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Prevalence and bacterial infection associated with subclinical mastitis in Gir cows

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Abstract
In present investigation, fore-milk samples of 188 quarters from 47 apparently healthy Gir cows of different parity and lactation were collected and subjected to modified California mastitis test, total somatic cell count and culture examination. Prevalence of subclinical mastitis in Gir cows was 26.06 percent (49/188) and 40.42 percent (19/47) on quarter and animal basis, respectively by cultural examination. Lactation number-wise prevalence was found highest in IIIrd lactation (55.55 percent) on animal basis. Staphylococci was most prevalent organism (49.09 percent) followed by Streptococci (23.64 percent), *E. coli* (14.55 percent), *Corynebacterium* spp. (7.27 percent) and *Bacillus* Spp. (5.45 percent).

Keywords: Prevalence, bacterial infection, subclinical mastitis, Gir cows

Introduction
India ranks first in the milk production and possesses the largest bovine population in the World. Milk production in India has increased to 146.3 million tonnes during 2014-15. As per the 19th livestock census (2012) [10], Rajasthan state has 13.3 million cattle which is 6.98 percent of total cattle population of the country. Udaipur district ranks first in the state in total cattle population and population of indigenous cattle. Gir is one of the most popular indigenous milch breed of cows.

Mastitis is one of the most economically important diseases of dairy cows. Subclinical mastitis is more prevalent and causes major losses (Sharma *et al.*, 2005) [17]. Annual economic losses due to subclinical mastitis in India have been estimated to be Rs. 4151.16 crores (Bansal and Gupta, 2009) [5]. Subclinical mastitis is difficult to detect and usually proceeds in to the clinical form. It reduces milk production and adversely affects milk quality (Seegers *et al.*, 2003) [16]. Once mastitis is set up clinically in animals, it is very difficult to treat because nutritional contents of milk provide favourable environment to the pathogenic organisms (Sharma *et al.*, 2006) [18]. Due to huge impact of subclinical mastitis on health and production, it is imperative to know the prevalence and bacterial infection associated with subclinical mastitis in Gir cows.

Materials and Methods
In present investigation, fore-milk samples of 188 quarters from 47 apparently healthy Gir cows of different parity and lactation were collected from August 20016 to November 2016 and subjected to modified California mastitis test, total somatic cell count and culture examination. Each apparently normal milk sample was screened for the presence of bacteria by cultivation, isolation and identification using standard procedures as per Cowan and Steel (1975) [6]. The total somatic cell count (TSCC) of milk samples was carried out as described by Prescott and Breed (1910) [12] and california mastitis test (CMT) as per Schalm and Noorlander (1957) [15]. The statistical analysis of the data was done using statistical method described by Snedecor and Cochran (1994) [21].

Results and Discussion
The prevalence of subclinical mastitis in Gir cows was 27.13 percent (51/188) on quarter basis in the present study based on both Modified california mastitis test and total somatic cell count. The prevalence of subclinical mastitis in Gir cows on the basis of cultural examination was 26.06 percent (49/188) on quarter basis. Further, the prevalence of subclinical mastitis in Gir cows on animal basis was 42.55 percent (20/47) based on modified California mastitis test and total somatic cell count.

Whereas, prevalence of subclinical mastitis in Gir cows on animal basis by cultured examination was recorded as 40.42 percent (19/47). Almost similar results were reported by El-Sagheer Ahmed *et al.* (1992) [1], Shrirame *et al.* (1997) [20], Saidi *et al.* (2013) [14], and Banger *et al.* (2015) [4].

The 2 samples which were found positive with Modified California mastitis and total somatic cell count had no pathogenic bacteria, attempted for culture in present study but these samples had modified california mastitis test as +1 and total somatic cell count more than 0.5 million/ml of milk. It might be possible that these 2 samples were having anaerobes, mycoplasma or fungi which were not attempt to culture in the present study.

Lactation number-wise prevalence of subclinical mastitis in Gir cows was highest (30.55 percent) in III lactation on quarter basis followed by IV lactation (27.27), I lactation (26.92), II, V and VI lactation (25 percent each). On animal basis, the lactation number wise prevalence was found highest in III lactation (55.55 percent), II and VI Lactation (50 percent each), I lactation (38.46 percent), VI lactation (37.5 percent) and IV lactation (36.36 percent). It was observed that the prevalence of subclinical mastitis in Gir cows had no relation to lactation number on quarter basis. Similar findings have also been reported by Islam *et al.* (2011) [8].

The high prevalence of subclinical mastitis in 3rd lactation in present investigation might be because of increased milk yield and decreased immunity in the cows. The prevalence of subclinical mastitis varies from farm to farm, depending upon the management system and hygienic and sanitary measures taken during milking.

Out of 188 milk samples, 49 were found positive for pathogenic bacteria on cultural examination. Out of these 49 bacteriologically positive samples 12.24 percent (6/47) had mixed infection. In mixed infection, combination of two types of bacteria was found. The bacteria identified in single infection included Staphylococci, Streptococci, *E. coli*, *Corynebacterium* spp. and Bacilli. Whereas the bacteria present in mixed infection were Staphylococci in combination with Streptococci, Staphylococci in combination with *E. coli*, Staphylococci in combination with Bacilli, Staphylococci in combination with *Corynebacterium* spp. and Streptococci in combination with *E. coli.*

Staphylococci, streptococci, *E. coli*, *Corynebacterium* spp. and bacilli alone was observed in 44.89 percent (22 samples), 22.4 percent (10 samples), 12.24 percent (6 samples), 6.12 percent (3 samples) and 4.08 percent (2 samples) samples, respectively.

Among the different bacterial isolates, staphylococci was found as most prevalent organism accounting for 49.09 percent (27/55), followed by streptococci as 23.64 percent (13/55), *E. coli* as 14.55 percent (8/55), *Corynebacterium* spp. as 7.27 percent (4/55) and bacilli as 5.45 percent (3/55).

Almost similar finding has also been reported by Rawat *et al.* (2011) [13], Sharma *et al.* (2012) [19], Ayano *et al.* (2013) [3], Katsande *et al.* (2013) [9], Abrahmsen *et al.* (2014) [1], Marimuthu *et al.* (2014) [11] and Alekish (2015) [2]. They found higher prevalence of staphylococci as compared to other pathogens in subclinical mastitis in cows.

Conclusion

Prevalence of subclinical mastitis in Gir cows was 26.06 percent and 40.42 percent on quarter and animal basis, respectively by cultural examination. Lactation number-wise prevalence was found highest in IIIrd lactation. Staphylococci was most prevalent organism followed by Streptococci, *E.coli*, *Corynebacterium* spp. and *Bacillus* Spp.

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