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## Prevalence and classification of anaemia in goats in Bidar

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#### Abstract

The present study was undertaken to know the prevalence and classification of anaemia in goats presented to the Veterinary clinical complex, Veterinary College, Bidar over the period of August 2020 to July 2021. Detailed signalment, clinical examination and laboratory investigation were carried out to find the underlying aetiology of anaemia in goats. Anaemia was diagnosed and classified based on the clinical examination of mucus membrane and haemoglobin concentration. The overall prevalence of anaemia in goat in Bidar was found to be 36.65 per cent. Anaemia was highly prevalent in August month. Less than 6 months of age group goats were more Anaemic followed by 7-12 months, 25 months and above and least prevalence in 13-24 months age. Female goats were more Anaemic compared to males. Osmanabadi goats were more Anaemic followed by non-descript goats and other specific breeds. Anaemia was more prevalent in monsoon followed by winter, summer, and least in the post-monsoon season. The aetiological study revealed that ectoparasites were the primary cause followed by endoparasites, mixed parasites, enteric protozoa, nutritional deficiency, and the least was due to haemoprotozoa. Moderate anaemia was more prevalent compared to severe anaemia in goats.

**Keywords:** Prevalence, anaemia, classification, goat

#### Introduction

Anaemia is defined as condition caused by decrease in haemoglobin, or red blood cell count, which was clinically suggested by pale or paper white mucous membrane, weakness, head down condition, exercise intolerance, tachypnoea, tachycardia and in extreme case collapse (Dey, 2017) <sup>[5]</sup>. Gastro-intestinal parasitism is one of the major problems in India causing emaciation, anaemia, edema, weakness, diarrhoea and death. Higher occurrence has been reported in monsoon season and higher prevalence in young ones in comparison to adults (Singh *et al.* 2015) <sup>[23]</sup>. Severe infestation of ectoparasites is linked to anaemia in goats. Nutritional deficiency though uncommon, is also incremented as major underlying cause of anaemia in flock and is further aggravated by the non-supplementation of concentrates and mineral mixture in grazing goat results in deficiency of minerals and vitamins (Bhagure, 2002) <sup>[2]</sup>. Anumol (2011) <sup>[11]</sup> and Rajendra *et al.* (2021) <sup>[16]</sup> recorded aetiology for anaemia in goat includes endoparasites, ectoparasites, enteric protozoa, haemoprotozoa, nutritional deficiency and other causes. The present study was undertaken to know the prevalence and classification of anaemia in the goats presented to Veterinary clinical complex, Veterinary College, Bidar over the period of August 2020 to July 2021. The study was approved by Institutional Animal Ethics Committee (IAEC).

#### Materials and Methods

The present study was undertaken at Veterinary Clinical Complex (VCC), Veterinary College, Nandi Nagar (KVAFSU), Bidar over a period of August 2020 to September 2021 during which 1,904 goats were screened to know the aetiology prevalence and severity of anaemia in goats. Detailed Signalment of species, breed, sex, age, and body weight were recorded from each goat including the history of grazing, deworming, dipping, vaccination, feed and water intake, regurgitation, duration of illness, pregnancy status, kidding status, fever, pain and rumination. Detailed clinical examination was done with the recording of parameters such as conjunctival mucus membrane, oral mucosa, vaginal mucosa, body condition, hair coat, recumbency, hair loss, exercise intolerance, soiled hind quarters, presence of external parasites and their severity, presence of flea dirt and lice nits. Rectal temperature, heart rate and respiration rate were recorded as per the standard procedures recommended by Kelly (1984) <sup>[11]</sup>.

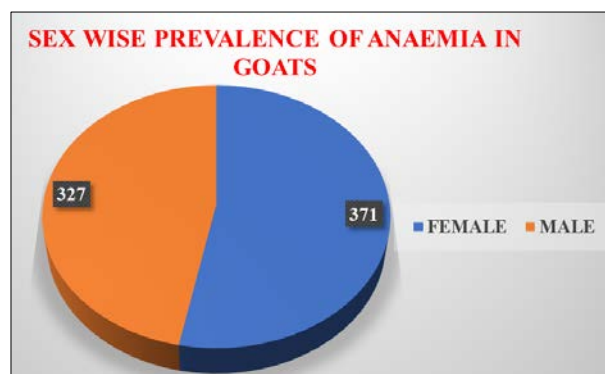
Faecal samples examination will be done by parasitological techniques and methods as recommended by Soulesby, (1982) [26] and results were recorded on clinical case sheet based on the morphology of ova of helminths and oocyst of enteric protozoa. Blood smear examination was done as per the standard procedures recommended by Soulesby, (1982) [26]. After proper restraining of goat, 2 mL blood was aseptically collected in EDTA (Ethylene diamine tetra acetic acid Na<sub>2</sub>EDTA) vials (CML BIO-TECH (P) LTD INDIA, Safelab® K2 EDTA) for the estimation of complete blood count from jugular vein. Goats with haemoglobin value below 8 g/dL were considered as anaemic.

**Results and Discussion**

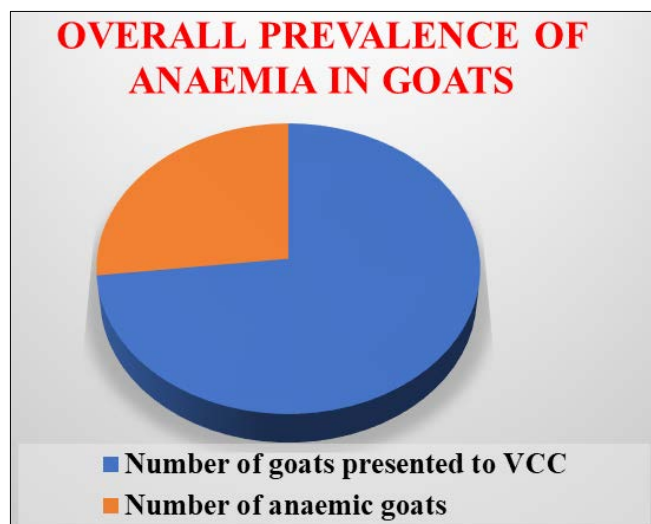
In the present study, out of 1,904 goats screened 698 goats were clinically anaemic, so the overall prevalence of anaemia in goat in Bidar was found to be 36.65 per cent. The results of current study were found to be closely related with 31.76 per cent occurrence in Iraq as reported by Hussain and Salman (2012) [8].



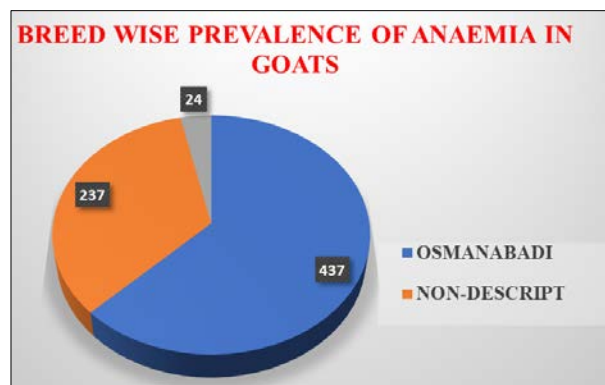
**Fig 3:** Showing age group wise prevalence of anaemia in goats in Bidar



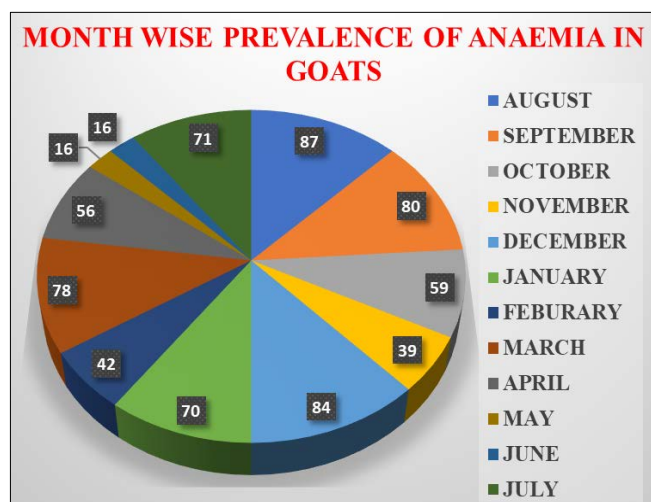
**Fig 4:** Showing sex wise prevalence of anaemia in goats in Bidar



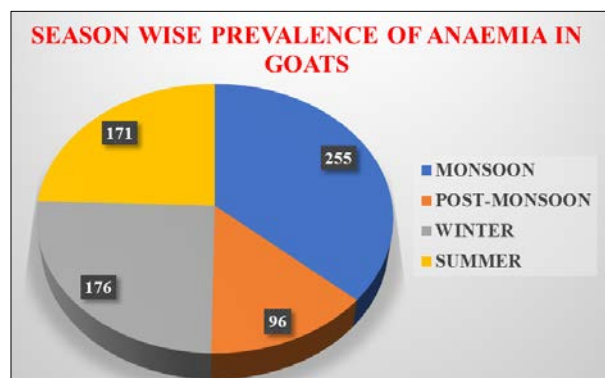
**Fig 1:** Showing the overall prevalence of anaemia in goats in Bidar



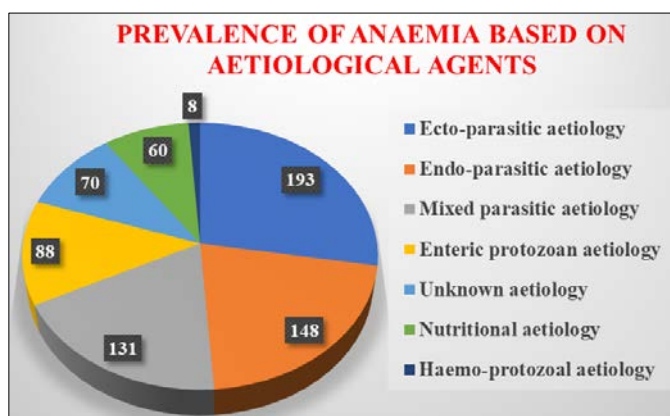
**Fig 5:** Showing breed wise prevalence of anaemia in goats in Bidar



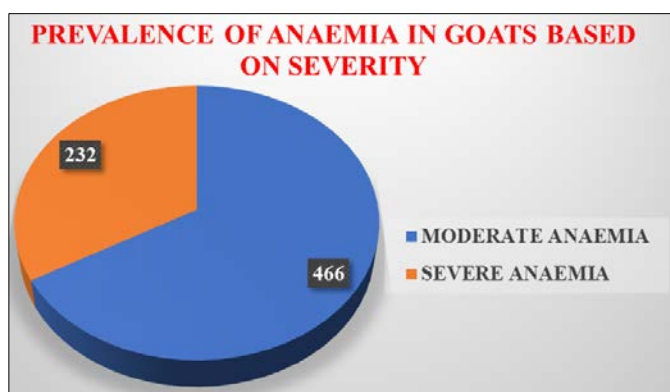
**Fig 2:** Showing month wise prevalence of anaemia in goats in Bidar



**Fig 6:** Showing season wise prevalence of anaemia in goats in Bidar



**Fig 7:** Showing prevalence of anaemia in goats based on aetiological agents in Bidar



**Fig 8:** Showing prevalence of anaemia in goats based on the severity in Bidar

Several researchers have attributed various factors to the occurrence of anaemia in goats including Agro-climatic conditions, animal husbandry practices and pasture management which determine the parasitic disease incidence and severity in grazing animals. Inappropriate feeding management (Shalini, 2011) [21], extensive rearing system (Bhagure, 2002) [2], favourable climate for parasites, poor management, lack of awareness to farmers and poor animal health extension services (Anumol, 2011) [1], overcrowding, early weaning, poorly developed immune system, dirty and or wet shed, and unclean water (Pavlovic *et al.* 2013) [14] have been reported as predisposing factors for the occurrence of anaemia in goats. Bidar district has longitude 76°42' E, latitude 17° 35' N and mean above-sea level height 715 meter with warm and temperate climate (Bidar district, 2021). Lack of awareness among farmers, inappropriate and underdosing of deworming agents could be attributed to the moderate prevalence of anaemia in goats in and around Bidar.

The month wise prevalence of anaemia in goats in Bidar was recorded highest in the month of August (46.27%, 87/188) followed by December (45.40%, 84/185), July (42.26%, 71/168), January (40.46%, 70/173), September (38.09%, 80/210), March (35.29%, 78/221), February (31.81%, 42/132), October (29.94%, 59/197), November (29.54%, 39/132), May (28.57%, 16/56), April (24.88%, 56/155) and least prevalence was observed in June (18.39%, 16/87) month. Highest prevalence of anaemia in goats during August, which is a part of the monsoon season in Bidar corroborates earlier reports of Soulsby (1982) [26] and Velusamy *et al.* (2015) [27] who have attributed high rainfall

and humidity favourable for higher parasitic infestation.

The highest prevalence was recorded in less than 6 months of age (51.43%, 359/698) followed by 7-12 months (21.50%, 150/698), 25 months and above (14.32%, 100/698) and least prevalent in 13-24 months age (12.75%, 89/698). The current findings were in accordance with Anumol, (2011) [1], Mohanambal *et al.* (2018) [13] and Rajendra *et al.* (2021) [16] who reported a higher prevalence of anaemia in goats of less than 6 months age group. Kids are susceptible to endecto-parasitic infection (Smith and Sherman, 2009 and Lata *et al.* 2017) [25, 12]. Exclusive feeding of doe milk to kids has been reported to be the cause of iron deficiency anaemia in kids as milk is a poor source of iron (Smith and Sherman, 2009 and Shalini, 2011) [25, 21]. The lowest prevalence of anaemia in goats was found in 13-24 months age group in the present study, similar findings reported by Mohanambal *et al.* (2018) [13], the possibility of development of immunity to parasitic infection to adult goats.

Among 698 clinical Anaemic goats, 53.16 per cent were female and 46.84 per cent were males suggesting of marginally higher occurrence in female goats as compared to males. Similar findings were reported by Ramesh (1998) [18], Rajkhova and Hazarika (2002) [17], Singh *et al.* (2010) [24], Goklaney (2011) [6] and Bhatane, (2018) [3]. High proportion density of female goat in Bidar (Livestock Census Report, 2019). Pregnancy and stress of lactation (Goklaney, 2011) [6], were been proposed as predisposing factors for more susceptibility of female goats over male goats for anaemia.

The highest prevalence was found in Osmanabadi breed goats (62.60%, 437/698) followed by non-descript goats (33.95%, 237/698) and least prevalence was observed in other specific breeds (3.45%, 24/698) including Beetle, Sirohi, Jamnapari and Sojat breed goats. Present study findings were found to be in accordance with Bhagure, (2002) [2] and Bhatane (2018) [3]. Preference for the Osmanabadi breed of goats by the farmers of Bidar due to overall sturdiness and better flock attitude could be attributed to the higher occurrence of anaemia compared to non-descript and other specific breeds in and around Bidar. Earlier reports (Singh *et al.* 2015) [23] suggesting the resistance of native goats to parasitic infestation and better managerial practices for specific breed of goats support the findings of the present investigation in lower prevalence of anaemia in non-descript and other specific breeds of goats.

The highest prevalence was observed in monsoon (36.53%, 255/698) followed by winter (25.22%, 176/698), summer (24.50%, 171/698), and least prevalence recorded in post-monsoon (13.75%, 96/698) season. Present study findings are in accordance with Sarkar (1989) [20] in west Bengal. High temperature, rainfall and relative humidity during monsoon were considered as predisposing factors for parasitic infection (Hafiz and Talukdar, 2013) [8] in goats. Rainfall and temperature favour the development of infective stages of parasites which gradually builds up the adult worm population in grazing goats (Velusamy *et al.* 2015) [27]. Support the findings of the present investigation. Lower prevalence during winter could be due to reduced mobility and grazing hours, thereby reducing the chance of contact between the host and parasite (Lata *et al.* 2017) [12].

The present study revealed that anaemia in goats was mainly due to ectoparasitic infestation (27.65%, 193/698) followed by endo-parasitic infection (21.20%, 148/698), mixed parasitic infection (18.80%, 131/698), enteric protozoal

infection (12.60%, 88/698), unknown aetiology (10.02%, 70/698), nutritional aetiology (8.59%, 60/698) and least was observed in haemo- protozoal infection (1.14%, 8/698). Similar findings were reported by Mohanambal *et al.* (2018)<sup>[13]</sup> and Rajendra *et al.* (2021)<sup>[16]</sup>. Ectoparasites, endo parasites, mixed parasites and nutritional deficiency were the primary causes of anaemia in goats (Bhagure, 2002)<sup>[2]</sup>. Anaemia due to unknown causes will obey with the hypothesis of Anumol (2011)<sup>[1]</sup> and Rajendra *et al.* (2021)<sup>[16]</sup>. Pregnant and young anaemic goats without having any parasitic infestation were classified as physiological anaemia due to increased demand of iron in growing foetus in pregnant goats and milk being a poor source of iron and copper and both conditions together were classified as nutritional anaemia as earlier reported by Bhagure, (2002)<sup>[2]</sup> and Goklaney *et al.* (2019)<sup>[7]</sup>. Velusamy *et al.* (2015)<sup>[27]</sup> and Jayalakshmi and Premalata (2020)<sup>[10]</sup> diagnosed anaemia due to haemo protozoal aetiology. Sporadic infection of Anaplasmosis is considered as the disease of minor economic importance in goats (Smith and Sherman, 2009)<sup>[25]</sup>.

Anaemic goats with haemoglobin value up to 5 g/dL and with paper white conjunctival mucus membrane were considered as severely anaemic and those with haemoglobin value 5-8 g/dL pale pink conjunctival mucus membrane and were considered as moderately anaemic (Santiago *et al.* 1975 and Mohanambal *et al.* 2018)<sup>[19, 13]</sup>. As per above classification, moderate anaemia (66.76%, 466/698) was more prevalent compared to severe anaemia (33.24%, 232/698) in Bidar. Oral haematinics mixture containing copper, cobalt and iron or intramuscular iron dextran were the line of treatment in moderately anaemic goats whereas blood transfusion is essential for severely anaemic goats (Sharma *et al.* 2009)<sup>[22]</sup>. So, the classification is essential for the appropriate therapeutic protocol in anaemic goats.

Moderate prevalence of anaemia in goats recorded in Bidar. August month, less than 6 months age group, female goats, Osmanabadi breed, moderate form of anaemia, monsoon season, and external parasites were the epidemiological factors for the moderate prevalence of anaemia in goats in Bidar. Diagnosis of anaemia is an important step to know the exact aetiology of anaemia and helps in symptomatic therapy in goats. Endectoparasitemia was the foremost cause of anaemia in goats in Bidar and underlined the importance of regular dipping and deworming.

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