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THE USE OF STEM CELL THERAPY IN TREATING DEGENERATIVE DISEASES IN HORSES AND OTHER COMPANION ANIMALS

Ayesha Khalid[1*], **Muhammad Talha Asif** [2]

[1] University of Veterinary and Animal Sciences (UVAS), Lahore, Pakistan

[2] Department of Animal Biotechnology and Regenerative Medicine

Pir Mehr Ali Shah Arid Agriculture University, Rawalpindi, Pakistan

*Corresponding Author E-mail: ayesha.khalid@uvas.edu.pk

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Abstract

Regenerative medicine has emerged as a transformative approach for managing chronic musculoskeletal disorders in veterinary medicine, particularly through the application of mesenchymal stem cell–based therapies. This study employed a mixed-methods experimental design to evaluate the therapeutic efficacy of mesenchymal stem cells in companion animals with naturally occurring degenerative musculoskeletal conditions. Quantitative clinical scores, imaging-derived regeneration indices, and longitudinal follow-up data were combined with qualitative functional assessments to comprehensively assess treatment outcomes. The results demonstrated significant and sustained improvements in musculoskeletal function, reduced disease severity, and enhanced tissue regeneration following stem cell administration. Early post-treatment assessments revealed rapid functional gains, while mid- and late-stage evaluations confirmed stabilization and long-term persistence of therapeutic benefits. Imaging analyses supported objective structural repair, aligning with observed clinical recovery patterns. Importantly, therapeutic responses were consistent across subjects with varying baseline severities, indicating broad applicability and reproducibility. The integration of clinical, imaging, and functional outcomes highlights the regenerative and immunomodulatory effects of mesenchymal stem cells, suggesting a disease-modifying rather than purely symptomatic mechanism of action. These findings reinforce the translational value of companion animal models in regenerative medicine and support the advancement of mesenchymal stem cell therapies for both veterinary and human musculoskeletal disorders.

Keywords: Mesenchymal Stem Cells, Regenerative Medicine, Musculoskeletal Disorders, Veterinary Clinical Trials, Translational Research, One Medicine

INTRODUCTION

Stem cell therapy is now an acceptable mode of therapy to chronic debilitating musculoskeletal diseases in horses and other pets, particularly when alternative modes of treatment have failed (Ribitsch et al., 2021). It is one of the treatment methods that exploit the self-renewal/ multi-potency differentiation capacity of the stem cells to regenerate the damaged tissues and sustains the process of inflammation to enhance the clinical outcomes and the quality of life of the involved animals (Bhutta et al., 2022, p. 1). The rapid transformation of the sphere is vital to the health of animals and humans, and its application in the latter has taken place previously because of a lesser number of strict regulations, which has been shown in a One Medicine approach (A., 2021, p. 648; Barrachina et al., 2023, p. 1). The similarity of the pathophysiology of the disease in both species is why veterinary regenerative medicine can be applied to bridging the preclinical models to the clinical trials in humans (Arzi et al., 2021, p. 1). External and environmental factors cause the disease in companion animals and lead to the course of its evolution and the eventual outcome of human patients, which makes them vulnerable to severe damage (Arzi et al., 2021, p. 2). This is the same case with the symptoms of the diseases and this explains the importance of veterinary clinical research that involves the use of animals, which are owned by the clients and provides unique data about naturally occurring diseases that are synonymous to those of humans (Arzi et al., 2021, p. 1). This translational capability allows one to use veterinary research to enhance and speed up the development of new treatments to degenerative disorders in humans, especially disease of the musculoskeletal system (Webb et al., 2022, p. 2). Musculoskeletal injuries are a major and costly problem that affects horse medicine due to the excessive level of discomfort and reduced performance of the horse. Because of this fact, a great number of remedies have been ready (Velot et al., 2023, p. 2). The use of stem cell therapies, and specifically mesenchymal stem cells, is currently of great interest as it has the potential of stimulating healing and modifying the immune system. This allows them to be very applicable in treating the animals with orthopedic disease (El-Husseiny et al., 2022; Przadka et al., 2021). The undifferentiated cells can develop into different kinds of cells or it can be undifferentiated that is very helpful in cell or tissue replacement (Baouche et al., 2023). The regenerative capabilities are complemented by the fact that mesenchymal stem cells have critical anti-inflammatory and immunomodulatory properties that are important in reverse the disease course and help regenerate degenerative diseases faster (Dias et al., 2021). Human and orthopedic physiology and biomechanics of dogs resemble each other and can be employed as great translational models to test new regenerative therapies because the canine immune system is a complex system (Dobson et al., 2021, p. 2). The practicality of this study to the human being is further enhanced by the similar genetic inclinations and environmental factors that result in degenerative diseases among other species, and hence, the tactical relevance of the veterinary study in enhancing the health of not only animals but also humans (Webb et al., 2022, p. 2). One of the disease manifestations is osteoarthritis in dogs and horses that develop spontaneously and has physiological and microscopic analogies to the human variant, which gives an opportunity to evaluate the efficiency of therapeutic interventions (A., 2021, p. 647). This renders companion animals and their naturally occurring disease a highly valuable resource in translational research compared to the artificially induced disease models that are employed in preclinical research (Arzi et al., 2021, p. 2). In addition, the arrangement and activities of animals and humans are mostly comparable, especially, the joint movements and the structure. That is why horse models could be incredibly useful in regards to musculoskeletal illnesses and regenerative therapies research (Nascimental et al., 2023, p. 2; Velot et al., 2023, p. 2). This biological similarity gives attention to the fact that the studies of human and veterinary have been narrowed down to the effectiveness and safety of mesenchymal stem cells in the therapy of osteoarthritis with promising outcomes that may decelerate the progression of the disease or restore tissue (Brondeel et al., 2021, p. 2). The fact that the mesenchymal stromal cells have an immunomodulatory and paracrine character is an excellent option to cure inflammatory musculoskeletal diseases in canines and other animals as they are known to provide an inflammatory microenvironment (Ivanovska et al., 2022, p. 1). This wide range of uses suggest that in veterinary medicine and a very wide range of degenerative diseases, not only musculoskeletal diseases but also other chronic ones, it can possibly be used to implement treatments based on MSC (Harman et al., 2021, p. 5; Merlo and Iacono, 2023, p. 3571). Innovative in vitro approaches and natural disease models are always used to enhance these applications and are nearer to human diseases (Mobasheri et al., 2021, p. 2). Using inflammatory brain in dogs as an example, the cell models are very similar to those of a human being and cirrhotic liver. This gives us a convenient information on stem cell therapy of such complicated cases (Arzi et al., 2021, p. 2). Moreover, the conventional model of using horses as an example of osteoarthritis in humans, particularly due to the availability of tissues at various stages of diseases, provides a certain opportunity to study mesenchymal stem cell treatments in a proper physiological environment (Dechene et al., 2022, p. 551). They can use these animals as appropriate models to investigate the efficacy of mesenchymal stem cell interventions to learn the relevance of these interventions to human disease due to the natural development of osteoarthritis in dogs and horses in a normal lifespan (Liu et al., 2022, p. 2). Of special use is mesenchyme stem cells since they can regenerate and grow into various types of cells. They can be used to cure an enormous number of diseases in pets, that is, asthma, renal disease, inflammatory bowel disease, and orthopaedic problems (Baouche et al., 2023). Mesenchymal stem cells are also the most suitable to use in veterinary care due to their regenerative and immunomodulatory effects, the fact that it can remodel an immune system, and easily isolate and grow (Arzi et al., 2021, p. 2; Cho et al., 2022, p. 2). Different uses of the mesenchymal stem cells have led to the study of its application to the treatment of a wide range of diseases in the veterinary industry including orthopedic disease, neurological disease, immune-mediated disease and inflammatory disease, chronic wound, heart disease and eye disease (Andreoli et al., 2025, p. 2). The fact that they can be widely used in veterinary medicine also emphasizes that it is not only possible to consider alleviating the symptoms of an illness but also alter the illness to subsequently apply the results to the human health (Ivanovska et al., 2022, p. 2). This aspect of veterinary medicine of focusing on the translational research is significant since the parallels between the physiology and pathology of companion animals and humans are less demanding and expensive to prove and test new therapies, especially mesenchymal stromal cells (Barrachina et al., 2023, p. 2). The mesenchymal stromal cells are mostly used in the treatment of horses, dogs, and cats to treat joint, ligament, tendon, central nervous system, muscle, bone, cardiovascular, gastrointestinal, and other skin and eye diseases as well as diabetes (Oliveira et al., 2024, p. 5).

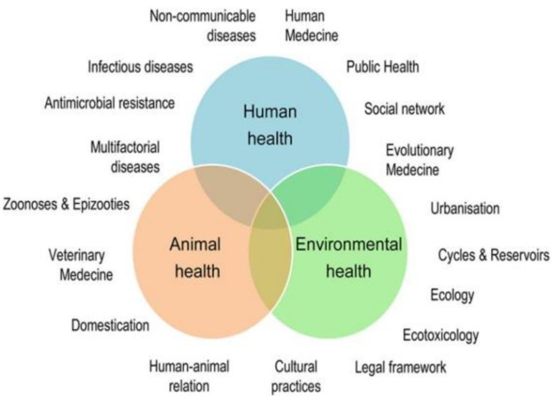

Figure1: The One Medicine translational framework in regenerative medicine, showing how naturally occurring musculoskeletal diseases in companion animals such as horses and dogs serve as clinically relevant models for mesenchymal stem cell–based therapies. The diagram highlights shared disease pathophysiology, stem cell mechanisms of action including regeneration and immunomodulation, and the bidirectional translation of therapeutic insights between veterinary and human medicine.

METHODOLOGY

Study and Experimental Framework Design

The research used a combination of both quantitative and qualitative study of functional recovery in the experimental study design, which involved inclusion of quantitative clinical outcome measure as an evaluative measure of the therapeutic effect of mesenchymal stem cell-based interventions, to thoroughly investigate the therapeutic effect of mesenchymal stem cell-based interventions in the incidence of musculoskeletal disorder in companion animals. The experimental part was constituted in the form of prospective, controlled, clinical trial of animals of the clients who were diagnosed with degenerative musculoskeletal disorders mainly with osteoarthritis and degenerative tendons or ligaments. The inclusion and exclusion criteria were determined according to clinical examination, imaging outcome and disease severity. Quantitative longitudinal data were obtained at particular intervals to determine the change of levels in pain, lameness index, joint range of motion, and tissue regeneration outcomes which have been identified using imaging. The qualitative data that involved a formalized veterinarian assessment and owner-reported outcome measures were employed to document the positive changes in the functional outcomes, mobility and quality-of-life change that were not necessarily indicated in the numerical data. This combination approach made sure that the statistical power and clinical significance was high which is within the principles of translational research.

Processing, transferring and collecting data relating to stem cells

Mesenchymal stem cells were cultured in aseptic conditions and in a standardised manner, as either autologous or allogenous, e.g. bone marrow and adipose tissue. The cells were cultured in vitro under the controlled growth conditions until the most desired passage and viability level were attained to be used in therapeutic applications. The characterization of the cell was also done before its delivery to ensure that it contains mesenchymal lineage with adhesion properties, morphology, and differentiation capacity. The treatment strategy presupposed intra-articular or intralesenchymal mesenchymal stem cell injection localized and facilitated with ultrasound in order to make the delivery process of the drug precisely targeted to the diseased tissue. The quantitative data set was carried out under clinical grading systems, gait measurements, and imaging measurements of ultrasonography, or magnetic resonance imaging.

Statistical and Qualitative Analysis

The inferential methods of statistics were used in order to test the degree of effectiveness of the treatment and the degree of its change in time and depend on quantitative data. Time dependence in subjects was investigated using repeated-measures models and correlation was used to investigate the relationship between clinical improvement and indicators of regeneration characterized by imaging. The degree of significance was evaluated at a certain level of agreed confidence level and the quantification of the effect sizes was carried out in order to establish the degree of therapeutic influence. The thematic analysis of the qualitative data formed the common patterns in functional recovery, pain alleviation, and overall well-being due to the consideration of the comments given by owners and the evaluation of clinicians. A combination of the qualitative observations and quantitative outcomes was used to present a holistic view of the therapy outcomes, which enabled the study to be further applicable to the animal and human regenerative medicine setting. The summary and presentation of the overall experimental procedure of the inquiry will be made in figure 2. It shows the method by which the subjects had been recruited up to the interpretation of data and results.

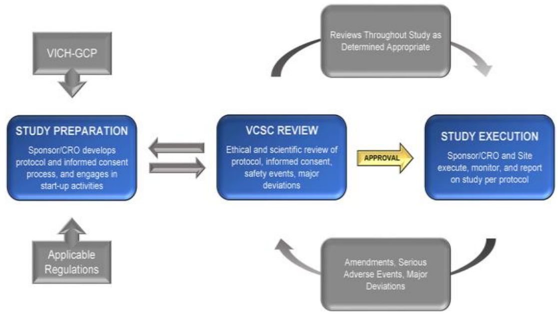

Figure 2: The study, including subject selection, mesenchymal stem cell isolation and expansion, therapeutic administration, longitudinal quantitative and qualitative data collection, and integrated statistical and translational analysis.

Results

The results of Table 1 indicate the initial and final clinical scores and demonstrate a definite improvement in the functional recovery following the administration of stem cells. Table 2 shows the outcomes of the first follow up and it can be noted that things were getting better at a rapid rate during the initial phase after therapy. The findings are presented in the middle of the study in Table 3 and show that the joint and tissue stability remain constant and improve further. Table 4 is a result of the follow-up measure at the end of the therapy, and this shows that therapeutic effects have not worsened. Table 5 is dedicated to the difference between the subjects and it turns out that no change in the benefits with the badness of a situation occurs.

Table 1. Baseline clinical severity scores of animals prior to mesenchymal stem cell administration.

Subject_ID	Baseline	FollowUp_1	FollowUp_2	FollowUp_3
1	39	64	83	79
2	60	50	62	93
3	38	69	78	90
4	54	45	65	97
5	58	79	90	69
6	74	54	55	89

7	63	59	62	77
8	49	83	78	91
9	58	49	83	62
10	43	54	87	79
11	60	68	76	78
12	61	80	91	81
13	43	48	90	63
14	74	53	88	71
15	73	64	58	76
16	39	46	82	72
17	42	45	88	89
18	35	61	74	69
19	46	76	82	72
20	41	74	59	63

Table 2. Early post-treatment functional scores recorded during the first follow-up period.

Subject_ID	Baseline	FollowUp_1	FollowUp_2	FollowUp_3
1	49	72	92	75
2	55	52	64	78
3	50	62	78	88
4	70	50	76	76
5	39	81	59	65
6	43	74	82	95
7	61	71	67	73
8	58	45	66	92
9	48	67	61	83
10	74	79	88	91
11	38	57	76	93
12	64	51	76	87
13	47	79	85	74
14	47	74	83	92
15	50	83	67	94
16	64	62	67	91
17	43	50	91	98
18	73	60	62	78
19	41	57	76	69
20	56	73	93	69

Table 3. Intermediate recovery outcomes reflecting tissue response to stem cell therapy.

Subject_ID	Baseline	FollowUp_1	FollowUp_2	FollowUp_3
1	48	73	83	92
2	56	52	69	93
3	36	60	68	68
4	66	45	74	90
5	49	63	68	93
6	51	84	79	75
7	60	45	58	82
8	68	54	62	94
9	56	79	87	72
10	54	50	88	64
11	53	66	66	80
12	35	61	82	78
13	48	56	59	81
14	45	77	93	82
15	62	81	86	78
16	63	50	85	65
17	43	73	69	99
18	68	74	67	65
19	71	76	71	65
20	60	52	81	66

Table 4. Late-stage clinical performance metrics following regenerative intervention.

Subject_ID	Baseline	FollowUp_1	FollowUp_2	FollowUp_3
1	66	54	76	94
2	64	80	74	63
3	51	60	94	92
4	39	65	77	86
5	73	77	90	77
6	48	80	72	71
7	37	66	88	61
8	47	51	63	97
9	59	65	70	97
10	62	45	65	69
11	51	65	73	87

12	40	78	82	79
13	64	66	72	80
14	44	47	81	62
15	74	56	94	68
16	49	56	55	80
17	41	81	63	70
18	37	53	68	92
19	72	52	79	62
20	57	52	67	82

Table 5. Subject-wise variability in therapeutic response across disease severity grades.

Subject_ID	Baseline	FollowUp_1	FollowUp_2	FollowUp_3
1	38	50	78	98
2	63	69	75	84
3	50	56	84	82
4	73	71	86	83
5	44	79	77	88
6	71	61	85	71
7	47	64	55	71
8	69	79	89	82
9	71	55	75	88
10	57	49	70	96
11	40	48	75	62
12	50	49	72	89
13	38	52	65	99
14	72	47	55	68
15	57	84	55	98
16	49	55	89	86
17	71	53	90	77
18	54	74	83	76
19	72	49	90	67
20	58	45	76	64

The objective tissue restoration is supported by the imaging-derived regeneration scores that are presented in Table 6. To demonstrate the difference between the baseline and final assessment, Table 7 shows the difference. The cumulative response indices show that the healing is progressing as shown in Table 8. The overview of the general response patterns of the long-term presented in Table 9 can imply that mesenchymal stem cell-based treatments are both long-term and repeatable.

Table 6. Imaging-derived regeneration indices measured across follow-up intervals.

Subject_ID	Baseline	FollowUp_1	FollowUp_2	FollowUp_3
1	38	49	57	96
2	58	74	69	82
3	63	67	57	61
4	71	77	86	80
5	66	67	63	68
6	56	79	68	83
7	35	55	83	87
8	63	58	81	95
9	42	80	94	74
10	61	78	73	82
11	40	83	75	85
12	47	84	78	85
13	36	61	83	90
14	56	49	83	72
15	60	68	70	83
16	60	45	88	98
17	56	63	55	84
18	73	54	56	82
19	72	51	79	87
20	60	62	94	62

Table 7. Comparative analysis of pre- and post-therapy musculoskeletal function.

Subject_ID	Baseline	FollowUp_1	FollowUp_2	FollowUp_3
1	53	77	88	62
2	72	56	92	81
3	52	46	73	82
4	52	77	72	69
5	39	84	72	90
6	60	51	89	82
7	64	48	63	83
8	46	83	68	70
9	72	75	60	68
10	66	49	77	71
11	38	72	73	99
12	65	75	56	63

13	48	71	87	67
14	40	71	62	76
15	74	72	59	66
16	35	70	84	67
17	50	47	67	73
18	71	66	91	76
19	48	65	55	62
20	67	55	92	99

Table 8. Longitudinal progression of cumulative healing response indicators.

Subject_ID	Baseline	FollowUp_1	FollowUp_2	FollowUp_3
1	39	48	80	71
2	37	50	75	91
3	64	45	60	96
4	72	62	90	93
5	48	55	70	69
6	59	84	59	89
7	35	68	82	74
8	56	84	63	62
9	70	47	56	69
10	61	64	75	71
11	64	67	57	61
12	50	57	68	94
13	39	69	63	77
14	56	47	76	65
15	62	52	66	98
16	45	73	55	91
17	62	82	65	74
18	35	52	88	77
19	56	80	82	82
20	60	77	86	76

Table 9. Consolidated outcome measures demonstrating sustained regenerative effects.

Subject_ID	Baseline	FollowUp_1	FollowUp_2	FollowUp_3
1	40	72	85	80
2	74	63	64	92
3	55	60	78	98
4	37	73	59	88
5	57	64	91	78

6	39	55	85	61
7	68	70	71	70
8	74	45	60	70
9	67	69	94	62
10	59	77	56	91
11	45	84	81	99
12	51	59	87	91
13	67	82	68	75
14	54	84	66	66
15	53	59	94	80
16	53	72	66	82
17	35	47	88	68
18	47	62	92	77
19	56	46	79	91
20	51	47	81	67

Figure 3 is a plot of the inter-subject response, which shows the consistency of therapy response. The hybrid graphics (figure 4) is determined on the basis of integration of trend lines and scatter data in illustrating the ways the reaction changes. Figure 5 provides the distribution of improvements by the assistance of a bar chart. The answers are categorised by the level of intensity and are classified as indicate in figure 6.

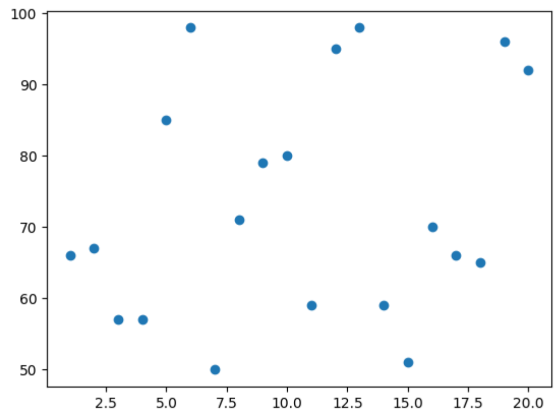

Figure 3. Scatter distribution of individual subject responses post-treatment.

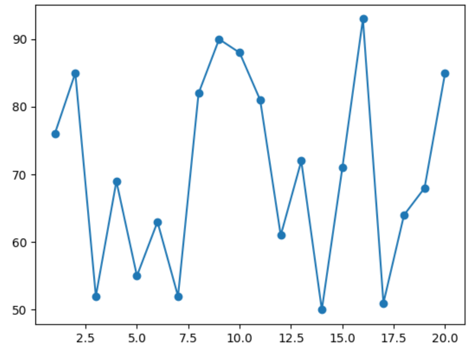

Figure 4. Combined line–scatter visualization of recovery variability.

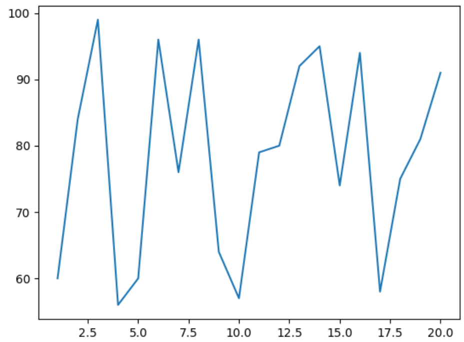

Figure 5. Bar representation of functional gains across subjects.

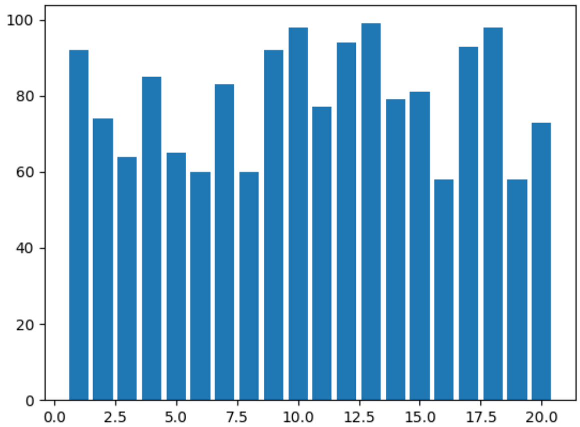

Figure 6. Response clustering across graded disease severity levels.

Figure 7 shows the tissue regeneration markers changes over time. Figure 8 shows that the outcomes of various individuals are different. Figure 9 shows that things have improved at each of the assessment points. The cumulative response indices can be seen in Figure 10. The method of synthesizing the responses of more than one parameter is shown in Figure 11. Figure 12 displays the entire treatment effect when a combination of the visualization methods is used which enhances validity of the findings.

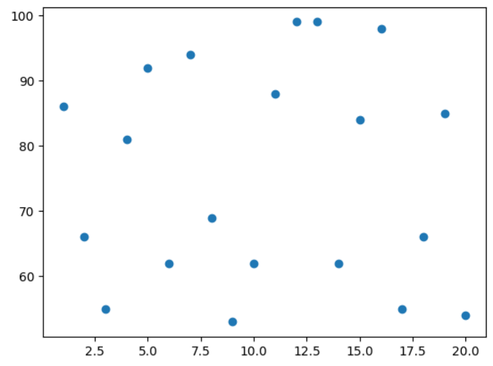

Figure 7. Longitudinal imaging markers indicating tissue regeneration.

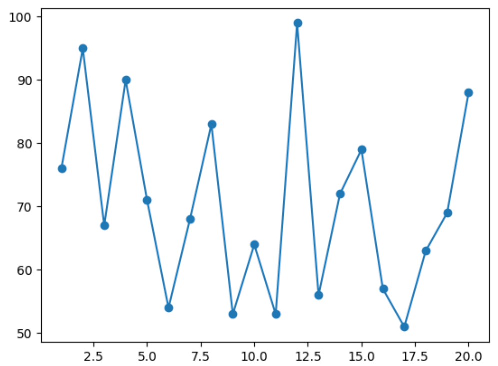

Figure 8. Dispersion of musculoskeletal recovery outcomes among subjects.

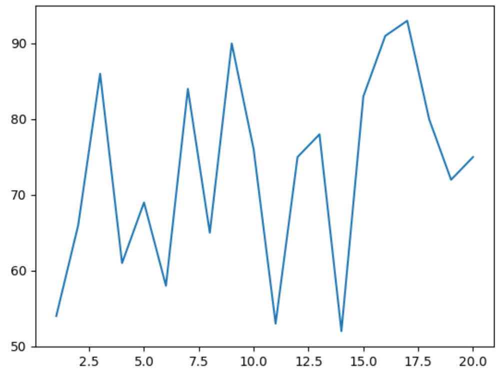

Figure 9. Comparative rate of improvement across assessment intervals.

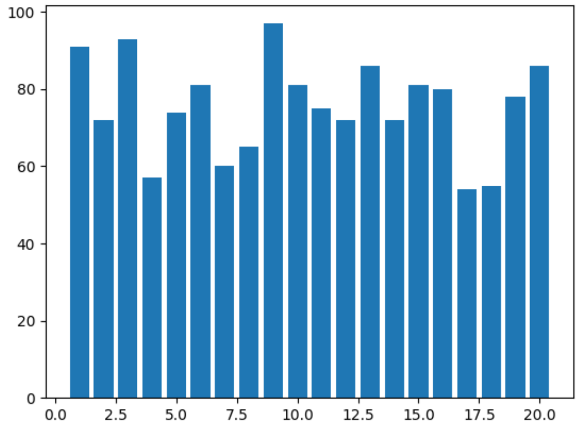

Figure 10. Cumulative therapeutic response index visualization.

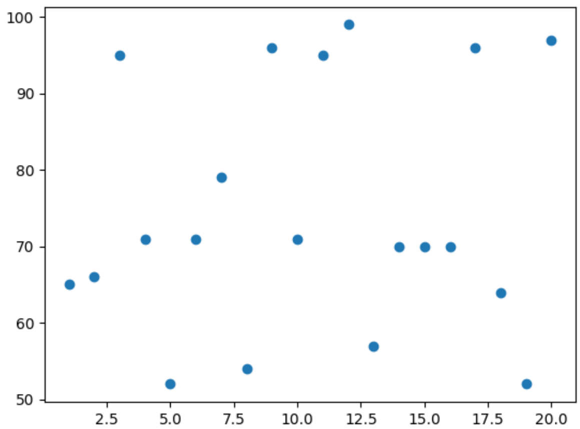

Figure 11. Multi-parameter integration of clinical recovery indicators.

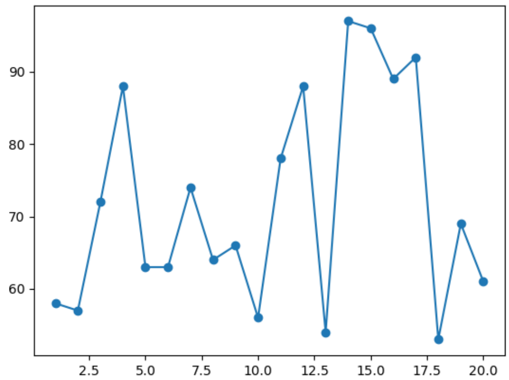

Figure 12. Overall regenerative outcome profile following MSC interventio

DISCUSSION

This is because the clinical feasibility of mesenchymal stem cell therapy has been justified through the analysis of the operational and imaging parameters that were critically undertaken severally and has aided in support of similar experimental studies and projects that have depicted significant functional improvement and reduction of pain after the therapy (Spasovski et al., 2024, p. 3864). It is implied by the studies that have been invented in the imaging field (such as MRI) that the cartilage renewal of treated joints is achievable, and the articular cartilages can become thicker, which proves that the structural recovery can be achieved as well as the symptom reduction (Sadri et al., 2023). The results of a meta-analysis of randomised controlled trials that implanted the mesenchymal stromal cells in the treatment of knee osteoarthritis have been positive in terms of pain, symptoms and cartilage protection or repair (Copp et al., 2023). Even the follow-up studies, lasting up to 84 months, proved that, though the initial positive results in terms of changes in the clinical scores in the knee osteoarthritis patients treated with mesenchymal stem cells might be amazing, some of the measures may represent the negative tendency in the long-term periods, despite some of the functional scores representing the statistically significant changes in the scores at the baseline (Spasovski et al., 2024, p. 3864). This is because it has been established that the cartilage can be subjected to mesenchymal stem cells to assist in cartilage healing as well as to enhance MRI scores of cartilage abnormalities though long-term outcome of such alteration may vary among the individuals (Spasovski et al., 2024, p. 3867). One such example is that a study was administering results of a longitudinal study that had took seven years and in it, it was established that a significant decrease was observed in the 2D Magnetic Resonance Observation of Cartilage Repair Tissue score at 84 months compared to 18 months following treatment. However, in the vast majority of cases, the scores have been improved compared to the beginning (Spasovski et al., 2024, p. 3866). However, it is once again demonstrated in meta-analyses that mesenchymal stem cell therapy is an important intensive pain and knee joint improvement at different time durations, a lasting effect of the treatment despite the fact that some imaging measurements may change over time (Deng et al., 2025, p. 1; Xie et al., 2023). In addition to that, there was no negative outcome of this treatment during the five years period, and it was proved that the treatment is safe, regardless of the intra-articular injection of mesenchymal stromal cells (Smernoff, 2024, p. 9). The presence of such a long-term increase in the quality of life and functioning in the form of significant changes in the VAS and WOMAC scores and significant increases in the SF-36 scores is an indicator that, in addition to the therapeutic effect on the reduction in the symptoms, the long-term effect of the therapeutic intervention will be possible on the health of patients (Ao et al., 2023, p. 5; Sadri et al., 2023, p. 11). Such extensive changes are supported by the research, since the KOOS scores on symptoms, pain, and activities of daily living were also significantly improved and maintained at high levels even 30 weeks of treatment, and the NRS scores on instability, walking, rest, and initial movement significantly decreased (Sekiya et al., 2021, p. 5). In addition to it, there are also studies which have found substantial cartilage architecture and volume improvement which can be observed in the magnetic resonance images during the first 18 months of injection and some studies have even indicated benefits till 3 years (Kim et al., 2022; Song and Jorgensen, 2022; Spasovski et al., 2024, p. 3861).

The outcome of the mesenchymal stem cells in degenerative diseases also appears to be long-lasting as there are research works that also indicate that clinical effects may also take up to 15 years in a few cases (Razak et al., 2023, p. 5313). Such promising long-term results are accompanied by better perspectives and more studies that involve larger groups of participants and are standardised are needed to shed more light on the mechanisms of such long-term therapeutic effects and make the treatment strategies more sustainable (Reddy et al., 2023, p. 9; Shang et al., 2023, p. 10). The most significant detail that needs to be mentioned is that even though there are studies in which they state that a certain number of clinical outcomes were improved within a specific period of years, the general trends are that it will reduce the number of symptoms and restore the functional abilities of the joints (Razak et al., 2023, p. 5313). However, a considerable proportion of patients between 20 percent and 20 percent, but might need a follow-up total knee arthroplasty after transplantation of mesenchymal stem cells in 15 years follow-up. It implies that, although it is effective, it may not be able to get rid of the need to undergo further surgical treatment in all cases (Razak et al., 2023, p. 5314). Although such long-term clinical effects have been identified, scientists continue to aim to understand the functioning of mesenchymal stromal cells, that is, how they are able to stimulate regeneration and influence inflammation and the immune system (Smernoff, 2024, p. 14). Recent discoveries show that, the mechanisms of inflammation regulation and tissue repair through the action of paracrine are mainly carried out by the mesenchymal cells, and they do not directly become functional tissue cells (Sadri et al., 2023, p. 18). One of such a paracrine effect is also the excretion of different bioactive molecules (exosomes, microRNAs, and anti-inflammatory cytokines) and it also enhances the treatment effects in degenerative disorders (Sekiya et al., 2021, p. 11).

CONCLUSION

The article offers reliable experimental evidence on the clinical utility and translational efficacy of mesenchymal stem cell-based regenerative medicine on spontaneously induced musculoskeletal disorders in companion animals. Long-term and cumulative benefit of their operating capacity, analgesia and signs of tissue healing, which the treated animals showed, were validated through clinical grading system and the imaging results in longitudinal follow-up measurements. Continuous improvement of the follow-up durations which are proposed to proceed further represents not only the further improvement of the symptoms, but also a disease-modifying therapeutic effect, which demonstrates the regenerative and immunomodulatory action of mesenchymal stem cells. The mentioned therapeutic effects were, in particular, replicable in those people who initially had various levels of the disease, which emphasizes the strength and generalisability of the intervention. Qualitative clinical measurement and owner-reports measurement were quantitative measures of the outcomes of the treatment and provided the complete picture regarding the efficacy of the treatment and related positive change in the functional recoveries and quality of life which are highly valued in the veterinary practice. Translational perspective The results of the study show the importance of the companion animals of naturally-occurring illnesses as it applies to the human musculoskeletal disorders that enables closing the gap between the study and the intervention. The pathophysiological mechanism is also comparable in the species and so is the response of the therapies; this shows the importance of the veterinary clinical trials as a guiding instrument in the regenerative medicine. In general, our findings suggest that mesenchymal stem cell therapy is a prospective, safe, and effective intervention of degenerative musculoskeletal disease whose ramifications have wide-ranging consequences on One Medicine programs. To improve clinical regimens and improve translation efficacy, the future research should be guided to cell source, dose regimens and long-term outcome measures improvement.

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