



Prevalence of omasal and abomasal disorders in cattle and buffaloes: A retrospective study

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The anatomical location of omasum and abomasum makes them inaccessible to common clinical examination. The omasum and abomasum are primarily affected with diseases such as omasal impaction, abomasal displacement, abomasal ulceration, abomasal impaction and late pregnancy indigestion (LPI). The impactions are manifested by a pattern of similar signs such as anorexia, dullness, and abdominal pain and loss of defecation, etc (Hussain *et al.* 2013) and are clinically difficult to differentiate from each other. However, the clinical signs of other disorders are somewhat unique and clinical diagnosis is possible most of the times. The economic losses of these disorders can be huge due to animal mortality and loss of production.

With the changes in the animal production, climate and feeding practices, there is emergence of omasal and abomasal disorders in cattle and buffaloes. These cases are on rise and in future may become one of the major problems of cattle and buffalo in India. Although, the epidemiology and prevalence of bovine gastrointestinal disorders has been studied in India (Hussain and Uppal 2015, Sharma *et al.* 2015), the diseases of omasum and abomasum have received least attention from Indian scientists. In India, the diagnostic protocols for these disorders are still in infancy and lack of suitable epidemiological data of an area further adds to problem. Abroad, various studies have been undertaken on abomasal displacement and few on abomasal ulceration. Epidemiological studies of these conditions seem to have received little attention especially from Indian workers and as a result there is no comprehensive information on prevalence of these in cattle and buffaloes.

In India, a recent study on slaughtered buffaloes has revealed a high prevalence of type 1 abomasal ulcers in buffaloes (Hussain *et al.* 2019). However, the clinical prevalence of abomasal ulcers and other disorders of omasum and abomasum are still to be documented. This study was thus designed to document the prevalence and

some epidemiological features of omasal and abomasal disorders in cattle and buffaloes in the state of Punjab.

This was a retrospective study on cattle and buffaloes presented at Large Animal Medicine Unit of Large Animal Clinics of Veterinary Teaching Hospital, GADVASU, Ludhiana, for year 2013. The available outdoor patient (OPD) cards of clinical cases of cattle and buffaloes were screened to record total number of cases of omasal and abomasal disorders, species and month of presentation. In total, OPD cards of 1025 cattle and 1003 buffaloes were studied. All the animals were > 1 year of age. The diagnosis of the diseases was based on the results of clinical examination, laboratory analysis, radiography, ultrasonography, laparo-rumenotomy and/or post-mortem examination. The cattle and buffaloes underwent a thorough clinical examination as described earlier (Hussain *et al.* 2013, 2014). The general health condition had been evaluated by determining demeanour and muzzle, skin elasticity, position of the eyes in relation to the sockets and body temperature. The rumen had been assessed for degree of fill, number of contractions and consistency of contents. Swinging and percussion auscultation as well as a rectal examination were also carried out.

The climate of Punjab consists of three main seasons and two transitional seasons. So, in order to observe any effect of season on the prevalence, the year was divided into five seasons, viz. Summer/hot seasons (April to June), rainy/monsoon season (July to September), post monsoon season (October to November), Winter/cold season (December-February) and pre-summer season (March).

Statistical analysis: The significance of prevalence between different groups was determined using χ^2 - test. The differences were regarded significant if p-value was <0.05.

To the best of our knowledge, this is the first retrospective study to document prevalence of omasal and abomasal diseases in cattle and buffaloes, especially from India and particularly in buffaloes. Out of 2028 animals (1025 cattle and 1003 buffaloes), 136 animals (68 cattle and 68 buffaloes) were suffering from omasal and abomasal disorders (Table 1). The overall prevalence of omasal

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Table 1. Prevalence of omasal and abomasal disorders in cattle and buffaloes

Season	Cattle		Buffalo		Overall	
	Total no. of cases	No. of omasal abomasal disorders	Total no. of cases	No. of omasal abomasal disorders	Total no. of cases	No. of omasal abomasal disorders
Summer	300	27 (9.0)	259	19 (7.34)	559	46(8.23)
Monsoon	310	19 (6.13)	321	18 (5.61)	631	37 (5.86)
Post-monsoon	125	11 (8.80)	143	12 (8.39)	268	23 (8.58)
Winter	194	10 (5.15)	220	17 (7.73)	414	27 (6.52)
Pre-summer	96	1 (1.04)	60	2 (3.33)	156	3 (1.92)
Overall	1025	68 (6.63)	1003	68 (6.78)	2028	136 (6.71)

Number in brackets represents per cent prevalence.

and abomasal disorders was 6.71% and prevalence was almost similar for cattle (6.63%) and buffaloes (6.78%). The overall prevalence did not differ significantly ($p < 0.05$) between cattle and buffaloes. The prevalence reported here may be actually higher or lower because the OPD cards of all the registered cases were not available for retrospective evaluation. Further this reported prevalence should not be extrapolated to general population of cattle and buffaloes because this prevalence is of a referral hospital but it may hold good for other Veterinary Hospitals of the Punjab State.

The documented omasal disorders in literature are omasal impaction and omasal dilatation while abomasal disorders include abomasal displacement, ulcers, impaction, bloat and late pregnancy indigestion (Constable *et al.* 2017). The primary omasal impaction is usually associated with feeding of the poor quality roughages especially wheat straw (Turkar and Uppal 2007, Hussain *et al.* 2013, 2021) while secondary omasal impaction can occur in many gastrointestinal disorders like traumatic reticuloperitonitis/pericarditis, intestinal obstruction, peritonitis, abomasal ulcers, diaphragmatic hernia, etc (Hussain *et al.* 2015b, 2021). The abomasal impaction can be dietary in origin but usually occurs as secondary to traumatic reticuloperitonitis (Ashcroft 1983). In addition to TRP, abomasal impaction has been reported secondary to traumatic pericarditis, abomasal ulceration, intestinal obstruction and even cases of dystocia (Hussain *et al.* 2021). Although the exact etiology of primary abomasal ulcers is unclear, stress, abomasal hyperacidity, mechanical abrasions are considered as the possible causes (Constable *et al.* 2017). In addition to a primary disease, abomasal ulcers can also occur secondary to other diseases like abomasal lymphoma

(Constable *et al.* 2017).

Age, breed and sex distribution: The age distributions for these cattle and buffaloes were not different from those of the population of hospitalized bovines in general. No bulls had ulcers. Most cases of cattle were Holsteins Fresian Cross and buffaloes were of Murrah breed or its cross, but that does not suggest a breed predisposition because over 90% of the clinic population was of the same breeds.

The 136 omasal and abomasal disorders comprised of omasal impaction (39), abomasal ulceration (74), abomasal impaction (7), abomasal bloat (1) and LPI (15) (Table 2). So, prevalence of omasal impaction was 1.92% (39/2028) and that of abomasal ulceration was 3.3% (67/2028). In a study on primary omasal impaction, the prevalence has been reported to be 4.10%, but the authors have stated that this prevalence may be actually higher than in the general population of cows and buffaloes, owing to inclusion of only those cows and buffaloes that were confirmed to have gastrointestinal dysfunction (Hussain *et al.* 2013).

With the exception of isolated clinical case reports on abomasal ulcers from India (Hussain *et al.* 2011, 2017), the epidemiologic information about this disease has been derived from a recent abattoir study where a high prevalence of type 1 abomasal ulcers has been reported in buffaloes (Hussain *et al.* 2019).

Although, type 1 abomasal ulcers are clinically difficult to diagnose, they can be important cause of low production (Hussain *et al.* 2019). The faecal occult blood test based occurrence of type 1 abomasal ulceration in healthy cattle and buffaloes has been reported to be 0.92% and 0.69%, respectively, with an overall occurrence of 0.83% (Hussain *et al.* 2015a). Contrary to present study, Sharma *et al.* (2015) reported a high prevalence (9%) of abomasal

Table 2. Seasonal distribution and species differences in omasal and abomasal disorders

Season	OI	AU	AI	AB	LPI	Over all
Summer	19(8,111)	20(16,4)	2(1,1)	0(0,0)	5(2,3)	46(27,19)
Monsoon	7(2,5)	25(15,10)	1(1,0)	0(0,0)	4(1,3)	37(19,18)
Post-monsoon	4(2,2)	16(8,8)	2(1,1)	1(0,1)	0(0,0)	23(11,12)
Winter	9(1,8)	12(8,4)	2(0,2)	0(0,0)	4(1,3)	27(10,17)
Pre-summer	0(0,0)	1(1,0)	0(0,0)	0(0,0)	2(0,2)	3(1,2)
Overall	39 (13,26)	74(48,26)	7(3,4)	1(0,1)	15(4,11)	136(68,68)

OI, Omasal impaction; AU, Abomasal ulceration; AI, Abomasal impaction; AB, Abomasal bloat; LPI, Late pregnancy indigestion; Numerals in parenthesis separated by comma indicate number of cattle and buffaloes, respectively.

Table 3. Statistical comparison between cattle and buffaloes for prevalence of various omasal and abomasal disorders

Species	OI	AU	AI	AB	LPI	Over all
Cattle	13(1.27)*	48 (4.68)*	3 (0.29)	0 (0)	4 (0.39)	68 (6.63)
Buffalo	26(2.59)	26 (2.59)	4 (0.4)	01 (0.1)	11 (1.1)	68 (6.78)

OI, Omasal impaction; AU, Abomasal ulceration; AI, Abomasal impaction; AB, Abomasal bloat; LPI, Late pregnancy indigestion; The numbers in parenthesis represent row percentages out of total number of cases (1025 cattle and 1003 buffaloes). *Differ significantly between cattle and buffalo at $p < 0.05$

ulceration in cattle and buffaloes. The prevalence of LPI (0.74%, 15/2028) was lower than that previously reported (Hussain *et al.* 2014). The higher prevalence in that study may be attributed to the fact that only gastrointestinal cases had been used to calculate prevalence and not the total number of cases presented.

The prevalence of omasal impaction was significantly ($p < 0.05$) higher in buffaloes (26/1003, 2.59%) as compared to cattle (1.27%, 13/1025) (Table 3) while prevalence of abomasal ulceration was significantly ($p < 0.05$) higher in cattle (4.68%, 48/1025) as compared to buffaloes (2.59%, 26/1003). The prevalence of other disorders did not differ significantly between cattle and buffaloes. The cause for higher prevalence of omasal impaction in buffaloes and abomasal ulceration in cattle could not be established in this study and needs further substantiation. May be there are anatomical difference between cattle and buffaloes with respect to number and function of omasal leaves and abomasum. Also, there is possibility of different response to abomasal ulceration induced pain and infection. However, this study suggests predisposition of buffaloes to omasal impaction and cattle to abomasal ulceration, and this assumption may be tested in experimental induced diseases. Similar to present study, Sharma *et al.* (2015) observed that impactions were significantly more in buffaloes as compared to cattle but contrary to the present study reported that abomasal ulceration was present in buffaloes as commonly as in cows.

Seasonal occurrence: The overall case prevalence was highest during post monsoon (8.58%) and summer seasons (8.23%) (Table 1). The prevalence of omasal and abomasal disorders did not differ significantly ($p < 0.05$) between the seasons except for omasal impaction and abomasal ulceration (Table 4). For other disorders, tables were not made due to non-significant differences and less

number of cases. The prevalence of omasal impaction was significantly ($p < 0.05$) highest during summer season than other seasons except for winter season. The exact cause for higher prevalence of omasal impaction during summer and winter months cannot be established as the data is of a referral hospital. However, we assume that the higher prevalence during the summer may be attributed to green fodder scarcity and feeding of wheat straw in dry and hot climate, as is the practice in most parts of Punjab during this season. In a previous study most cases of omasal impaction were presented during the months of fodder scarcity (May-June) and were being fed with machine made wheat straw but it was hard to draw firm conclusions regarding seasonality because of the low number of cases (Hussain *et al.* 2013). However, by this study it was established that there is certain correlation between omasal impaction and season. The prevalence of abomasal ulceration in pre-summer was significantly ($p < 0.05$) lower than monsoon and post monsoon seasons (Table 4). This statistical difference implies a possible role of fodder and other environmental factors in the pathogenesis of abomasal ulceration.

The study revealed 6.71% overall prevalence of omasal and abomasal disorders in cattle and buffaloes, being 1.92%, 3.65%, 0.35%, 0.05% and 0.74%, for omasal impaction, abomasal ulceration, abomasal impaction, abomasal bloat and late pregnancy indigestion, respectively. The prevalence of omasal impaction was significantly higher in buffaloes and abomasal ulceration was significantly higher in cattle. The prevalence of omasal impaction and abomasal ulceration varied significantly with different seasons. The predisposition of buffaloes and cattle to a particular disorder needs further substantiation.

SUMMARY

The present study was undertaken to ascertain the prevalence of omasal and abomasal disorders in cattle and buffaloes. This was a retrospective study of 2028 bovines. The overall prevalence of omasal and abomasal disorders was 6.71%, being similar for cattle (6.63%) and buffaloes (6.78%). The omasal and abomasal disorders comprised of omasal impaction, abomasal ulceration, abomasal impaction, abomasal bloat and late pregnancy indigestion, with an overall prevalence of 1.92%, 3.65%, 0.35%, 0.05% and 0.74%, respectively. Significantly higher incidence of omasal impaction in buffaloes (2.59%) compared to cattle (1.27%), and abomasal ulceration in cattle (4.68%) compared to buffaloes (2.59%), is new and interesting finding which could not be explained. The

Table 4. Prevalence of omasal impaction and abomasal ulceration in different seasons

Season	Omasal impaction	Abomasal ulceration	Total no. of cases
Summer	19 (3.40) ^b	20 (3.58) ^{abcd}	559
Monsoon	7 (1.11) ^a	25 (3.96) ^{cd}	631
Post-monsoon	4 (1.49) ^a	16 (5.97) ^d	268
Winter	9 (2.17) ^{ab}	12 (2.89) ^{bc}	414
Pre-summer	0 (0.0) ^a	1 (0.64) ^{ab}	156
Total	39 (1.92)	74 (3.65)	2028

Numbers in parenthesis represent row percentages out of total number of cases, the values with different superscripts in a column differ significantly.

prevalence of other disorders did not differ significantly between cattle and buffaloes. The overall case prevalence was highest during post-monsoon (8.58%) and summer seasons (8.23%). The prevalence of omasal impaction was highest during summer season than other seasons except for winter season. The prevalence of abomasal ulceration in pre-summer was significantly lower than monsoon and post-monsoon seasons. The data so generated would be a basis for further research to establish the causes for species predisposition to omasal impaction and abomasal ulceration, and association of these disorders with seasons.

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