

## GROSS STUDY OF GALLBLADDER ASSOCIATED LYMPHOID TISSUE (GbALT) OF MADRAS RED SHEEP (*Ovis aries*)

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Gallbladder (Gb) being a temporary storage organ of bile might harbour toxins of both endogenous and exogenous origin. Antigens of either invading parasites or microorganism eventually might lead to either acute or chronic gallbladder associated diseases. Of late gallbladder has attracted greater attention among the immunologists due to the existence of mucosal associated lymphoid tissue (Chandrasekar *et al.*, 1992 b). As the detailed studies of histological and immunocytochemical aspect of these lymphoid aggregates have already been reported in Buffaloes and goats (Chandrasekar *et al.*, 1992a; Lalitha and Chandrasekar 1993) an attempt is made to study the density of lymphoid tissue in the gall bladder of Madras Red Sheep.

### Materials and Methods

A total number of 105 gallbladders were collected from apparently healthy adult Madras Red Sheep from the local slaughter house immediately after slaughter. Before fixation, the volume, colour, consistency and pH of the bile, weight of empty gall bladder, and dimensions at the neck, body, and fundus were recorded. The gall bladders were cut open, stretched and fixed in 10% acetic acid for 24 hrs. (Langman and Ronald, 1986, Narayanan *et al.*, 1995) to make the lymphoid follicle visible macroscopically (Fig.). The pin head sized follicles were counted by using hand lens, from neck, body and fundus regions of Gallbladder. Data were subjected to statistical analysis.

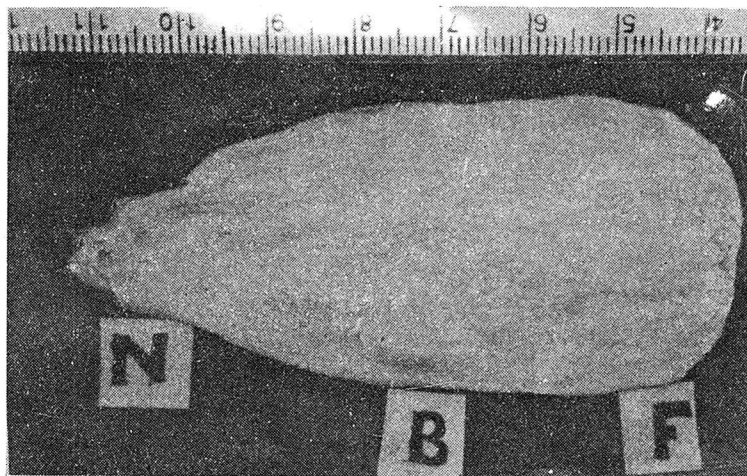


Fig. Gallbladder showing the mucosal lymphoid follicles

## Results and Discussion

Based on the observations of gall bladder wall thickness, weight of empty gall bladder and characters of bile viz. colour, volume, consistency and pH, the data were categorised into three groups (Table 1). The colour of the bile was dark green, Golden brown and yellow and average. The volume of bile was 6.8, 4.7 and 1.3 ml. with the three groups respectively. The consistency of the bile varied from serous, slimy to highly viscous (Biliary mud), and pH was 6.8, 6.0 and 6.3. The wall thickness, weight of empty

gallbladder and consistency of bile were directly proportional, but indirectly proportional to volume of bile (Table 1). Acetic acid fixation exposed lymphoid follicles in maximum number of gallbladders. A striking feature of this study was that in females, group II & III had more overall total mean lymphoid follicle than males (Table-2). All the Gall bladder in the group III exhibited lymphoid aggregation. The density of lymphoid follicles in gall bladder increased from body (80.5%) to neck (85.4%) to fundus (96.3%).

Table 1 · Physical characters of gall bladder and bile

Group	Thickness of GB wall	Weight (gms)	Characters of bile			
			Colour	Volume (ml)	Consistency	pH
I	Thin and transparent	2.09	Dark green	6.8	Serous	6.8
II	Moderately thick	2.20	Golden brown	4.7	Slimy	6.0
III	Thick	2.24	Yellow	1.3	Highly viscous (Biliary mud)	6.3

Out of a total number of 105 gall bladders included in the study 78.09% have been positive for grossly visible lymphoid follicles. However the absence of such lymphoid aggregation does not rule out the probable existence of microscopically scattered lymphoid cells (Chandrasekar *et al.*, 1992 b).

The thickness of the Gallbladder was positively correlated to its weight and negatively correlated to volume of bile. Especially in all the Gallbladders of group III

the lymphoid follicles were not only easily discernible, but were also density distributed. The reason attributable to higher follicle density might be probably due to the active chronic immune response to the highly viscous yellowish bile - Biliary mud (Cardell, 1978).

Gallbladder associated lymphoid aggregations were distributed along neck, body, and fundus. The maximum number of gallbladders revealed follicles in the fundus region which might be a consequence of

antigen escaping from the liver (Chandrasekar *et al.*, 1992a) to the most dependant part of the gallbladder.

Sex difference has been observed in the Group II & III, where the females exhibited greater number of lymphoid follicles than the males, which might principally be due to the stimulation of the local mucosal immune system in the gallbladder. The gallbladders were collected irrespective of cyclic or pregnant females. Estrogen contributes to

certain extent towards the formation of cholelithiasis and cholecystitis by altering respective bile constituents and also high plasma progesterone levels in the third trimester of pregnancy has been found to impair gallbladder response to cholecystokinin leading to abnormal contractility and reduced motility of gallbladder resulting in biliary stasis (Kecskemeti, 1985) evoking strong local immune response in the form of grossly visible aggregated lymphoid follicles.

Table 2 Distribution of lymphoid follicles in gall bladder

Regions of Gb and sex	Group I		Group II		Group III	
	% of Gb with Lymphoid follicles	No. of lymphoid follicle Mean (Range)	% of Gb with follicles	No. of lymphoid follicles Mean (Range)	% of Gb with Follicles	No. of lymphoid follicles Mean (Range)
<b>Neck</b>						
Male	42.9	20.2 (6-31)	52	21 (12-42)	100	26.28 (6-53)
Female	50	24.4 (13-43)	65	24 (7-49)	100	47.69 (19-74)
<b>Body</b>						
Male	42.9	41 (17-116)	43.5	32.9 (13-59)	100	41.17 (13-95)
Female	40	38.75 (27-49)	60	50.25 (7-153)	100	107.8 (36-271)
<b>Fundus</b>						
Male	57.1	32.67 (13-63)	65.2	35.25 (8-79)	100	33.7 (13-73)
Female	70	23.75 (9-39)	70	65.29 (12-127)	100	101.22 (52-171)
<b>Overall Total</b>						
Male	61.9	73.46 (13-185)	73.9	65.29 (12-127)	100	101.22 (52-171)
Female	70	70.42 (9-134)	70	98.42 (27-227)	100	216.46 (103-413)

Frequent exposure of gallbladder mucosa to the heavy antigenic load especially in ruminants from liver and intestine, and the corrosive action of bile necessitates the existence of local immune system. Further detailed study can exploit the functional importance of this unique GbALT and its role in hepatic and gallbladder associated disorders.

### Summary

Gallbladder associated lymphoid tissue was studied in 105 slaughter house specimens from Madras Red sheep. Number of lymphoid follicles were more in females and the density was more in the fundus of gall bladder.

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