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Bhavitha D
M.V.SC Scholar,
Department of Veterinary
Medicine, PVNRTVU,
College of Veterinary Science,
Rajendranagar, Hyderabad,
Telangana, India

Ambica G
Assistant Professor,
Department of Veterinary
Medicine, PVNRTVU,
College of Veterinary Science,
Rajendranagar, Hyderabad,
Telangana, India

Lakshmi K
Associate Professor,
Department of Veterinary
Medicine, PVNRTVU, College of
Veterinary Science, Korutla,
Telangana, India

Chandrashekar EL
Professor and Univ Head,
Department of Veterinary
Surgery and Radiology,
PVNRTVU, College of
Veterinary Science,
Rajendranagar, Hyderabad,
Telangana, India

Satish Kumar K
Professor and Univ Head,
Department of Veterinary
Medicine, PVNRTVU,
College of Veterinary Science,
Rajendranagar, Hyderabad,
Telangana, India

Corresponding Author:
Bhavitha D
M.V.SC Scholar,
Department of Veterinary
Medicine, PVNRTVU,
College of Veterinary Science,
Rajendranagar, Hyderabad,
Telangana, India

Synovial fluid analysis in osteoarthritis affected dog

Bhavitha D, Ambica G, Lakshmi K, Chandrashekar EL and Satish Kumar K

Abstract

The present study was conducted among geriatric dogs (>6 years) that were presented with the history and clinical signs of lameness, inability to bear weight and exercise intolerance to Veterinary Clinical Complex (VCC), Campus Veterinary Hospital, College of Veterinary Science, Rajendranagar; Veterinary Hospital Bhoiguda and dogs from the peripheral hospitals over a period of six months from January to June 2022. In all the suspected geriatric dogs, detailed history was taken, followed by thorough physical and clinical examination and in all the positive cases synovial analysis was done to know the changes at joint level and details of the cases are mentioned below.

Keywords: Osteoarthritis, geriatric dogs, synovial analysis

Introduction

Osteoarthritis is one of the commonly encountered conditions in geriatric dogs and is characterized by variable degrees of pain, reluctant to jump or climb upstairs, stiffness of gait, lameness, joint swelling, and crepitus (Beale, 2005) [2]. Obesity causes extra stress to the joint and thereby promoting cycle of inflammation, degradation and chondrocyte damage in osteoarthritis dog. MacWilliams and Friedrichs (2003) [6] reported that synovial staining in osteoarthritis revealed the presence of macrophages, neutrophils and monocytes in the smear stained with Giemsa. Anirudh and Ranganath (2015) [1] mentioned that synovial fluid estimation is important in diagnosing different stages of osteoarthritis and important factor in prognosis of osteoarthritis.

Materials and Methods

Dogs with osteoarthritis formed as basis for the present study. About 0.2 ml of synovial fluid was collected followed by aseptic conditions and sample was transferred into EDTA coated vials and stored at 40C for synovial analysis. The analysis was done by using VET-IDEXX serum analyser and physical parameters were estimated immediately after collection.



Fig 1: Collection of Synovial fluid from osteoarthritis affected dog

Results and Discussion

In the present study, synovial fluid volume collected was about 0.25 ml from the affected joint

which is in accordance with McWilliams and Friedrichs (2003) [6], Anirudh and Ranganath (2015) [11] and Wood and Gibson (2020) [10]. The reason for no change in Synovial fluid volume in OA geriatric dogs is attributed to the non-inflammatory response within in the joint.

In the present study, the colour of the synovial fluid obtained ranged from colourless, pale yellow to straw coloured and red tinged. These findings agree with McWilliams and Friedrichs (2003) [6].



Fig 2: Synovial fluid volume collected from OA affected dog

Table 1: Synovial fluid analysis in OA affected dog

Sl. No	Parameter	Apparently healthy Dogs	Affected dogs
1	Volume (ml)	0.21±0.05	0.2±0.01
2	Total Protein (g/dl)	2.4±0.20	3.95±0.03*
3	TNCC (cells/ml)	2897.12±150.14	2844.90±157.36
4	Mononuclear cells (%)	84.32±0.21	83.6±1.57
5	Neutrophils (%)	7.5±0.12	7.4±0.24

In the present investigation, the protein concentration in synovial fluid is significantly higher in osteoarthritis dogs and these findings agree with the reports of Xu *et al.* (2009) [11], Anirudh and Ranganath (2015) [11] and Oslen *et al.* (2019) [9]. There was no significant difference in total nucleated cell counts in synovial fluid, which is in accordance with the findings of Wood and Gibson (2020) [10]. There was no significant difference in mononuclear cell count in synovial fluid which is in consistency with the findings of Jacques *et al.* (2002) [5], McLaughlin and Roush (2002) [8] and MacWilliams and Friedrichs (2003) [6]. Also, there is no significant difference in neutrophilic count in synovial fluid before and after therapy in both the groups, which is in consistency with the findings of MacWilliams and Friedrichs (2003) [6] and Wood and Gibson (2020) [10].

Viscosity of the synovial fluid is reported to be normal in most of the dogs but some dogs showed decrease in the viscosity, which correlates with the findings of Fernandez *et al.* (2002) [3], Jacques *et al.* (2002) [5] and McWilliams and Friedrich (2003). Decrease in viscosity in OA cases is

attributed to dilution of synovial fluid by hyaluronidase and lysosomal enzymes (Fernandez *et al.*, 2002) [3]. Decreased in viscosity may be due to decrease in concentration of hyaluronic acid as well as decrease in its chain length and molecular weight of (Herrero- Beaumont *et al.*, 2007) [4].



Fig 3: Synovial fluid viscosity in a) early b) mild and c) severe osteoarthritis

In the present study, the synovial fluid staining revealed the presence of synovial macrophages, neutrophils, and monocytes, which is in accordance with the findings of Mahaffey (2002) [7] and MacWilliams and Fredrichs (2003) [6].

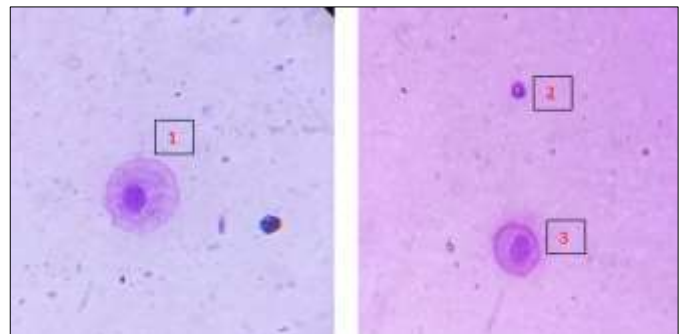


Fig 4: Synovial fluid staining revealed 1) macrophage 2) neutrophil 3) monocyte in OA affected dog

Conclusion

In the current study, with respect to synovial fluid analysis, except significant elevation in total protein, there was no any significant change in the other parameters, indicating that osteoarthritis is a non-inflammatory and is a degenerative condition that affects joints and is primarily caused by ageing, with little effect on the synovial fluid parameters.

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