

# MORPHOMETRY OF NORMAL HIP JOINT AND DYSPLASTIC HIP JOINT IN YOUNG LABRADOR RETREIVER DOGS—A STUDY

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The present study recorded the complete femoral geometry of healthy as well as dysplastic hip joint in Labrador retriever breed young dogs. In dogs below 6 months of age, all the proximal femoral, acetabular and other measurements except FSC and TW were significantly different between healthy hip joint. HAL, FNALa, AW, HD, FSD, AA, EAA DI and SI were higher in CHD where as FNALb, ND, FOA, HNI, AHI, PC and NA were significantly higher in healthy hip joint. In dogs with healthy hip joint FNALa, FSC, HD, ND, TW, AI and PC were higher in male dogs where as in CHD, FSC, TW were higher in female dogs and FIA, AA were higher in male dogs. No significant difference in hip geometry was seen between right and left limbs in healthy hip as well as CHD. AW and ND were higher in bilateral CHD and FSC was higher in unilateral CHD. In unilateral CHD, FSD and PC were higher in female dogs where as FIA was significantly higher in male dogs.

**Keywords:** Hip, Morphometric measurements, Normal Hip joint, CHD, Labrador retriever.

Canine Hip Dysplasia (CHD) is one of the most commonly diagnosed orthopaedic diseases in dogs. Imaging of the canine pelvis coupled with physical examination findings are the principle methods used to screen for and diagnose CHD (Delaunay *et al.*, 1997). Determination of metrics of hip joint will aid in early detection of CHD and facilitate a better outcome in hip pathologies (Sarierler *et al.* 2017).

## Materials and Methods

The present study was conducted to determine metrics of hip joint in 32 Labrador retriever dogs presented over a period of one year by dividing them in to two groups: Group I with Labrador retriever breed dogs aged below six months and Group II with Labrador retriever breed dogs aged between six to twelve months.

Hip morphometric measurements included Hip Axis Length (HAL) Femoral Axis Length (FNALa) FNALb, Acetabular Width (AW), Femoral Shaft Cortex width (FSC) Femoral Head Diameter (HD) Femoral Neck Diameter (ND) Trochanteric Width (TW), Femoral Shaft Diameter (FSD) Femoral Inclination Angle (FIA) Acetabular

angle (AA), external acetabular angle (EAA) and acetabulum head index (AHI), Percentage coverage (PC), Norberg Angle (NA), Distraction Index (DI) and Sub luxation index (SI). The data collected were statistically analyzed using SPSS- software version 17.0, TWO WAY ANOVA, and Tukey's Post Hoc test.

## Results and Discussion

### Labrador retriever breed dogs below 6 months of age (Group I):

HAL values were significantly higher in CHD. HAL was significantly higher in male Sivas Kangal dogs with healthy hip joints as also recorded by Sarierler *et al.* 2017. Male dogs with bilateral CHD had significantly higher HAL values. In CHD, FNALa value was higher. Within the group of dogs with healthy hip joint, FNALa was higher in male dogs. FNALb value was significantly higher in CHD. In bilateral hip dysplasia AW was significantly higher and male dogs had higher AW values in bilateral CHD. No significant differences between the measurements were made in the left and right sides of the Sivas Kangal breed healthy dogs.

Within the group male dogs in healthy group had higher FSC whereas in dogs with CHD female dogs had significantly higher FSC. FSC was thicker in male dogs with a healthy hip joint in Sivas Kangal breed HD in male dogs had higher HD value. HD was higher in female dogs with CHD, compared to healthy hip joint as similar findings were of Sarierler *et al.* 2017.

ND values were significantly higher in dogs with healthy hip joint and male dogs. Within the group of dogs with healthy hip joint, TW value was significantly higher in male dogs whereas in CHD, TW was significantly higher in female dogs. FSD was significantly higher in CHD. FSD was significantly higher in female dogs with unilateral CHD and in male dogs with bilateral CHD. FIA was significantly higher in dogs

with healthy hip joint. In CHD, male dogs had higher FIA values. Dogs with healthy hip joint had significantly higher HNI value.

In CHD, AA was significantly higher in the present study. AA was significantly higher in male dogs when the CHD was bilateral. Significantly higher EAA value was observed in CHD. Higher EAA values were observed in cases of acetabular. Within the group of dogs with healthy hip joint, AHI was significantly higher in male dogs. PC was significantly higher in male dogs with healthy hip joint as also mentioned by Lopes *et al.*, 2018, in the present study. PC was significantly higher in female dogs with unilateral CHD. NA was significantly higher dogs with healthy hip joint. DI and SI were significantly higher in CHD. Higher SI values were recorded in CHD.

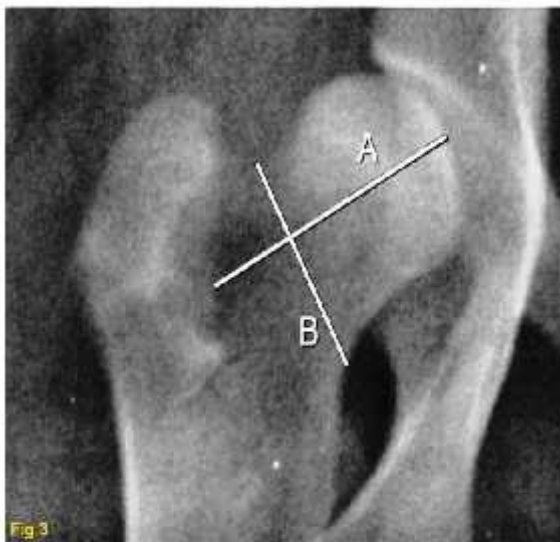


Fig 3  
Head-neck index of Heyman and Herndon (A/B x 100). A: total length of femoral head and neck. B: femoral neck width at the narrowest point.



Fig 4  
Head-neck index of Heyman and Herndon (A/B x 100). A: total length of femoral head and neck. B: femoral neck width at the narrowest point.

**Labrador retriever breed dogs between 6 to 12 months of age (Group – II):**

HAL was significantly higher in female dogs with CHD. Within the group of dogs with healthy hip joint, FNAL was significantly higher in male dogs and was significantly higher in female dogs in CHD. Similar observation was in Sivas Kangal dog breed similar findings were

recorded by Sarierler *et al.*, 2017. FNAL values were significantly higher in CHD. Unlike in the present study, on the contrary, higher AW and FSC values were recorded in male Sivas Kangal breed dogs with healthy hip joint. HD values were significantly higher in CHD. Within the group of dogs with healthy hip joint, HD values were significantly higher in female dogs.

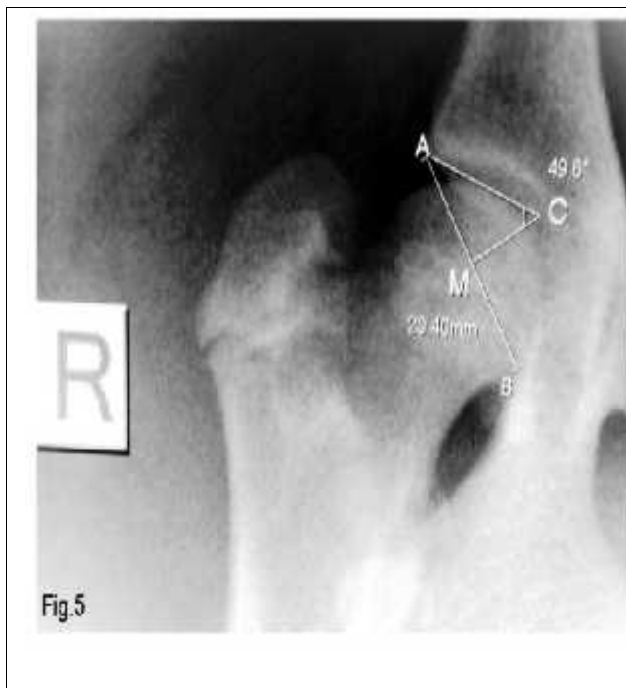
ND values were significantly higher in CHD. Female dogs had higher ND values when the CHD was unilateral, on the contrary, male dogs had significantly higher ND values when the CHD was bilateral. TW values were significantly higher in CHD. FSD was significantly higher in male dogs within the group with healthy hip joint.

Significantly higher FIA values were observed in dogs with healthy hip joint. Female dogs with healthy hip joint had significantly higher FIA values than female dogs with CHD and significantly higher FIA values were observed in the right hip joint compared to the right hip joint with CHD. No

such difference was recorded in FIA values by some researchers whereas higher FIA values were recorded in CHD by other researchers also.

HNI values were significantly higher in dogs with healthy hip joint. Within the group of dogs with healthy hip joint, female dogs had significantly higher HNI values than male dogs.

Significantly higher AA values were observed in CHD. Within the group of dogs with healthy hip joint, AA values were higher in male dogs as Sarierler *et al.*, 2017, also recorded higher Acetabular angle values in male Sivas Kangal breed dogs.



EAA values were significantly higher in CHD. Higher EAA values were observed in acetabular dysplasia. Higher AHI values were observed in dogs with healthy hip joint. Within the group of dogs with healthy hip joint. PC values were significantly higher in dogs with healthy hip joint. Lower mean PC values have been reported in CHD as also recorded by Lopes *et al.*, 2018. DI values were significantly higher in CHD. Significantly higher SI values were observed in CHD.

All the acetabular and other parameters were impacted due to CHD. AW, FSC, ND and AA were significantly different between unilateral and bilateral CHD. Many proximal femoral, acetabular and other measurements of the hip joint are higher between male and female dogs with healthy hip joint except HAL, FNALb, AW, FIA, EAA, NA, DI, and SI in both the group of dogs. In CHD, only HAL was higher between male and female dogs of group II and rest of the measurements are similar in male and

female dogs whereas in group I dogs FSC, TW, FIA, AA were between male and female dogs.

**Conflict of Interest** The authors declare that there is no conflict of interest.

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