REVIEW OF LITERATURE
Strictly speaking, there exists very scanty literature on the subject under review. Lymphadenitis, be in frank clinical illness or in subclinical infection in apparently healthy animals, received practically little attention as a subject itself and dealt as a part and parcel of the pathological studies of the disease process by any worker either in this country or abroad. However, in course of disease investigation or studies on isolation of particular bacterial agent many workers have come across agents involved in lymphnode infection and these are reviewed to have an idea on the agents likely to find in lymphnodes of sheep and goats.

1. Corynebacterium ovis and other Diptheriodes:

Corynebacterium ovis is a notorious organism responsible for causing caseous lymphadenitis in sheep (Gaiger and Davies, 1955; Nieberle and Cohrs, 1966; Jubb and Kennedy, 1970; Smith, Jones and Hunt, 1972).

Lamichow (1954) studied an enzootic attack of Corynebacterium ovis infection in sheep in Siberia and found that lymphnodes of the head-region were mostly affected and the morbidity rate is 10% to 50%.
Hanko and Otterlin (1955) recorded necrosing lymphadenitis in cases of diphtheroid and ulcerative enteritis in sheep and goats in Sweden. It is presumed that such agents might have been isolated from mesenteric lymphnodes too.

Dhanda and Singh (1955) recorded an outbreak of Corynebacterium ovis infection in goats showing abscesses in the superficial lymphnodes around the throat.

Seedon (1965) thoroughly studied caseous lymphadenitis in sheep in Australia and he opined that the mode of transmission was due to contamination of shearing and other superficial wounds with Corynebacterium ovis from polluted environment.

In U.S.A. the percentage of Corynebacterium ovis infection were found to be 0.13% of entire carcase and 0.84% of parts of carcases during 1967-71 in slaughtered sheep.

Ramachandran and Sharma (1969) suggested occurrence of 27.1% of Corynebacterial pneumonia in goats in India. Their project was to study pneumonia causing agents and it would not be unwise to expect such agents from mediastinal lymphnodes of pneumonic animals.

Same view holds true for Sarkar and Bhattacharyya (1975) who isolated Corynebacterium ovis from acute pneumonia cases of Black Bengal goats in Calcutta.
2. *Salmonella* spp.

Although there are records of isolation of various serotypes of *Salmonella* from sheep and goats (Hopely and Wilson & Miles 1975; Buxton and Fraser, 1977), but Khera (1968) has aptly pointed out the rare incidence of Salmonellosis in these species. However, although a little bit out of place, it may be stated that *Salmonella* serotypes including *S. aberdeen*, *S. colombo*, *S. typhimurium* were isolated from sheep and goats in India (Sharma and Singh, 1963; Nath et al., 1966).

Salmonellar dysentery arising commonly due to *S. typhimurium* as contamination of feed and water are involved in man, poultry and sheep (Aserkoff et al. 1970).

3. *Mycobacterium bovis*, *Mycobacterium avium* and *Mycobacterium tuberculosis*:

Koch (1884) first recorded caseation of bronchial lymphnodes in a goat with pulmonary tuberculosis.

Iyer (1932) detected tuberculosis in 6 out of 943 goats examined in India. It is strongly probable that lymphnodes were involved in such cases.
Other records like that of Iyer (1932) stated only about detection of Mycobacterium from sheep and goats without particular mention about lymphadenitis (Craig and Davies, 1938; Nanda and Gopal Singh, 1943; Mohan, 1950). It appears from the records that Mycobacterium bovis was involved in such cases.

Soliman et al. (1953) presented the results of his tuberculin testing in goats followed by postmortem examination, the gross lesions indicated tuberculosis of intestinal origin, which points out the more possibility of isolation of the organism from mesenteric lymphnodes.

Robinson (1955) conducted a transmission experiment with Mycobacterium bovis and Mycobacterium tuberculosis inoculated orally to 5 sheep and 5 goats and found no lesion in Mycobacterium tuberculosis inoculation, but recorded tubercles in 4 of the 5 sheep with Mycobacterium bovis inoculation.

Francis (1958) estimated that the percentage of types of tubercle bacilli isolated from naturally infected goats are 97.9%, 0%, 2.1% and 0% for bovine, human, avian and atypical types respectively and from naturally infected sheep are 99.6%, 0%, 0.4% and 0% for bovine, human, avian and atypical types respectively.
Sharma and Dwivedi (1978) recorded tuberculosis lesions in the lung and pulmonary lymphnodes of 32 sheep and 104 goats in natural divisions of Uttar Pradesh.

4. *Mycobacterium paratuberculosis* (Johnes Disease Bacillus):

Mesenteric lymphnode involvement with *Mycobacterium paratuberculosis* in sheep and goats has been recorded in literature. Dieter (1938) observed that characteristic mucosal folding and intestinal lesions were usually absent in sheep.

Lall (1952-56) and Rajya and Singh (1961) detected Johnes's Disease bacillus involvement in Indian goats and sheep respectively. Lymphadenitis affecting the same of mesenteric region together with intestinal lesions were described by the both group of workers.

Kluge et al (1968) experimentally inoculated the virulent cultures into 3 week old lambs and established the typical lesions in intestines and other organs.

5. Viruses:

Though some virus diseases like Swine-fever, Infectious Canine Hepatitis, Equine Infections Anaemia are involved in
causing lymphadenitis in pigs, dogs and horses respectively, there is very scanty information in literature of same involvement in sheep and goats.

Brandly and Jungherr (1964) recorded rinderpest virus infection in sheep.

Buxton and Fraser (1977) described a Rinderpest like disease in sheep and goats known as the virus of "Peste des petits ruminants" (PPR) causing lymphadenitis in West Africa. They opined it as a strain of Rinderpest virus adapted in sheep and goats.

6. Parasites:

Various parasites may be lodged in the lymphnodes either in larval form or in course of migration and thus may cause lymphadenitis in sheep and goats.

Jubb and Kennedy (1970) and Thronton and Grfacey (1974) mentioned a big list of parasites which may lodge there accidentally or in course of migration. The larval form of lungworms (Muellerious sp., Protostrongylus sp.) and Strongylus sp., Oesophagostomum columbianum, Fasciola hepatica are likely to be found in mesenteric lymphnodes causing granulomatous
lymphadenitis. The nodes become enlarged, hard and irregular and are encapsulated with nodules.

7. **Mycotic agents**:

   Pulmonary mycosis are subclinical, insidious respiratory infection of sheep of goats. Few are of zoonotic importance.

   Vashistha (1982) described coccidioidomycosis as the primary disease of lymphnodes and lungs in sheep. There is inflammation along with mixed reaction of exudative and proliferative changes.

   Others are Aspergillosis, Blastomycosis, etc. and are recorded by several workers in sheep and goats (Jungerman and Schwartzman, 1972; Chauhan and Dwivedi, 1974).

8. **Neoplastic growths**:

   No accurate datum on the incidence of tumours of lymphatic system are available, because most of these animals are being slaughtered before they attain the cancer-age.

   Monlux et al. (1956) recorded the neoplasm in the sublumber, renal and internal iliac group of lymphnodes with variable involvements of adjacent tissues. They reported that
out of 13,000,000 sheep and lambs slaughtered, 34 were condemned because of leukaemia or lymphoma.

Cotchin (1960) identified 3 cases of tumours in goats as lymphomas.

Schalm (1965) reported a case of Malignant lymphoma in a goat.