



Study on Physiological, Biochemical and Pathological Evolutions of Donkeys Affect by Gastrointestinal Trac Disturbances

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Aim: This study was for investigating causes, some clinical, pathological, physiological and biochemical parameters of donkeys affected by Gastrointestinal Tract Disturbances (GIT).

Study Design: Twenty donkeys were included in this study 12 GIT infected donkeys were isolated from all diseased donkeys that come to the Educational veterinary hospital of Nyala South Darfur State- Sudan according to the clinical signs of GIT-disturbance and 8 donkeys clinically normal as control group.

Place and Duration of Study: This study was conducted in Educational veterinary hospital of Nyala South Darfur State- Sudan, during the period from December 2019 to April 2021, Samples were collected from ill donkeys that come to the hospital. Those Samples were analyzed in University of Nyala, Faculty of Veterinary Science, Department of Physiology and Biochemistry.

Methodology: Case history, causes and clinical examination were taken to all donkeys under this

study. Respiration rate, pulse rate, rectal temperature, and some biochemical values (total protein, albumin, globulin, creatinine, urea, triglyceride, phosphate, AST and LDH) were measured.

Results: Porridge, Leaves of beans, Water Mellon, Grain over feeding were found the main causes of GIT disturbance in donkeys, causes of some GIT disturbance of donkeys were unknown, respiration rate, pulse rate and rectal temperature were elevated, behavior of donkey infected by GIT disturbance changes were rolling, no desire to walk, petechial haemorrhage of eye mucus membrane, bilateral abdominal distension, all measured biochemical value were highly increased.

Conclusion: Most causes of GIT disturbance in donkeys were found somehow related to the food administration, behavioral changes, elevation of some physiological and biochemical parameters were registered in donkeys under this study.

Keywords: Gastrointestinal tract disturbances; colic; GIT biochemical parameters; donkeys.

1. INTRODUCTION

Most fatal diseases of donkeys are related to the digestive system disturbances such as colic by its all types, especially when be complicated by endotoxemia [1,2]. Colic is characterized by abdominal pain which may be mild or severe with diarrhea or constipation, causing behavioral, physiological, and biochemical changes [3,4] whereas endotoxemia that means existence of endotoxin in the blood stream mostly develops during colic period and characterized by increasing of defecation interval, fever, increasing of pulse and respiration rate [5,6]. Endotoxin is the outer cell wall of gram negative bacteria, chemically is lipopolysaccharide [7].

Etiology of digestive system disturbance are many, but mostly due to nutritional and managerial problems related to food, water supply and the environment around the animal [8-10] or may be related to Internal parasite [11,12], problems of teeth [13,14], or bacterial infection such as Salmonella and Clostridia [15].

2. MATERIALS AND METHODS

2.1 Study Area

The current study was conducted in the Educational veterinary hospital of Nyala South Darfur State- Sudan, during the period from December 2019 to April 2021, Samples were collected from sick donkeys that come to the hospital during the period from December 2019 to April 2021. Nyala is located between Latitude 13-9.30° north and Longitude 27-24.30° east.

2.2 Animals

A total number of 12 donkeys showing signs of digestive system (GIT) disturbances and

clinically 8 healthy donkeys were examined in Nyala, South Darfur State, Sudan.

2.3 Treatment

Samples were collected from 12 donkeys came to the Educational veterinary hospital of Nyala South Darfur State- Sudan, showed signs of GIT disturbance such as diarrhea, abdominal bloat, or colic, other 8 clinically healthy donkeys were sampled as control group.

2.4 History

A detailed history of the cases was obtained from the owner and examination of source of feed, environment, and source of water when possible as described by Kelly [16].

2.5 Clinical Signs

Clinical signs were documented for each individual case according to Kelly [16].

2.6 Physiological Parameters

All donkeys were examined clinically for estimation of respiratory rate, pulse rates, rectal temperature, and using standard methods according to Kelly [16].

2.7 Blood Collection

Five milliliter of whole blood were collected from Jugular vein of each donkey by disposable syringe, after following of aseptic technique procedures, whole the blood were mixed with heparin in plastic container for plasma separation, for blood biochemical parameters measurement.

2.8 Blood Biochemical Parameters

The following blood biochemical parameters: Total protein, albumin, urea, creatinine, triacylglyceride, LDH, AST, and phosphate were measured using spectrophotometer (Biosystem – BTS-302) in the Physiology Laboratory, Faculty of Veterinary Science University of Nyala.

2.9 Statistical Analysis

Data were analyzed statistically using SPSS 19.0 for Windows. Independent-t-test was used for analysis of data obtained from donkeys.

3. RESULTS

3.1 Causes of GIT Disturbances in Donkeys

Most causes of GIT disturbances in donkeys were unknown, but leaves of beans were the most encountered causes, followed by porridge, water mellon, and grain overload (Table 1).

Clinical signs and Pathology: Abnormal behavior of donkeys infected by GIT disturbance included rolling, no desire to walk, petechial hemorrhage of eye mucus membrane, and bilateral abdominal distension (Fig, 1 A). Total death of donkeys was (3), postmortem was made for two cases, the another one was not because it was difficult to be reached. one case with bilateral abdominal distension obstruction of transverse colon by dehydrated fecal ball was found and in the another case there was distension of the stomach with yellow fluids, addition to the enlargement and fragility of the liver and mostly empty intestine which may indicate functional obstruction (Fig, 1 B).

3.2 Physiological parameters of Donkeys Infected by Disturbance of GIT

Respiration rate and pulse rate per minute were increased in donkeys infected by GIT-disturbances compared to control group ($P < 0.05$), but no change in rectal temperature was reported, (Table 2), Petechial hemorrhage and congestion of eye mucus membrane were noticed, bilateral abdominal bloat, and rolling in some cases.

Biochemical parameters GIT infected Donkeys: Almost all measured biochemical parameters, the concern blood, urinary system and liver were increased in infected donkeys comparing to the control group. These parameters are total protein, globulin, urea and creatinine, Triglyceride, Lactate Dehydrogenase, Alkaline Phosphatase (ALP), phosphate, and Aspartate aminotransferase (AST) also increased ($P < 0.05$) except albumin which did not change as seen in Table 3.

4. DISCUSSION

Most causes of Gastro-Intestinal (GIT) disturbances in donkeys were unknown because the clause contact person to the donkey mostly does not come when taking history of the ill-donkey, leaves of beans were the most encountered causes, followed by porridge, water mellon, and grain overload those etiologies were reported in horses [17]. Over feeding increase stretching of the (GIT) and stimulate the nerve ends in that wall leading to abdominal pain, changing of (GIT-PH) due to microbial fermentation, change the normal flora of the hind gut and over product volatile fatty acids let the opportunistic and pathogenic bacteria causes enteritis [18,19].

Table 1. The most encountered causes of GIT disturbances in donkeys

No	Cause	Frequency	Percentage %
1	Porridge	2	16.66
2	Leaves of beans	2	16.66
3	Water Mellon	1	8.33
4	Grain over feeding	1	8.33
5	Unkown causes	6	50

Table 2. Physiological parameters of Donkeys infected by disturbance of GIT

Parameter	Control	GIT- disturbance cases
Respiration rate	28.67 ± 4.59 ^a	32.90 ± 9.32 ^b
Pulse rate	41.67 ± 4.36 ^a	62.40 ± 12.87 ^b
Temperature(C ⁰)	35.81 ± 0.92 ^a	37.49 ± 1.74 ^a

Table 3. Biochemical parameters GIT infected Donkeys

Parameter	Control	treatment	p-value
Total protein	35.08 ± 2.64 ^a	85.08 ± 28.86 ^b	0.03
Albumin	25.17 ± 25.17 ^a	56.5 ± 24.20 ^a	0.06
Globulin	9.9 ± 3.7 ^a	27.62 ± 21.22 ^b	0.00
Urea	2.33 ± 0.81 ^a	2.33 ± 17.52 ^b	0.00
Creatinine	3 ± 0.6 ^a	28.4 ± 16.75 ^b	0.00
Triglyceride	391.83 ± 120.58 ^a	1024 ± 313.73 ^b	0.04
LDH	465 ± 166.82 ^a	1087 ± 371.1 ^b	0.03
AST	87.17 ± 30.53 ^a	68.6 ± 12.76 ^b	0.02
Phosphate	0.71 ± 0.43 ^a	3.94 ± 1.16 ^b	0.01

*Values with different letters in the same row are significantly different (p<0.05)



Fig. 1A. (bilateral abdominal distension) Fig. 1B. (obstruction of transverse colon)



Fig. 1C. (empty intestine) Fig. 1D. (enlarged liver) Fig. 1E. (distended stomach)

Increasing of respiration rate and pulse rate recorded in diseased donkeys in this study was similar to which was reported in horses [20,21] and that may be due to muscle hyperactivation,

Rectal temperature in diseased donkey was not changed [20]. Rectal temperature elevates in severe colic cases due to physical effort or

presence of pyrogenic agent or may not change in light GIT disturbed cases [3,22].

Increasing of total protein in this study was agreed by [23,24], while globulin also increased in diseased donkeys, and this was previously reported [25]. Globulin in these donkeys infected by GIT disturbances were recorded in previous

studies by [25,26] Total protein and globulin increase due to lose of fluids as in dehydration [1], significant affection of dehydration on blood biochemical parameters need the loss of fluids reaches 12-15% [25]. No significant changes in albumin were noticed in this study. When globulin increases and albumin decreases that indicate happening of inflammation [27].

Both Urea and Creatinine were highly increased in GIT disturbed donkeys in this study and in study by Davis [28] who justified their increasing together because of either dehydration or secondary renal dysfunction which may develops specially in cases of GIT- disturbances.

Increasing of Triglyceride in GIT disturbed donkeys was similar to that in horses [21,26] and Donkey [25]. This Increasing is affected by degree of stress and anorexia [21].

Lactate dehydrogenase (LDH) and Aspartateamino Transferase (AST) both of them were significantly increased in this study. Increasing of LDH in this study was agreed by Alsaad [27] in cases infected by GIT disturbance and who justified that increasing due to the damage of intestine mucosa . Increasing of AST in cases of GIT infections was reported also by Davis [28]. Liver enzymes as a whole in cases of GIT disturbance increases either because of ascending infection from intestinal lumen through the bile duct, or because of inflammatory mediators or endotoxins absorption [29].

Feeding of high grain diet leads to increasing of arterial and vein blood flow to helps in clearing of endotoxin that develop in GIT disturbed donkeys which increased liver enzymes also [30]. Phosphate was highly elevated in diseased donkeys compared to the control group, as reported by Alsaad [27]. Phosphate is controlled by parathyroid hormone and vitamin D, It makes up cell membranes so it increases in cases of severe cellular damage [1].

5. CONCLUSION

Most causes of GIT disturbance in donkeys were found somehow related to the food administration, behavioral changes, elevation of some physiological (respiration rate and pulse rate) whereas rectal temperature did not change. Total protein, Albumin, Globulin, Urea, Creatinine, Triglyceride, (LDH), (AST) and Phosphate were highly elevated in Donkeys affect by gastrointestinal tract disturbances.

Further studies are needed for histopathology and for bacterial culture to determine the bacterial growth to be controlled by specific antibiotic. Also food types that given to donkeys need more studies to be analyzed so as to identify the specific causative agent in each flood a lone in Nyala State, Sudan.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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