MORPHOMETRIC OBSERVATIONS ON LYMPH NODES IN GOAT FOETUSES*

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Abstract

Prenatal studies on the biometry of the developing lymph nodes in goat were conducted in 41 foetuses. There was a progressive increase in the size of the lymph nodes, viz. mean length, width, thickness and weight of lymph nodes as the age advanced. The weight of the lymph nodes exhibited positive correlation with body weight and age. In the five major lymphocentres studied, it was found that the superficial lymph nodes occurred as single ones and deep or visceral lymph nodes occurred in groups. The topographical position of these lymph nodes showed slight variation in position in some animals studied. The mean values for gross parameters showed slightly higher values for male animals and in the lymph nodes of the right side.

Keywords: *Foetus, Goat, Lymph nodes, Morphometry, Prenatal*

Lymph nodes are small or large sized nodules of the lymphoid tissue and are regarded as the filters or barriers located in the course of smaller lymphatics .They consist of capsule, stroma, cortex, medulla, nodules and hilus. The secondary lymphoid tissues are generally located at the strategic site where foreign antigen could be efficiently brought together with the regulatory and effector cells of the immune system. The organised structure of the secondary lymphoid tissue is thought to enhance the sensitivity of antigen recognition (Fu and Chaplin, 1999).

Although extensive work has been conducted on the lymph nodes in other species of animals, the prenatal development of caprine lymphatic system has not attracted enough attention by lymphatic researchers in the past and is not adequately described. Descriptive reports about the morphogenesis of the caprine lymph nodes are scanty. Hence this study was conducted to elucidate the biometrical parameters of the lymph nodes in goats at different stages of prenatal life

Materials and Methods

The study was conducted on 41 goat foetuses. After recording straight and curved Crown Rump Length (CRL), the age of the foetuses was calculated using the formula derived by Singh *et al.* (1979) for goat foetuses, $W^{1/3} = 0.096$ (t - 30), where, W = body weight of the foetus in g and t = age of the foetus in days. Based on the age, the foetuses were divided into five groups. Embryos and foetuses upto 60 days of age, were fixed as such. From embryos of 61 to 90 days of age, the areas surrounding and including the developing lymph nodes, the ventral aspect of the neck along with carotid sheath and the dorsal thoracic and lumbar vertebral regions were collected and fixed as such. Representative lymph nodes from five major lymphocentres were studied, *viz.*, parotid and mandibular lymph nodes from lymphocentres of the head, prescapular lymph node from neck, caudal mediastinal lymph node from thoracic cavity, jejunal mesenteric lymph node from abdominal

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viscera, and prefemoral lymph node from abdominal wall. From larger foetuses of 91 days of age and above, the lymph nodes were dissected out to record the morphometric parameters like weight, length (long diameter), width (short diameter) and thickness of the lymph nodes were measured in each foetus. From this group of foetuses, the ventral aspect of the neck along with carotid sheath and the thoracic duct and cisterna chyli along with their related structures were also collected and fixed as such. For making comparative studies on growth, organs like liver, thymus and spleen were also collected. The data collected were analysed statistically following Snedecor and Cochran (1994).

Results and Discussion

In the five major lymphocentres studied, it was found that the superficial lymph nodes occurred as single ones and deep or visceral lymph nodes occurred in groups. This was in accordance with the observations of Gadre *et al.* (1988) in the cross-bred male calves.

The topographical position of these lymph nodes showed slight variation in some of the animals studied, which partially agreed with the findings of Sarma *et al.* (2004) in Assam local goats, who found slight variation in position of most of the lymph nodes except mandibular and superficial cervical lymph nodes.

There was a progressive increase in the mean length, width, thickness and weight of lymph nodes as the age advanced (Table 1), similar to the observations made by Gadre *et al.* (1986) in the lymph nodes of cross bred calves, who could also observe that there was an enlargement of lymph nodes on exposure to antigens.

The gross parameters of the lymph

Table 1. Average length, width, thickness and weight of lymph nodes at fourth and fifth month of gestation (Mean± S. E.)

Lymph node	Age in Months	Parameters			
		Length (mm)	Width (mm)	Thickness (mm)	Weight (g)
Parotid	4	2.30 ± 0.10	1.90 ± 0.07	1.30 ± 0.02	1.40 ± 0.06
	5	8.20 ± 0.02	5.40 ± 0.01	3.40 ± 0.01	3.30 ± 0.01
Mandibular	4	2.40 ± 0.11	1.70 ± 0.05	1.20 ± 0.03	1.40 ± 0.04
	5	8.50 ± 0.01	4.70 ± 0.01	2.00 ± 0.02	3.20 ± 0.01
Prescapular	4	7.70 ± 0.01	5.00 ± 0.01	2.20 ± 0.01	4.80 ± 0.02
	5	18.30 ± 0.05	9.60 ± 0.04	3.30 ± 0.01	7.80 ± 0.04
Prefemoral	4	5.10 ± 0.01	2.60 ± 0.01	1.30 ± 0.01	2.20 ± 0.01
	5	13.20 ± 0.02	6.10 ± 0.02	2.40 ± 0.01	4.50 ± 0.01
Mediastinal	4	11.00 ± 0.20	1.60 ± 0.07	1.40 ± 0.04	2.20 ± 0.06
	5	33.00 ± 0.03	3.90 ± 0.01	3.20 ± 0.01	4.60 ± 0.01
Mesenteric	4	0.70 ± 0.14	0.29 ± 0.02	0.13 ± 0.01	0.33 ± 0.40
	5	2.08 ± 0.30	0.65 ± 0.11	0.42 ± 0.01	1.32 ± 0.10

Table 2. Correlation of body parameters with liver, spleen and lymph node weight

Sl. No.	Parameter	Correlation coefficient (r)					
		Body weight	Age	CRL straight	CRL curved	Liver weight	Spleen weight
1	Body weight	-	0.986**	0.946**	0.945**	0.985**	0.871**
2	Age	0.986**	-	0.978**	0.978**	0. 987**	0.978**
3	Straight CRL	0.946**	0.978**	-	0.939**	0.934**	0.932**
4	Curved CRL	0.886*	0.878*	0.939**	-	0.921**	0.933**
5	Liver weight	0.985**	0.987**	0.934 **	0.921**	-	0.975**
6	Spleen weight	0.871**	0.978**	0.932**	0.933**	0.975**	-
7	Parotid lymph node weight	0.971**	0.934**	0.890*	0.868*	0.901**	0.891**
8	Mandibular lymph node weight	0.825*	0.850*	0.875*	0.859*	0.931**	0.945**
9	Prescapular lymph node weight	0.981**	0. 951**	0.962**	0.963**	0.937**	0.898**
10	Prefemoral lymph node weight	0.954**	0.951**	0.933**	0.911**	0.872*	0.874*
11	Mediastinal lymph node weight	0.930**	0.949 **	0.989**	0.986**	0.851*	0.852*
12	Mesenteric lymph node weight	0.818*	0.851*	0.831*	0.816*	0.880*	0.840*

* P<0.05 ** P<0.01

nodes exhibited positive correlation with body weight, age and CRL. These also showed a similar relation with the liver and spleen weight indicating a growth trend in accordance with other internal organs and major lymphatic organs (Table 2).

The comparison of mean values of lymph nodes during fifth month showed that these values were slightly higher in the lymph nodes of the right side than those of the left side (Fig. 1) similar to the reports of Sarma *et al.* (2004) in Assam local goats.

The mean values for gross parameters of lymph nodes during fourth and fifth month were slightly higher in males when compared to that of the female animals, with the mean difference ranging between two to five millimeters unlike the findings of Gadhave

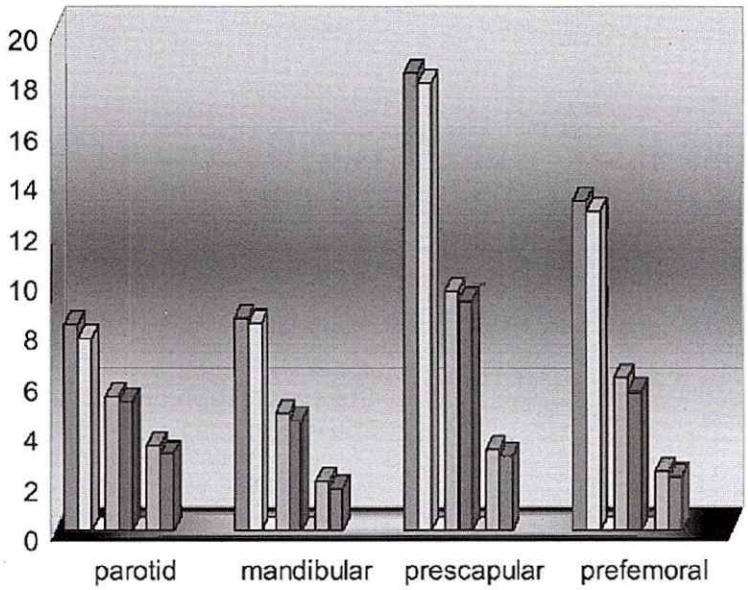

Fig.1. Biometrical parameters of lymph nodes of right and left sides during fifth month of gestation
From Left 1. Length right 2. Length left 3. Width right 4. Width left 5. Thickness right 6. Thickness left

(1996) in Murrah buffaloes. But Pospieszny *et al.* (2002) stated that the sex of the foetus had no influence on the morphology and development of the tracheo-bronchial cranial lymph node in prenatal life in sheep.

Since the lymphatic system plays a crucial role both in normal and pathological processes with lymph nodes acting as filters of body fluids, the regional and side differences in the biometry of these organs only indicated the respective changes in the exposure to external influences.

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