

Implications of Osteoarthritis in Canines and Scientific Developments to potentially increase their Welfare

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Word count: 1002

Introduction

Osteoarthritis (OA) is an unfortunate disease that affects dogs of all ages. It is essentially the deterioration of cartilage and soft tissue leading to inflammation and severe pain caused by the joints grinding together (Pinna *et al.*, 2013). While this chronic degenerative disease impacts the welfare of dogs, recent scientific developments present a potential method to manage the disease. This paper includes studies by Ehrenzweig *et al.* (2012), Lewis *et al.* (2013) and Pinna *et al.* (2013) that explore the implications of canine OA and discuss preventative methods and pain-relief treatments alternative to traditional non-steroidal anti-inflammatory drugs (NSAIDs) for future clinical use.

Discussion

Ehrenzweig *et al.* (2012) explored the effect of Lymphocyte T-Cell Immunomodulator (LTCl) as an alternative pain-relief treatment to NSAIDs for canine OA. The common form of pain relief for OA is NSAID, which essentially decreases the production of prostaglandins and therefore swelling and pain associated with OA. However, many side effects are associated with its use, including renal and cardiovascular issues (Ehrenzweig *et al.*, 2012). Thus, LTCl is an alternative that provides pain relief and improves limb mobility of dogs experiencing osteoarthritic pain by regulating the level of lymphocytes as high amounts contribute to the pathogenesis of immune-mediated diseases (Ehrenzweig *et al.*, 2012).

Subcutaneous injections were administered to 24 dogs over a period of four weeks. Pressure applied by the affected joint on a MatScan force plate was measured as a source of pain on the first and last day of the experiment. In addition, the number of lymphocytes in the blood was measured to indicate the severity of the disease (Ehrenzweig *et al.*, 2012).

Most of the dogs treated with LTCl increased the pressure applied by the affected joint after the treatment period, signifying that there was some pain relief, while most of the placebo group decreased the pressure applied on the mat. Lymphocyte levels in the blood decreased in response to LTCl and increased in the placebo group. The validity of the results, however, could be questioned due to the small sample size, but the findings of this study are supported by previous trials (Ehrenzweig *et al.*, 2012). Thus, LTCl is a potential alternative to NSAIDs without any side effects as it decreases blood lymphocyte levels and increases the functional capacity of affected joints in dogs with OA (Ehrenzweig *et al.*, 2012).

Furthermore, Lewis *et al.* (2013) explored preventative methods by determining whether Estimated Breeding Value (EBV) data could be employed to genetically select against Canine Hip Dysplasia (CHD) traits in dogs to improve their welfare in future generations. The study accumulated genetic information of canine pedigree breeds and employed EBV to determine the genetic potential of transferring the CHD trait to their offspring (Lewis *et al.*, 2013). EBV is an approximation of the breeding value for a characteristic in an individual and provides an indication of the proportion of the trait that will be passed on to offspring. The study focuses on CHD but this disease can progress into OA if the condition worsens (Lewis *et al.*, 2013). While the data from this study were obtained from previous years, the ability to apply EBV on the data is a recent scientific development. Pedigree information on 15 breeds of varying ages was collected for a study from the UK Kennel Club and EBV was conducted on their hip and elbow scores (Lewis *et al.*, 2013).

The results of the study indicated an improvement in selection against CHD in most breeds from phenotypic selection over the years. However, the EBV provided a more accurate evaluation of genetic worth compared to phenotype selection only, a statistic supported by Wilson *et al.* (2012). Thus, the

results indicate the benefits of employing EBV for genetic selection against CHD and, therefore, OA, in breeds or individuals possessing higher tendencies to express the trait in their offspring in order to improve the welfare of future canine generations (Lewis *et al.*, 2013). Limitations included incorporating only pedigree breeds in the study, so the results are only relevant for certain portions of the canine population. For this reason, further studies applying EBV to numerous cross breeds should be undertaken.

Moreover, Pinna *et al.* (2013) compared the effect of a Pulsed Electromagnetic Field (PEMF) to that of Firocoxib, a NSAID sanctioned for pain relief and mobility in dogs with OA. PEMF stimulates an upsurge in erythrocyte membrane potential, vascular vasodilation and oxygenation of tissue causing pain relief via low-frequency non-ionised electromagnetic fields with no rise in temperature, thereby not affecting the welfare of dogs during the trial (Pinna *et al.*, 2013).

Dogs (n=25) were treated with PEMF while 15 were treated with Firocoxib (as controls). Each dog was placed on a PEMF mat and treated for 8 to 10 minutes across its whole body and on any impacted joints. This treatment was applied 3 to 6 times weekly over 20 sessions. Pain was measured on a score basis of behavioural changes considered symptoms of pain observed by the owners. Improvement in mobility, signifying a decrease in pain, was determined by clinicians via radiographic and orthopaedic examinations (Pinna *et al.*, 2013).

Consequently, the results indicated that both treatments significantly decreased the level of pain from canine OA, but the control group ceased to improve after 4 months while the PEMF group remained stable until the conclusion of the trial (Pinna *et al.*, 2013). Limitations of the study included the accuracy of assessing pain, as observations could vary among owners. However, clinical examinations were conducted in correlation with these observations, thereby validating the conclusions (Pinna *et al.*, 2013). The study would have benefited from including a larger and equal sample size, thereby achieving more accurate and thus more reliable conclusions. Consequently, further studies are required to support PEMF treatment on dogs in clinical practices.

Conclusion

Preventative genetic selection through EBV, cell manipulation and non-invasive PEMF serve as alternatives to NSAIDs in treating osteoarthritic pain in dogs, thereby improving their welfare. However, additional studies are required to further consolidate these findings for future use in clinical practice.

References

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