

Clinical, hematological and biochemical findings in cattle suffering from rumen impaction in Libya

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Received 6th June, 2020; Accepted 10th October, 2020

ABSTRACT: The present study was conducted on 32 cattle suffering from rumen impaction caused by plastic material as foreign body, admitted to the Veterinary Teaching Hospital, University of Omar Al-Mukhtar, Libya, during the period from 2008 to 2018. 15 clinically healthy cows were included and considered as control for rumen impaction. For each case, history, age, results of clinical examination and laboratory findings were recorded and analyzed. The results obtained from clinical findings showed that affected cattle had significantly ($p < 0.05$) decrease ruminal motility compared to control group. A significant increase of MBR and pH of ruminal fluid in affected cows compared to the control group. There were no significant differences ($p > 0.05$) in the mean values of rectal temperature, heart rate and the respiratory rate between the affected cattle and healthy cows. There was significant ($p < 0.05$) increase of PCV%, total protein and urea in cattle with rumen impaction compared to the control group. Whereas, there was a significant ($p < 0.05$) decrease in mean values of potassium and calcium in cattle with rumen impaction compared to the control group. The mean values of RBC, Hb, WBC, sodium, phosphorus and bilirubin were not significantly different between the cattle with rumen impaction and healthy cattle. There was no significant difference in mean value of glutaraldehyde test between both groups. Among the clinical, hematological and biochemical findings, impaired general condition, reduced appetite, reduction of rumen motility, reduction of rumination, recurrent ruminal tympany, reduction time of methylene blue, alkaline pH of rumen content, a slight degree of dehydration, hypocalcaemia and hypokalemia are the most efficient in the characterization of the rumen impaction in cattle. Hematological findings revealed a limited diagnostic value in rumen impaction. It is suggested that ruminal fluid and biochemical analysis could be useful in diagnosis of rumen impaction with non-metallic foreign body.

Keywords: Biochemical, cattle, hematological, Libya, rumen impaction.

INTRODUCTION

Rumen impaction due to metallic or non-metallic foreign bodies is among the most common cause of gastrointestinal disorders in ruminants (Hayder et al., 2006; Ismail et al., 2007; Bakhiet, 2008; Khose et al. 2010; Aref and Abdel-Hakim. 2013). The incidence of non-metallic foreign bodies (mostly polythene material) was explored by previous literature mostly in cows (Hailat et al., 1997; Khan et al., 1999; Igboke et al., 2003; Hayder et al., 2006; Boodur et al., 2010; Tesfaye and Chanie, 2012). Clinically, rumen impaction with a non-metallic foreign body is characterized by clear signs of emaciation,

dehydration, abdominal distension and asymmetry of the abdomen. Affected animals showed a lack of feces in the rectum, foamy salivation, recumbency and inappetence (Meyer et al. 1992, Blood and Radostits, 1994; Ismail et al., 2007; Athar et al., 2010b). There are a lot of studies related to rumen impaction in cattle. In Libya, there are currently still lacks of reports available on the clinical, hematological and biochemical findings in cattle suffering from rumen impaction. This present study describes the clinical, hematological and biochemical findings in cattle with rumen impaction.

MATERIALS AND METHODS

Animals

The present study conducted on 32 (group 1) cattle suffering from rumen impaction caused by plastic material as foreign body, admitted to the Veterinary Teaching hospital, University of Omar Al-Mukhtar, Libya, during the period from 2008 to 2018. Group 2 included 15 clinically healthy cows that were considered as control for rumen impaction. The presence of the foreign body was diagnosed by external abdominal palpation, rectal examination and rumenotomy. Cows were clinically examined according to Resenbeger (1990).

Clinical examination

For each case, history, age, results of clinical examination and laboratory findings were recorded and analyzed. Animal data obtained included heart rate, respiratory rate, temperature, rumen motility, fecal quantity in rectum and filling of the rumen. Approximately 100 to 200 ml of rumen fluid was collected using rumen fluid extractor and was immediately examined for consistency, pH and MBRT (Dirksen, 1969).

Laboratory analysis

Three blood samples were collected from each animal by venipuncture of jugular vein for haematobiochemical analysis and glutaraldehyde test. Blood samples were collected (5 ml) in vials containing EDTA for measuring white blood cell count (WBCs), erythrocyte count (RBCs) (Schalm et al., 1975), packed cell volume (PCV %) (Coles, 1986), and hemoglobin (Hb) (Wintrobe et al., 1976). Blood samples for biochemical analysis was collected from each animal into a 10ml vacutainer tubes without anticoagulant. Serum samples were separated and used for biochemical analysis. Spectrophotometer was used to evaluate the total proteins and bilirubin. Sodium (Na) and potassium (K) concentration were measured using the flame photometer. Calcium (Ca), phosphorus (P) and urea were estimated by Atomic Absorption Spectrometer. In order to carry out glutaraldehyde test (Aslan and OK, 1991), 5 ml blood with EDTA was taken from the jugular vein of animals. Blood samples were centrifuged at 3000 rpm. Two ml of collected plasma was put in a 10 ml plastic injector, mixed with 2 ml of glutaraldehyde solution and was checked every 30 seconds to assess coagulation. The time of coagulation was recoded.

Statistical analysis

The data obtained were expressed as mean and standard deviation. Values were analyzed statistically between

healthy cows and affected cattle using the independent t-test. P values ≤ 0.05 were considered significant.

RESULTS

Signalment and clinical findings

The age of the affected cattle was between 2 and 14 year with a mean age of 5.2 ± 2.51 years. There were 6 Holstein, 18 mixed breed and 8 native cattle. Out of 32 cattle with rumen impaction, 2 were male and 30 were female. Out of 30 cows with rumen impaction 8 cows were pregnant. The duration of illness ranged between 7 to 120 days with a mean duration of 18 days. Clinical examination of cattle suffering from rumen impaction indicated impaired general condition, reduced appetite, reduced milk yield, reduction of rumen motility, reduction of rumination, scanty pasty faces, recurrent ruminal tympany and distention of the abdomen. The mean, standard deviation and median of the clinical finding parameters in healthy cattle and cattle with rumen impaction is presented in Table 1. Out of 32 cattle with rumen impaction, five cows (15.6%) showed hyperthermia. Increased respiratory rate was recorded in 10 cows (31.2 %). Six (18.8%) cows showed tachycardia and only one cow had bradycardia. There were no significant differences ($p > 0.05$) in the mean values of rectal temperature, heart rate and the respiratory rate between the affected cattle and healthy cows. The result obtained from clinical findings showed that affected cattle had significantly ($p < 0.05$) decrease ruminal motility compared to control group. There was a significant increase in MBR and pH of ruminal fluid of the affected cows compared to the control group.

Hematological and biochemical findings

Table 2 presents the mean values of hematological and biochemical parameters in cattle with rumen impaction and healthy cattle. There was significant ($p < 0.05$) increase of PCV%, total protein and urea in cattle with rumen impaction compared to the control group. Whereas, there was significant ($p < 0.05$) decrease in mean values of potassium and calcium in cattle with rumen impaction compared to the control group. The mean values of RBC, Hb, WBC, sodium, phosphorus and bilirubin were not significantly different between the cattle with rumen impaction and healthy cattle. There was no significant difference in mean value of glutaraldehyde test between of both groups.

DISCUSSION

This present study describes the clinical, hematological and biochemical findings in 32 cattle with rumen impaction. Regarding the findings of the respiratory rate, heart rate

Table 1. Clinical and ruminal fluid parameters of apparently healthy cattle and those with rumen impaction.

Parameters	Control (n=15)	Cattle with TRP (n= 32)
Body temp. (°C)	38.5±0.7	38.7±0.3
Respiratory rate /min.	29.4 ±1.2	28.6 ±3.2
Pulse rate/min.	71.8±8.3	73.2±5.4
Rumen movement (/5 min)	5.8±0.5	1.4 ±1.3*
Ruminal fluid pH	6.9±0.5	8.1 ±0.3*
MBRT (min)	4.7±0.3	16.7 ±1.3*

Means with different superscripts indicate significant difference at (p <0.05).

Table 2. hematobiochemical parameters of apparently healthy cattle and those with rumen impaction.

Parameters	Control (n=15)	Rumen impaction (n=32)
RBCs (x10 ⁶ /μl)	8.9±2.3	8.3±1.3
PCV %	31.6 ±2.1	38.5 ±2.3*
Hb (g/l)	11.0±1.7	10.9±0.2
WBCs (×10 ³ /μl)	8.6±0.3	8.9± 0.1
Totalprotein (g/l)	61.7±1.3	81±2.4*
Bilirubin (μmol/l)	4.0±0.3	4.5±2.4*
Urea (mg/dl)	20.4± 2.1	36.5±4.1*
Sodium (mmol/l)	132.9± 1.7	134.2±0.4
Potassium (mmol/)	4.6 ± 0.5	3.2±0.6*
Calcium (mg/dl)	9.6±0.7	7.3±0.4*
Phosphorus (mg/dl)	5.8±0.3	5.4±0.6
Glutaraldehyde test	Negative	Negative

Means with different superscripts indicate significant difference at p <0.05.

and body temperature, it seemed that the presence of the foreign body did not alter clinical findings, although hyperthermia and increased respiratory rate were noticed in some clinical cases. Increased temperature values might be attributed to peritonitis or septicemia accompanying concurrent parturition diseases, such as metritis, mastitis (Dirksen 1994; Braun et al., 2007; Athar et al., 2010 a, b). The increased respiratory rate is probably due to the increased pressure of the dilated rumen on the diaphragm (Kuiper and Breukink, 1986; Garry, 1996; Bakhet, 2008). In the present study, the clinical examination of cattle suffering from rumen impaction indicated impaired general condition, reduced appetite, reduced milk yield, reduction of rumen motility, reduction of rumination, scanty pasty faces, recurrent ruminal tympany and distention of the abdomen. These results were in accordance with those obtained by Reddy et al. (2004) and Ramaswamy and Sharma (2011). Reduced ruminal motility was observed in all cattle with rumen impaction. However, non-metallic foreign body was found and the foreign materials were mostly plastic. Such materials were heavy and, in some cases, concreted and settled in the ventral aspect of the rumen and reticulum

(Akraiem and Abd Al-Galil, 2016). The presence of impacted material may cause partially or completely block of the ruminoreticular orifices. The ingested polythene hinders the process of fermentation and mixing of contents might lead to indigestion (Hailat et al., 1998; Radostits et al., 2007; Vanitha et al., 2010).

Measuring of the ruminal fluid showed a significant increase in pH values and the reduction time of methylene blue (MBRT). The expected MBRT under normal conditions of ruminal function is often three minutes (Braun et al., 2007). An increase of pH ruminal fluid and MBRT are important diagnostic tool in field condition for the early detection of plastic indigestion in bovine (Boodur et al., 2010). The glutaraldehyde test is still an important diagnostic tool because the clotting time is shorter than normal in 90% of cattle (Braun et al., 2007). In the glutaraldehyde coagulation test, positive results were obtained only from those animals having adhesion. This result agreed with those obtained by Dirksen (1994) and Akinrinmade and Akinrinde (2012).

In the hematological profile, a significant increase of PCV was observed in affected cows compared to healthy ones. In the present study, a slight degree of dehydration

was observed in cattle with rumen impaction. Similar findings were reported by Akraiem and Abd Al-Galil (2016). There was no significant difference in mean values of erythrocytic count, leukocyte count and hemoglobin concentration obtained in both groups. These findings are in accordance to those obtained by Rouabah et al. (2017).

In the present study, significant increase in mean values of serum total protein, total protein and serum urea were observed in cattle with rumen impaction. The significant increase in total protein might be due to hemoconcentration and response to inflammation (Misk et al., 1999; Athar et al., 2011; Hussain et al., 2010; Dodia et al., 2014; Rouabah et al., 2017). The significant increase in serum urea might be attributed to dehydration and decreased renal flow (Turkar and Uppal., 2007; El-Attar et al., 2007).

Potassium, calcium and were significantly lower in cattle with rumen impaction compared to control group. Hypokalemia in this study was explained by anorexia associated with the rumen impaction or a disturbed ingest transport (Attar et al. 2007 and Rouabah et al., 2017). Hypocalcaemia was observed in cattle with rumen impaction. This result might be attributed to dietary deficiency and decrease of calcium absorption due to reduced rumen motility (Igbokwe et al., 2003). There was no significant difference in mean value of glutaraldehyde test between both groups. Positive results were obtained only from those animals having adhesion (Dirksen, 1994).

Conclusion

Among the clinical, hematological and biochemical findings, impaired general condition, reduced appetite, reduction of rumen motility, reduction of rumination, recurrent ruminal tympany, reduction time of methylene blue, alkaline pH of rumen content, a slight degree of dehydration, hypocalcaemia and hypokalemia are the most efficient in the characterization of the rumen impaction in cattle. Hematological findings revealed a limited diagnostic value in rumen impaction. It is suggested that ruminal fluid and biochemical analysis could be useful in diagnosis of rumen impaction with non-metallic foreign body.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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