

A preliminary investigation into laterality differences of range of motion during flexion and extension of canine proximal limb joints

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## Background

Research into musculoskeletal imbalance and differences between left and right hand side joint ROM in *C.familiaris* is limited[1]. Relationships between thoracic and pelvic limb structure and function have been observed, however, there is little peer reviewed research[2]. Passive joint ROM provides a measure of the limits that a particular joint can move in its physiological planes of motion without influence of muscle activity. The study aim was to assess and compare left and right-side flexion and extension of the glenohumeral(shoulder), humeroulnar/humeroradial(elbow), coxofemoral(hip) and femorotibial(stifle) joints and for laterality ROM differences.

## Materials and Method

Siberian husky dogs( $n=18$ ) from a single kennel who live and work together were selected to minimise genetic and environmental effects. Dogs were of mixed gender (55.5% males ( $n=10$ ) and 45.5% females( $n=8$ )), aged >1year (mean $\pm$ S.D.(range)):  $5.1 \pm 3.2(1.4-11.8)$ . Joint ROM was measured using goniometry, a validated, non-invasive method in dogs[3], by the same investigator previously tested for acceptable repeatability of measurement. Dogs were conscious and placed in a standing position[4]. Specific bony landmarks were identified before triplicate measures of joint flexion and extension were taken on both sides of each dog for shoulder, elbow, hip and stifle joints. Mean values of triplicate measures were computed. Paired t tests and Pearson Correlation Coefficient compared laterality of joint ROM, gender, age (<6yrs vs >6yrs) effects.

## Results

There was no significant difference ( $p>0.05$ ) between left and right side flexion and extension measures for all joints. Gender had no significant effect ( $p>0.05$ ) on joint ROM measures for flexion or extension of all joints. Age (<6yrs vs >6yrs) had a significant effect on right hip flexion ( $p=0.0009$ ) and for both left and right sides for shoulder flexion ( $p=0.0002$  and  $p=0.0004$ ), elbow flexion ( $p=0.001$  and  $p=0.0006$ ), hip extension ( $p=0.02$  and  $p=0.009$ )(figure1). The shoulder joint showed greatest ROM asymmetry (SI=3.63%). Joint asymmetry was minimal for elbow (SI=0.1%), stifle (SI=0.63%) and hip (SI=1%) joints.

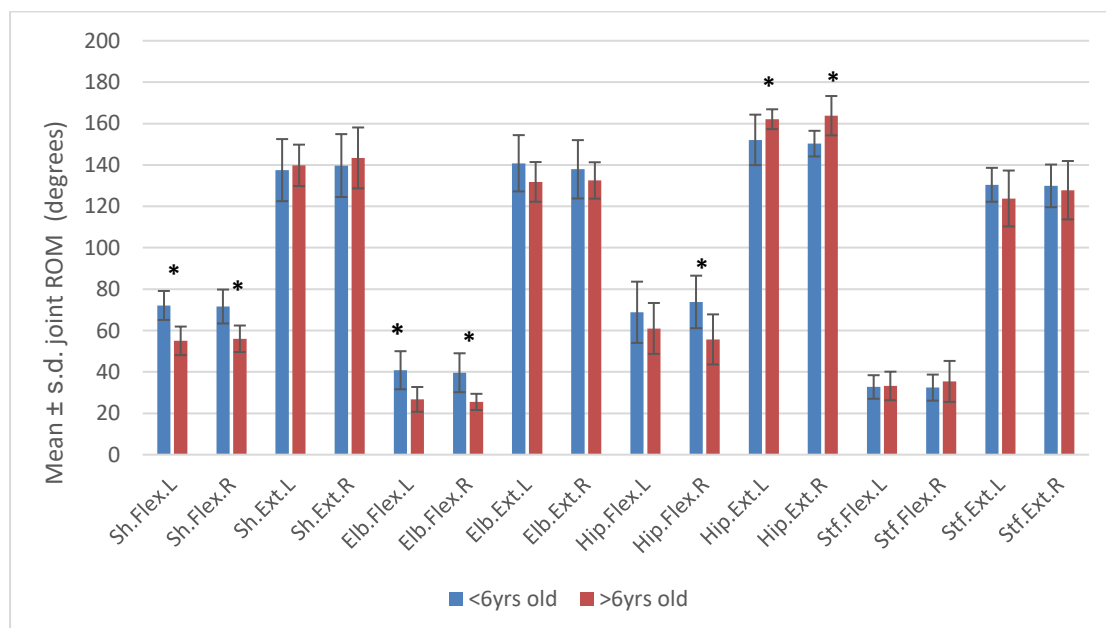


Figure 1. Bar chart of mean joint flexion and extension ROM for age groups  
\*denotes significance difference between groups

## **Conclusions**

Bilateral ROM measures of both fore and hind quarters are important to consider in joint movement assessment and particularly for older dogs. Joints can show difference preference in asymmetry of passive ROM. This warrants further investigation with larger cohorts of defined age groups and could have implications in monitoring limb joint function of dogs.

## **References**

- [1] Adamokova, J; Benediktova, K; Svoboda, J; Bartos, L; Vynikalova, L; Novakova, P; Hart, V; Painter, M; Burda, H. Turning preference in dogs: North attracts while south repels. PLoS One, 2021, 16(1).
- [2] Zink, C. & Schlehr, M., Working Dogs Structure; Evaluation and Relationship to Function. Frontiers in Veterinary Science, 2020. Volume 7.
- [3] Jaegger, G., Dennis, .. M. & Levine, D.,. Reliability of goniometry in Labrador Retrievers. American Journal of Veterinary Research, 2002. 63(7), pp. 979-986.
- [4] Sabanci, S; Ocal, M. Comparison of goniometric measurements of the stifle joint in seven breeds of normal dogs Veterinary and Comparative Orthopaedics and Traumatology 2016, 29,3. pp.214-219