

Gut Associated Lymphoid Tissue (Peyer's patches) in the intestine of the adult Bakerwali goat and non-descript goats of Jammu region

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Journal of Livestock Science (ISSN online 2277-6214) 14: 304-307

Received on 1/9/23; Accepted on 15/10/23; Published on 2/11/23

doi. 10.33259/JLivestSci.2023.304-307

Abstract

The present study was conducted on the intestine of six adult Bakerwali and non-descript goats from the Jammu region with the goal to locate the position of the Gut Associated Lymphoid Tissue (GALT). The gross distribution and structure of the lymphoid tissue varied between intestinal segments in both the breeds. The location of the lymphoid nodules was ante-mesenteric in both the breeds. Duodenum of both the breeds had small nodule like lymphoid tissue (Peyer's patches). The jejunum had the lymphoid tissue that was the most developed out of all the gut segments. Lymphoid tissues were oval-shaped and orientated with their long axis parallel to the long axis of the gut. The maximum width recorded as 1.32 cm, while the length was 4.42 cm. Like non-descript goats, the lymphoid tissues of Bakerwali goat were also elongated but shorter and thinner. Maximum width was found to be 0.98 cm, and length was 1.78 cm. Ileum of both Bakerwali and non-descript goats displayed prominent nodule-like lymphoid tissue. Large intestine of Bakerwali goat was devoid of any lymphoid tissue. The lymphoid tissues of nondescript goats resembled nodules, and some of the lymphoid tissues in the cecum took the shape of rounded tubercles with a depression in the centre.

Keywords: Bakerwali goat; gross location; intestine; lymphoid tissue

Introduction

An essential part of the digestive system is that it is vulnerable to numerous parasites and pathological antigens in the intestine. The intestine has lymphoid tissue, which contributes to immune response, in the form of nodules in the intestinal mucosa that serve as part of gut associated lymphoid tissue (GALT). The GALT of the intestine is crucial parts of the body's immune system that guard against infections and foreign antigens while providing tolerance for commensal bacteria and food antigens (Forchielli and Walker 2005). According to Cesta (2006), the GALT triggers an immunological response in regard to certain antigens found throughout the entire gut mucosal surface. The GALT is also crucial in the diagnosis and vaccination schedule of some diseases such as goat paratuberculosis caused by *Mycobacterium avium* (Munjal et al., 2005). Gross studies on the lymphoid tissue of the intestine have been conducted in farm animals (Liebler-Tenorio and Pabst 2006), calves (Yasuda et al. 2013) and goats (Gautam et al. 2013). Understanding the mechanics of digestion and immunity will be made easier with the aid of the anatomical research of the intestine in connection to GALT. Goats are important source of livelihood for the people living in the difficult terrains globally (Salvana et al 2021). Anatomy of several breeds of goats habituating difficult terrains eg Bakerwali have not been studied (Suri et al, 2022). Due to paucity of literature on the gross morphology of GALT in Bakerwali and non-descript goats, the present study has been planned.

Materials and methods

Small and large intestines of adult Bakerwali and non-descript goat irrespective of sex (N=06) were procured from local slaughter house immediately after slaughter. Intestines were washed thoroughly in running tap water, sliced at the mesenteric border and stored in 2% glacial acetic acid for 6–8 hours for visualization of the lymphoid tissue (Peyer's patches) on the intestinal mucosa (Gahlot 2017).

Results and discussion

The distribution and structure of the lymphoid tissue varied between intestinal segments in both the breeds. Both the breeds had ante-mesenteric lymphoid nodules, which was consistent with the findings made by Gahlot and Kumar (2018). According to earlier studies conducted on goats (Gautam et al. 2013), buffaloes (Alboghobeish and Nejat 1999) and Japanese black calves (Yasuda et al. 2013), numerous small lymphoid nodules were found on the mucosal surface of the small intestine.

Duodenum of both the breeds had small nodule like lymphoid tissue (Fig. 1). However, Alboghobeish and Nejat (1999) in buffalo and Gahlot and Kumar (2018) in goat did not find any Peyer's patches in the duodenum. However, according to Gautam et al. (2013), goats had Peyer's patches near the terminal part of the duodenum.

Out of all the gut segments, the jejunum possessed the lymphoid tissue that was the most developed (Fig. 2). The long axis of the lymphoid tissues, which were oval in shape, was parallel to the long axis of the gut in both the goat breeds under study (Fig. 2). The maximum width was 1.32 cm and the length was 4.42 cm. The lymphoid tissues of Bakerwali goats were elongated, but shorter and thinner than those of non-descript goats (Fig. 3). Maximum length was recorded as 1.78 cm and maximum breadth was found to be 0.98 cm. In contrast, a few very small patches were found in the middle of the jejunum of goats (Gautam et al. 2013) and buffaloes (Alboghobeish and Nejat 1999). However, Peyer's patches were more prevalent and larger in size in the caudal part of the jejunum in the native Assam goat as reported by Gautam et al. (2013).

The ileum of both Bakerwali and non-descript goats displayed prominent nodule-like lymphoid tissue (Fig. 4). In buffalo (Alboghobeish and Nejat 1999) and goat (Gahlot and Kumar 2018), the ileal Peyer's patch was found as a single continuous aggregation of lymphoid follicles which took the form of a continuous strip. Yasuda et al. (2006) compared the gut associated lymphoid tissue in calf and chicken and noticed two types of Peyer's patches in calf, namely the jejunal and ileal. As a central lymphoid organ, the Bursa of Fabricius could be compared to the ileal PP. While jejunal Peyer patches are a secondary lymphoid organ that contributes to the maturation of the local immune response, Peyer patches of the ileum act as a primary lymphoid organ for B cells. (Mutwiri et al. 1999 and Yasuda et al. 2006).

The large intestine of Bakerwali goat was devoid of any lymphoid tissue that could be seen grossly. On the other hand, the lymphoid tissues of non-descript goats were nodule-like, and some of the lymphoid tissues in the cecum took the shape of rounded tubercles with a depression in the centre (Fig. 5) which was similar to the observations made by Gahlot and Kumar (2018) in goat.

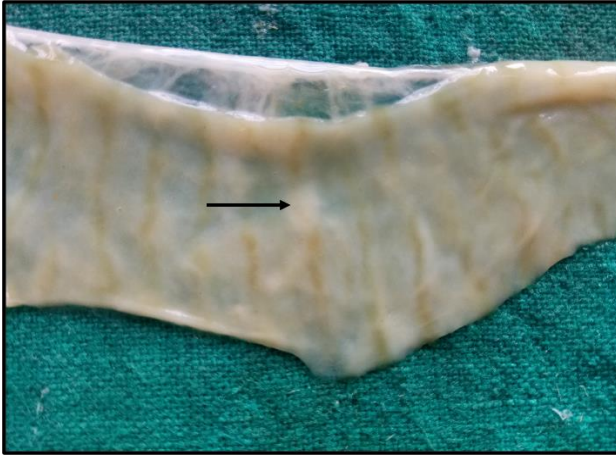


Fig. 1 Photograph showing nodule like lymphoid nodule (arrow) in the duodenum of non-descript goats

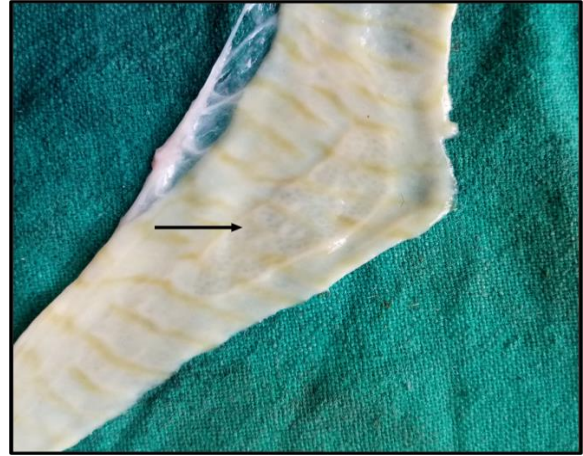


Fig. 2 Photograph showing well developed elongated lymphoid nodule (arrow) in the jejunum of non-descript goats

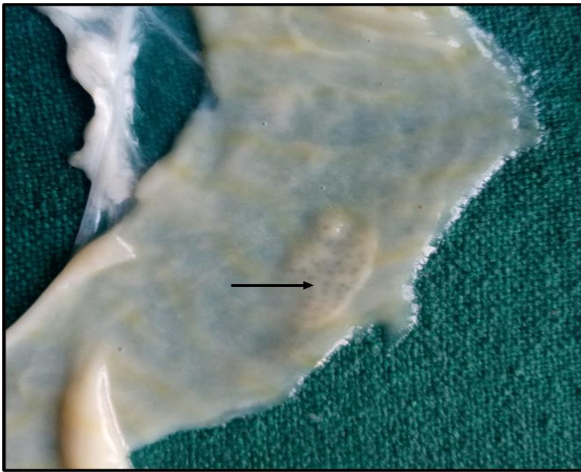


Fig. 3 Photograph showing elongated lymphoid nodule (arrow) in the jejunum of Bakerwali goats

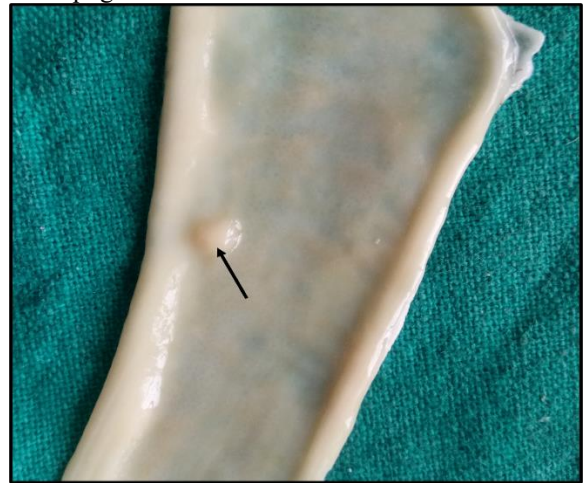


Fig. 4 Photograph showing nodule like lymphoid nodule (arrow) in the ileum of non-descript goats

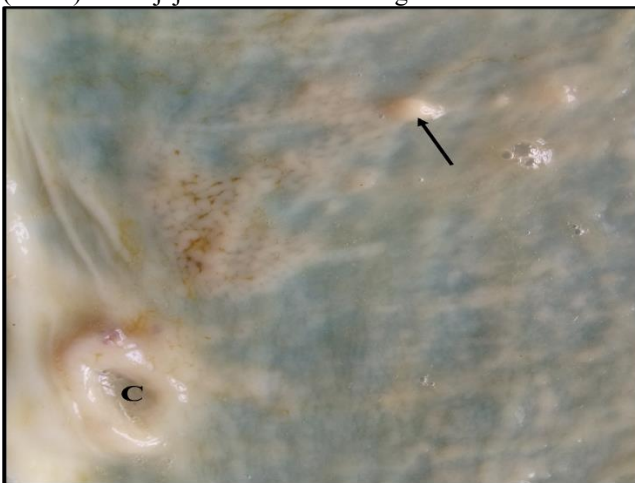


Fig. 5 Photograph showing nodule like lymphoid nodule (arrow) and few rounded tubercles with a depression in the centre (C) in the caecum of non-descript goats

Conclusion

The distribution and structure of the lymphoid tissue varied between intestinal segments in both the breeds. Out of all the gut segments, the jejunum possessed the lymphoid tissue that was most developed. The lymphoid tissues of Bakerwali goats were elongated, but shorter and thinner than those of non-descript goats. Large intestine of Bakerwali goat was devoid of any lymphoid tissue that could be seen grossly. The lymphoid tissues of non-descript goats resembled nodules, and some of the lymphoid tissues in the cecum took the shape of rounded tubercles with a depression in the centre.

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