoral compartment, likely due to increased weight-bearing loads. Age-related changes to molecular signaling, cell senescence, and tissue homeostasis disrupt the ability of chondrocytes to maintain and repair cartilage. Genetic analysis has found several candidate genes involved, but much remains uncertain about precise mechanisms. Twin studies estimate that genetics contribute up to 65% of disease risk overall (Wilkinson & Zeggini, 2021). Beyond genetic factors, free radicals and chronic inflammation degrade cartilage over time. Diet and mechanical stresses also play a crucial role. Typical presentations involve the gradual onset of aching knee discomfort and stiffness in those over 40 years old. Radiographs reveal joint space narrowing, osteophytes, bone marrow lesions, and subchondral sclerosis (Lee, 2021). Management aims to reduce pain and improve quality of life, given that no cure exists.

Secondary

Experienced before the age of 45 years, the cause of trauma (instability), which causes injury to the joints (for example, broken bones or misaligned joint surfaces) due to loose joints and surgery on the joints. Other causes are genetic factors and metabolic diseases. Younger individuals often

develop OA secondarily after trauma, inflammatory joint diseases, or congenital/developmental abnormalities. About 12% of all OA cases are post-traumatic, with higher risks for intra-articular fractures and cruciate ligament tears (Wang et al., 2020); (Betancourt et al., 2022). Repetitive injuries from competitive sports are another common cause. Other secondary risk factors include obesity, diabetes, and other arthropathies like gout or autoimmune disorders. The pathological processes resemble primary OA, including cartilage breakdown, though initiating factors differ (Yao et al., 2023). Total joint replacements comprise mainstay surgical treatments reserved for severe, end-stage diseases unresponsive to more conservative measures.

Risk Factor

Age Above 50 Years

Age is the most substantial risk factor for OA. Radiographic evidence of OA occurs in the majority of people by the age of 65 years (Lee, 2021). Multiple large-scale studies confirm the exponential rise in prevalence with older age across all joint sites. For example, the incidence of symptomatic knee OA rose from 0.1 per 1000 person-years before age 50 up to 3 per 1000 person-years by age 60 and higher in women (Allen et al., 2022). Age-related changes affecting cartilage composition and metabolism reduce tissue tolerance to mechanical stresses over time. Chondrocytes lose the ability to maintain proteoglycan matrix and adequately repair microdamage. Bone also demonstrates slower remodeling and repair capacity. The integrity of multiple joint tissues becomes compromised, leading to degeneration.

Gender – Female Sex

All types of OA demonstrate substantially higher prevalence among women, indicating that sex-based factors influence susceptibility. Radiographic hip and knee OA are 50% more common, while the risk for developing symptomatic disease doubles in women versus men, even after adjusting for age and BMI (Tschon et al., 2021); (Allen et al., 2022). Explanations for this disparity remain uncertain but may involve anatomical differences, effects of estrogen on cartilage and bone metabolism, and laxity in ligaments during menopause. Women experience more severe pain and functional limitations from OA. Analyses project that the numbers afflicted will rise given the expanding/aging female populations (Tschon et al., 2021)

Obesity

Weight gain is consistently associated with increased incidence and progression of OA across all major joint sites. A 2022 pilot trial found obese individuals 3x more likely for knee OA and over 2x for hip OA versus normal-weight persons (Schweda et al., 2022). Dose-response relationships exist - each standard deviation rise in BMI elevates relative risk by approximately 35% after adjusting variables. Excess loading and adiposity-related factors both contribute mechanistically. Inflammatory cytokines like leptin and IL-6 secreted from white adipose perpetuate cartilage catabolism. Visceral fat is also associated more strongly with OA than total body weight, highlighting metabolic activity.

Immobilization History

Prolonged immobilization causes significant muscle atrophy and loss of knee strength, predisposing the knee to cartilage breakdown once mobilization resumes. As little as 2 weeks in a cast or splint leads to measurable quadriceps wasting and biomechanics alteration. Animal models demonstrate similar cartilage changes to those in early OA - decreased proteoglycan content,

disrupted collagen matrix, cell death, and surface erosion (Samvelyan et al., 2021); (Szponder et al., 2022). The prolonged stationary positioning likely also reduces nutrient flow for avascular joint tissues. Preventative physiotherapy should be implemented post-immobilization before attempting normal function.

Prior Joint Injury

Intra-articular fractures cruciate or cartilage tears markedly raise chances for developing post-traumatic OA years later. Around 50% progress to OA 5-20 years following major knee trauma (Filbay et al., 2021); (Kvist et al., 2020)The acute injuries precipitate inflammatory cascades plus aberrant tissue repair responses that fail to regenerate native properties. Surgical treatments like partial meniscectomies also culminate in similar patterns of cartilage degeneration over the long term. Chondrocyte viability remains impaired despite the apparent healing of defects. Severity positively correlates with risks, though even less extensive lesions predispose patients to eventual osteoarthritic changes.

High Physical Activity Levels

Lifelong athletic activity does not cause OA but can exacerbate risks from excessive use and blunt trauma in vulnerable joints. Specific movements like pivoting/cutting sports substantially increase the odds of knee OA. Professional athletes exhibit earlier onset and accelerated progression after retirement (Kvist et al., 2020). Comparisons among elite soccer players, runners, and shooters reveal chronic symptoms in 79-90% of later in life (Migliorini et al., 2022); (Kvist et al., 2020). Heavy lifting occupations are similarly associated with hip/knee OA development. Dose-dependent relationships exist based on frequency, duration, and intensity of loading. Still, moderate recreational exercise helps maintain mobility and healthy joint tissues.

Crystal Deposition Disorders

Microscopic calcium pyrophosphate or monosodium urate crystals deposited in articular cartilage induce significant inflammation and damage. Their presence commonly coincides with imaging-confirmed OA. Symptomatic chondrocalcinosis from calcific particles affects over 7% of adults by age 85 (Rosenthal et al., 2023). Comparable gout prevalence reaches 6% in older men. Both dramatize episodic arthritis flares initially with eventual persistent activity limitations resembling end-stage OA. Anti-inflammatory colchicine and xanthine oxidase inhibitors provide partial relief. Surgical washout of irritant crystals may benefit certain refractory cases.

Additional Factors

Racial factors influence OA propensity (Pishgar et al., 2022). For instance, African Americans exhibit considerably reduced risks for hand and knee disease versus Caucasians. Contrastingly, hip OA proves more prevalent and severe among Chinese versus white Canadians. The reasons for these discrepancies remain unclear, making further study of genetic and environmental contributors necessary. Beyond genetics, bone density, joint laxity, proprioception deficits, and metabolic disorders like diabetes can all independently or additively increase susceptibility. The multifaceted etiology means personalized risk profiles should weigh combinations of potential factors.

Symptoms and Signs

In the early stages, the joints feel stiff and painful after not moving for a long time, such as after waking up or sitting for a long time. The knee joint feels painful when used for activities such as walking for a long time, going up and down stairs, or squatting (Allen et al., 2022); (Yao et al.,

2023). You often hear a rubbing sound when the knee joint is moved. Excessive accumulation of joint fluid can also occur until the joints swell. In the advanced stages, the pain is not only felt during activity but also when resting, and it does not even feel easy to walk or move (World Health Organization (WHO), 2023). The knee may become stiff and bent like the letter O or X.

There are 4 grades of Osteoarthritis according to the Kellgren-Lawrence Grading Scale (Macri et al., 2022):

Stages 1 and 2 are categorized as mild joint calcification

a. Grade 1 Osteoarthritis
   The common space begins to narrow
   The joint cartilage begins to become rough
b. Grade 2 Osteoarthritis
   The common space becomes narrower
   The surface of the cartilage is rough and fibrous

Grades 3 and 4 are severe common calcifications

a. Grade 3 Osteoarthritis
   The joint spaces are very narrow, especially the sides inside the knee
   The surface of the cartilage is rough and thin
b. Grade 4 Osteoarthritis
   The joint gap disappears, the thigh bone and shin bone stick together, and the cartilage layer thins and disappears in some parts.

Pain Level

Numerical Pain Intensity Scale (Numerical rating scales): This scale is used as a substitute for word description tools. Patients rate pain on a scale of 0-10. The number 0 means no pain, while the number 10 means the most severe pain. The Numerical Rating Scale (NRS) is almost the same as the Visual Analog Scale but has numbers along the lines.

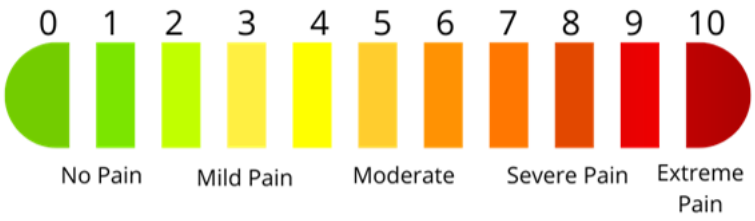

Figure 1. The Numerical Rating Scale (NRS)

The numbers are 0-10 or 0-100, and the child is asked to indicate the pain they feel. This Numerical Scale can be used on younger children, such as those aged 3-4 years or older. Pain levels can be classified as follows:

a) Scale 1: no pain
b) Scale 2-4: mild pain, where the client has not complained of pain, or it can still be tolerated because it is still below the arousal threshold.
c) Scale 5-6: moderate pain, where the client begins to groan and complain that someone is pressing on the painful part
d) Scale 7-9: including severe pain, the client may complain of extreme pain, and the client is unable to carry out everyday activities.

e) Scale 10: including extreme pain; at this level, the client can no longer recognize himself.

Stem Cells For Osteoarthritis Therapy

Body cells that have 'worked' in a tissue can reproduce only a few times before they are damaged. Mesenchymal stem cells (MSCs) stimulated intense interest in their ability to differentiate into mesodermal lineages like bone, cartilage, and fat. Meanwhile, stem cells can make a lot of themselves, to infinity - according to the body's needs. These cells are thought to be able to re-form damaged tissue. This ability is believed to be used to help treat various diseases, especially chronic diseases. There has been a lot of research trying to understand and test the usefulness of stem cells. Preclinical evidence reveals implanted MSCs engraft within damaged joint tissues and demonstrate lasting cell survival (Fernández-Pernas et al., 2020). Transplanted MSCs reduced inflammation and cartilage erosion progression in animal OA models (Szponder et al., 2022). Researchers hypothesized that similar regenerative mechanisms may translate to human trials.

The use of stem cells to treat OA has been around for a long time. In treatment, paramedics usually also include the use of blood plasma or platelet-rich plasma to support healing. To date, over 25 small randomized controlled pilot studies have explored MSC injections at varied dosages and delivery methods for knee OA. A randomized-controlled study (Hegab et al., 2023) demonstrated significant improvements in pain and function scores at 6-12 months post-treatment versus controls or hyaluronic acid, though effect sizes prove modest. Several other trials utilize imaging to confirm increased cartilage thickness and regeneration histologically—confounding factors like considerable heterogeneity between protocols and high risks of biased temper conclusions. Optimizing cell potency, combination approaches, and appropriateness for different OA severities require further research.

The use of stem cells for OA of the knee has been widely used in many centers around the world. The process involves taking stem cells and PRP, which are then both inserted into the knee joint. How it works: the doctor will take it from the patient's own body; it can be taken from the patient's blood, fat, or bone marrow. What is most often done is through the blood, which is taken and then processed in a closed manner without contamination, directly put into a machine to produce stem cells, which are then multiplied so that the number is sufficient using a particular machine to increase the number of cells with the Quantum system, a multipotent type of stem cell which can be directly entered into the blood. The source is after the knee area is anesthetized or given painkillers so that it is pretty comfortable when injected. The injection is carried out in a sterile operating room.

Notably, culture expansion of MSCs before injection may reduce viability and potency. Microfragments derived from partial ligament digests contain concentrated native MSCs, avoiding this limitation. Recent data on microfragmented adipose treatments for knee OA found sustained cartesian pain score improvements comparable to bone marrow MSCs (Muthu et al., 2023). Umbilical cord MSCs also demonstrate advantages, including superior expansion capacity and avoiding invasive harvesting procedures. Platelet-rich plasma contains various growth factors that can stimulate MSCs and native cartilage progenitors (Zhang et al., 2020). Multiple meta-analyses found that PRP injections outperformed hyaluronic acid for OA pain and quality of life with relatively minimal risks (Hegab et al., 2023). Combining PRP with MSCs may have synergistic effects on

chondrogenesis and tissue remodeling. However, high-quality clinical data to support specific protocols still needs to be discovered.

Moving forward, solutions addressing wide availability, biological variability, and overcoming limited cell potency will help progress cell therapies toward reliable OA disease modification and possible reversal. Standardization of cell characterization and processing, identifying diagnostic biomarkers for personalized treatment selection, and combination with scaffold materials or gene editing represent exciting areas in early phase exploration. Several outstanding questions remain regarding stem cell sources, preparation, and delivery methods. Bone marrow MSCs were originally most common for convenience obtaining from the iliac crest (Muthu et al., 2023); (Lee, 2021). Subsequently, the focus shifted toward adipose tissue as abundantly available with less invasive lipoaspiration procedures—however, potency and proliferation capacity decline with age regardless of harvesting technique. Allogeneic umbilical or placental cells avoid this confound, but possible immunogenicity concerns exist. Optimizing cell expansion protocols in the lab can enhance viability, though risks of contamination and hours of culture can induce senescence.

Various innovative approaches continue emerging to improve reliability. For example, (De Francesco et al., 2021) pioneered a minimally manipulated stromal vascular fraction containing a native mix of blood cells, MSCs, and regulatory lymphocytes. Others employ three-dimensional scaffold materials mimicking native cartilage to support implanted cell engraftment (Da Silva et al., 2020). Gene editing modalities suggest ways to boost regenerative activities or provide lasting anti-inflammatory effects without needing repeat injections. Moving forward in the late 2020s, progressing cell therapies beyond small trials demonstrating proof of concept scalable and generalizable treatment paradigms stands as the most pressing translational challenge. Combination protocols merging strengths of different cell sources, growth factor mixtures, and biomaterial supports will likely prove most effective clinically. Continued basic science advances around immunomodulation, homing mechanisms, and in situ reprogramming offer grounds for optimism.

The following recommendations should be made to avoid getting OA as early as possible or to prevent OA from recurring namely by;

a) Maintain body weight
b) Sports that do not use many joints
c) Sports activities as needed
d) Avoid injury to joints.
e) Take joint supplements
f) Consume healthy food
g) Choose appropriate and comfortable footwear
h) Relax with various techniques
i) Avoid movements that stretch the finger joints.
j) If there is a deformity in the knee, for example, an O-shaped leg, do not leave it alone. That matter. This will cause uneven pressure on all bone surfaces.

METHODOLOGY

Research design

This research uses a qualitative descriptive method with a case study where combination therapy of stem cells and PRP offers the potential to modify the natural recovery of knee osteoarthritis using stem cell-based technology.

The reason the Qualitative Method was chosen was because this study aimed to explain and analyze the effectiveness of combination therapy of stem cells and PRP in the treatment of Osteoarthritis.

Research Setting

This research was carried out at the Vinski Regenrative Center which is the main stem cell therapy clinic of the Celltech Stem Cell Center laboratory located at Vinski Tower, Jl. Ciputat Raya No.22 A Pondok Pinang, South Jakarta, Indonesia 12310 which is has a legal permit by Minister of Health RI and accredited by World Council of Stem Cell (WOCS) Geneva, Switzerland.

Participant

This study involved 7 female patients and 2 male patients aged over 50 years who experienced OA with various complaints such as knee joint pain which was painful when used for activities such as walking for a long time, going up and down stairs or squatting and often heard sounds. Occurs when the knee joint is moved. Each patient was studied using comparative literature studies and based on the x-ray results of each patient. Then, each patient undergoes a combination of stem cell therapy with PRP which is injected repeatedly over a certain period of time, possibly 3 to 4 times in 12 months. Patient data is collected periodically and recorded in a notation book containing personal data and health history.

Data Collection Technique

Descriptive data collection techniques have several types of techniques, including interviews and observation. All participants provided baseline data, including demographic information and disease characteristics.

Dose

Patients are treated with live stem cells maintained at the CELLTECH Stem Cell and Banking Laboratory, and therapy is performed at the Vinski Regenerative Center clinic. Stem cells are stored in cryo tanks at -1900 Celsius (190 degrees below freezing), which is done in a "closed system" or "open system." Closed systems run independently of human operations and are fully automated, whereas open systems use human operators to adjust the process as necessary. Secure systems are also referred to as quantum processes. This system is considered more efficient and sterile than an open system because it operates automatically in an isolated system and is separated from human intervention. The main concentration of stem cells comes from the umbilical cord and umbilical cord blood. Stem cells are stored in vials containing 20 million cells or more. The provision of stem cells for therapeutic purposes depends on the type and severity of the disease, as this determines the number of stem cells required.

The stem cell dose is calculated by measuring the patient's body weight (in kilograms) and multiplying it by a factor of one million, in this case, with the type of diabetes. For example, the dose for a person weighing 70 kg is 70 million stem cells (70 x 1,000,000). The allogeneic nature of stem cells allows the replacement and restoration of damaged cells at the target recovery site (Catarino et al., 2020). The dosage is also influenced by the number of cells damaged and needing to be

restored. The quality of recovery depends on the dose. For example, a stem cell pack containing 20 million stem cells may have minimal effects, while a higher dose will be more effective for severe conditions.

Six months after each round of stem cell therapy, patient progress is monitored to determine treatment efficacy. The treatment used for this case study is consistent with the success of stem cell treatments for diseases such as Prader-Willi syndrome, autism, and several other diseases. The theory underlying this case study is that stem cells have regenerative properties that can rejuvenate and replace damaged cell tissue, and because of their allogenic nature, stem cells can be applied to any part of the body (Tatullo et al., 2020). Meanwhile, PRP uses blood from the patient himself. This method consists of several stages, which include taking blood, processing the patient's blood into PRP, and injecting PRP into the patient's body. Before having PRP injections, patients are asked not to take certain drugs that can thin the blood, such as aspirin or ibuprofen, as well as omega-3 supplements.

RESULTS AND DISCUSSION

Nine patients underwent stem cell and PRP treatment at our clinic, aged over 50 years, 7 women and 2 men. They have a painful condition in the joints involving inflammation and damage to the tissue around the joints; the joints feel stiff and sore, and the knees hurt when walking for a long time, going up and down stairs, or squatting. Some complain of pain when resting and even find it difficult to walk and mobility.

Combination therapy of stem cells and PRP is commonly used in the treatment of joint conditions such as arthritis and muscle tears. These treatment methods offer individual benefits that, when combined, can shorten recovery time and reduce procedure-related pain. Here, we will review the main benefits that a combination of stem cell and PRP therapy can offer OA patients over the long term.

The following are several Vinski Regenerative Center patients with Osteoarthritis:

Table 1. Patient A is female and 58 years old. Before Therapy: Grade 3

Therapy schedule	Pain Level
01/19/2023	8
01/31/2023	6
02/07/2023	4
02/10/2023	2

Table 2. Patient B Female, 57 years old, before therapy: Grade 2

Therapy schedule	Pain Level
11/06/2022	6
25/06/2022	4
07/15/2022	2
06/08/2022	1

Table 3. Patient C, female, 76 years old, before therapy: grade 3

Therapy schedule	Pain Level
22/05/2023	9
27/05/2023	7
31/05/2023	3

Table 4. Patient D, 81 year old female, before therapy: grade 3

Therapy schedule	Pain Level
06/05/2023	7
25/05/2023	5
12/06/2023	2

Table 5. Patient E, 59-year-old male, before therapy: grade 2

Therapy schedule	Pain Level
03/03/2023	5
31/03/2023	3
12/04/2023	2
18/04/2023	1

Table 6.Patient F, 74 year old female, before therapy: grade 3

Therapy schedule	Pain Level
30/04/2021	8
07/05/2021	7
18/05/2021	4
25/05/2021	2

Table 7. Patient G, 53 year old female, before therapy: Grade 3

Therapy schedule	Pain Level
21/01/2023	8
04/02/2023	6
11/03/2023	4
11/03/2023	1

Table 8. Patient H, Male 57 years old, before therapy: Grade 2

Therapy schedule	Pain Level
16/09/2023	7
07/10/2023	4
14/10/2023	2

Table 9. Patient I, 52-year-old female, before therapy: Grade 3

Therapy schedule	Pain Level
10/09/2021	9
06/11/2021	7
29/04/2022	4
19/05/2022	2

Based on research on OA patients in our clinic, there are already problems with cartilage. Some have previously experienced injuries, and then some have thinning joint cushions due to age. Then, each patient is injected with stem cells and PRP. After 6 months, another X-ray was taken, and it was seen that the cartilage was starting to form again. The process of developing cartilage in joints is different. Some patients immediately feel the effects within 1 month, and some only feel the impact of stem cell therapy after 6 months. Stem cells taken from the patient's own body will replace damaged cells in the knee, and the effect of treatment with stem cells depends on the patient's condition.

In patients with OA, the joints cause the cartilage to become thin or damaged. OA is joint in older adults and is accompanied by degenerative diseases and can occur in people who are overweight, resulting in continuous stress on the knees. After the knee stem cell injection, the

patient rests for a while, can walk straight away, and does not need treatment; he goes straight home. For a few days, avoid going up and down stairs. What should not be done after having a stem cell injection in the knee is doing strenuous sports such as basketball, jumping, or high-impact sports, which should be avoided for up to six months. During the healing process, your therapy will focus on strengthening the joints and the muscles that support them. So movements such as prayer or walking are essential so that muscles and joints are trained again. This repetition of stem cells and PRP is carried out 4 times with an interval of 1 to 2 weeks, depending on the patient's condition. In severe or advanced stages of OA, the orthopedic surgeon will provide advice and other therapies according to the patient's condition, such as surgery or other procedures.

CONCLUSION

Mobility is essential in healthy aging for staying active and independent. Still, in reality, due to the aging process, OA can happen to anyone, and untreated OA will not heal spontaneously. The current standard treatment for healthy aging is minimal due to the lack of vascularization in the cartilage tissue. Therefore, combination therapy of stem cells and PRP is the most promising therapy for regenerating joint tissue, especially in mid to late-stage disease. Thus, the combination of stem cells and PRP is the best therapy currently for joint tissue. Stem cell therapy is one promising alternative widely used to treat OA, given mesenchymal stem cells' multilineage potential for tissue repair and anti-inflammatory properties (Harrell et al., 2019). Based on qualitative descriptive research methods conducted at the Vinski Regenerative Center on 9 of our patients, the combination of stem cells and PRP for OA therapy showed improvement in the condition of the knees and joints in each patient. Previously, patients experienced various complaints, such as knee joints feeling painful when used for activities such as walking for a long time, going up and down stairs, or squatting, and often heard rubbing sounds when the knee joints were moved. Still, after several therapy sessions, the condition of the joints and knees improved. These results show that stem cell therapy combined with PRP can rejuvenate damaged cells and also repair cells, especially in the joint and knee area, so that all previous complaints gradually improve. In the future, treating patients with this technology will become relatively routine because this technology has progressed relatively rapidly, and more research is being carried out, especially on stem cells from the umbilical cord.

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