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Research Article

RISK FACTORS ASSOCIAED WITH OSTEOARTHRITIS IN GERIATRIC DOGS

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ABSTRACT

The present study was under taken with an aim to evaluate the risk factors associated with osteoarthritis affected geriatric dogs. A total 3040 geriatric dogs were presented to Veterinary Clinical Complex, Campus Hospital, College of Veterinary Science, Rajendranagar and Veterinary Hospital, Bhoiguda during the period of January to June 2022. Out of 3040 dogs, 350 geriatric dogs wereaffected for osteoarthritis, indicating the overall incidence of 11.51%. The risk factors recorded for osteoarthritis were, overweight in 202 (57.71%), neutering in 45 (12.86%), slippery floor in 33 (9.43%), overuse of calcium in 30 (8.57%), heavy exercise in 20 (5.71%), underlying joint diseases in 15(4.29%) and hypothyroidism in 5 (1.43%) dogs.

Keywords: Geriatric dogs, Heavy exercise, Neutering, Osteoarthritis, Overweight

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Osteoarthritis is one of the commonly encountered conditions in geriatric dogs and is characterised by variable degrees of pain, reluctant to jump or climb upstairs, stiffness of gait, lameness, joint swelling and crepitus (Beale, 2004). Obesity causes extra stress to the joint and thereby promoting cycle of inflammation, degradation and chondrocyte damage in osteoarthritis dog. Overfeeding is one of the reasons for development of osteoarthritis in older canines. Restricted movement is one of the direct reasons predisposing to osteoarthritis in dogs (Nesic *et al.*, 2006). The major risk factors associated with Osteoarthritis in dog are obesity, lack of exercise, injury, hormonal imbalances, non-physiological burdens and mixtures of several conditions (Gencoglu *et al.*, 2020). Hip dysplasia is a hereditary orthopaedic condition in certain breeds will predisposes to osteoarthritis in dogs (Lust, 1980). Neutering is a major factor for musculoskeletal disorders like osteoarthritis in dogs (O'Neill *et al.*, 2020). Vigorous exercise (Mele, 2007) and excess calcium supplementation especially during the growth stages may predispose dogs for the development of osteoarthritis. Dogs kept on slippery flooring like tarpaulin and newspapers are more likely to develop hip dysplasia, which may lead to osteoarthritis in later stages of life (Witte, 2019). Hypothyroidism accounts for 3.4% of the osteoarthritic cases in dogs (Juge *et al.*, 2017).

MATERIALS AND METHODS

The present investigation was carried out in the Department of Veterinary Medicine, Veterinary Clinical Complex and Veterinary Surgery and Radiology, Rajendranagar, Hyderabad and Veterinary Hospital, Bhoiguda, Telangana. A total of 3040 geriatric dogs over a period of 6 months from January to June 2022 were screened to know the incidence of osteoarthritis among geriatric dogs. A detailed history was collected from the owners of all the suspected cases and subsequently tested for joint, bone and soft tissue abnormalities by radiography, ultrasonography and computed tomography. Among these, 350 dogs were affected with osteoarthritis. A detailed investigation from all the positive cases were conducted to record the risk factors associated with osteoarthritis in geriatric dogs.

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RESULTS AND DISCUSSION

In the present study, the risk factors recorded for osteoarthritis were reported to be overweight in 202 (57.71%), followed by neutering in 45 (12.86%), slippery floor in 33 (9.43%), overuse of calcium in 30 (8.57%), heavy exercise in 20 (5.71%), underlying joint diseases in 15(4.29%) and hypothyroidism in 5 (1.43%) geriatric dogs. Among the all the risk factors, overweight was found to be major factor involved in occurrence of osteoarthritis in geriatric dogs, followed by neutering, slippery floor, imbalances between Ca: P, heavy exercise, underlying joint diseases and hypothyroidism.

The present results are in near accordance with findings of McLaughlin and Roush (2002), Marshall *et al.* (2009), Runge *et al.* (2010), Sanderson (2012) and Anderson *et al.* (2020). Metabolic and systemic consequences of obesity may play a more significant role in the aetiology of OA, wherein fat produces systemic inflammatory factors like cytokines and adipokines, which were distinct adipose tissue-produced components with considerable inflammatory qualities (Mosley *et al.*, 2022). Further in obese cases increased body weight leads to increased pressure on the weight bearing joints and predisposes for the development of OA (Anderson *et al.*, 2020) and obesity

Fig. 1. Risk factors associated with Osteoarthritis in Geriatric Dogs

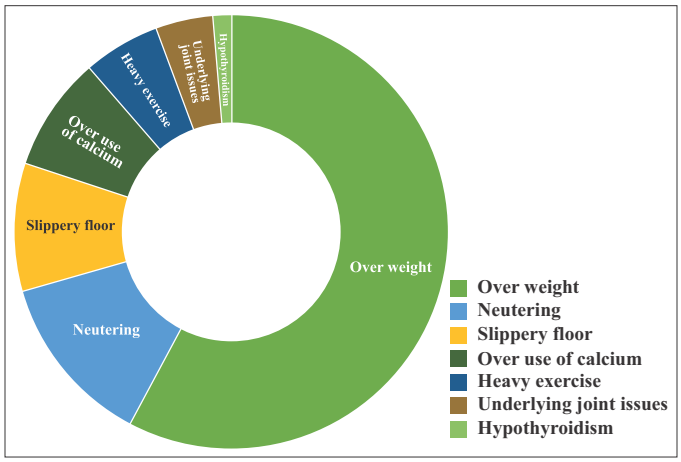

Fig. 2. Radiography of OA dog showing a) unilateral hip osteoarthritis, arrow indicating loss of joint space and degenerating joint

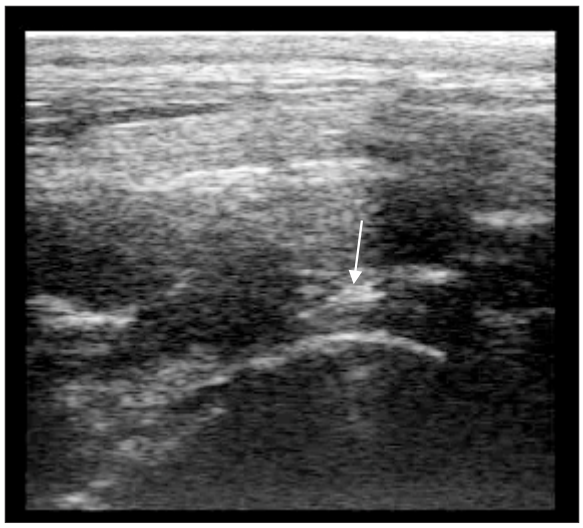

Fig. 5. Presence of osteophyte on the head of femur

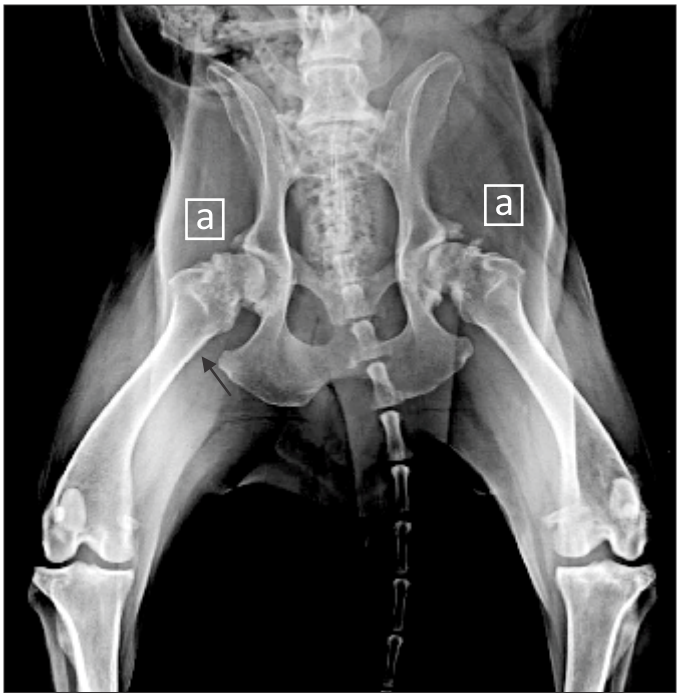

Fig. 3. Radiography of OA dog showing a) bilateral hip osteoarthritis, arrow indicating loss of joint space and loss of femoral head contourand arrow indicating sclerosis of bone

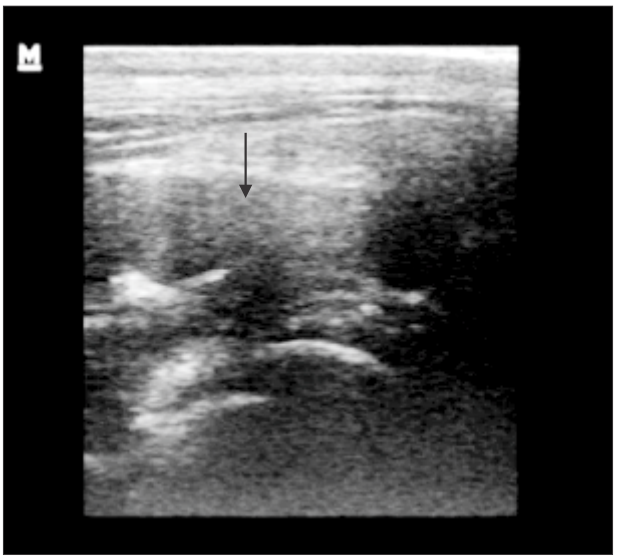

Fig. 4. Sonography of OA dog showing Myositis

primarily causes an increase in mechanical loading, which in turn causes mechanical stress, more wear and tear and ultimately cartilage degeneration and results in OA (Loef *et al.*, 2019).

In the present study, neutering is reported as the second most risk factor associated with OA in geriatric dogs and is in accordance with findings of German (2006), Meeson *et al.* (2019), Preet *et al.* (2021), O'Neill *et al.* (2020) and Anderson *et al.* (2020). Neutering predisposes dogs for the development of osteoarthritis due to the imbalanced gonadal hormones affecting the growth rate and development of the bones (Anderson *et al.*, 2020) and

Table 1. Risk factors associated with Osteoarthritis in Geriatric Dogs

Sl. No.	Factor	No. of Dogs	Percentage (%)
1	Over weight	202	57.71%
2	Neutering	45	12.86%
3	Slippery floor	33	9.43%
4	Over use of calcium	30	8.57%
5	Heavy exercise	20	5.71%
6	Underlying joint issues	15	4.29%
7	Hypothyroidism	05	1.43%
8	Total	350	100

Table 2. Average neutering age of dogs affected with Osteoarthritis

Sl. No.	Breeds	Neutered age (Months)
1	Pugs (18)	6.5
2	Labrador Retrievers (15)	7
3	Golden Retrievers (05)	7.5
4	German Shepherds (07)	1 year

Table 3. Thyroid estimation in dogs affected with Osteoarthritis

Sl. No.	Breed	Average TT4
1	Labrador Retrievers (2)	0.4
2	Pugs (2)	0.6
3	Spitz (1)	0.8

in the absence of gonadal hormones, an abnormal growth plate closure may increase the likelihood of a clinically obvious joint problem as the age advances in dogs (Riva *et al.*, 2013). The changes that occur in sex hormones after neutering, thought to cause behavioural changes, most notably increased food seeking and decreased physical activity leading to OA (Bermingham *et al.*, 2014; Raffan *et al.*, 2015).

Heavy exercise is one of the risk factors for the development of OA in dogs and the present findings are in accordance with the studies conducted byAnderson *et al.* (2020), Bland *et al.* (2015) and Mele (2007). Strenuous exercise particularly at young age may leads to OA which might be due to over use and damage to the developing joints (Anderson *et al.*, 2020).

In the present study, slippery floor is reported as one of the risk factors associated with OA in dogs and is in accordance with the studies of Alsaleem *et al.* (2013), Witte *et al.* (2019), Capon (2021), Goldberg *et al.* (2022) and Capon (2021). Dogs raised on slippery floor may develop osteoarthritis as the age advances, which might be since as dogs moves on slippery floor, some of the back muscles and joints needs to stabilize themselves on such floors and movement will be restricted in some parts of the dog's body, while other parts will have to work harder than normal to compensate. Over time, this inefficient movement can become habitual and the back muscles and joints may develop osteoarthritis as age advances.

Further, over use of calcium during young age is one of the risk factors for the development of OA in geriatric dogs and similar observations are reported by Richardson and Toll (1997), Raditic and Athens (2019) and Lauten (2006). Excess use of calcium during the young age causes suppression of the parathyroid gland and this excess calcium may leaches out from body if feed continuously and makes bone thin and weak leading to hip dysplasia and inturn leads to OA as the age advances.

In the present study, underlying joint diseases like hip dysplasia accounted for 4.29% in occurrence of OA in dogs, which is in accordance with the findings of Sandell (2012), Alsaleem (2013), Ramirez-Flores *et al.* (2017) and Meeson *et al.* (2019). This might be due to fact that hip dysplasia leads to loss of normal joint conformation in younger stages of life and as age advances the trauma to hip joint increases and leads to OA in geriatric age.

In the present study, Hypothyroidism accounted for 1.43% in occurrence of OA in dogs. This finding is in consistent with the reports of German (2006) and Kutzler (2020) and slightly lower (2.8%) percent reported by Juge *et al.* (2017). This observation could be substantiated that hypothyroidism leads to accumulation of certain proteins in the body especially at the joints resulting in joint and surrounding muscle damage and as the age advances, leads to degenerative changes. However, according to Kutzler (2020), OA in hypothyroid dog might be because of effect of gonadectomy on the joints.

CONCLUSION

Among all the risk factors associated with osteoarthritis, overweight is seen in majority of the cases followed by neutering, slippery floor, overuse of calcium, heavy exercise, underlying joint diseases and hypothyroidism. As obesity is seen in majority of the cases, weight management has to be done for certain breeds like Labrador Retriever, where osteoarthritis is a genetic predisposition condition to avoid the severity of the disease.

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