A CASE STUDY ON THE SUCCESSFUL DIAGNOSIS AND TREATMENT OF AN ADULT TUSKER AND A JUVENILE CALF ELEPHANT (*Elephasmaximus*) IN WILD AILING FROM LACTO-ACIDOSIS(Area of the study)

ABSTRACT

Background: An adult wild tusker and a juvenile wild elephant was diagnosed with lacto-acidosis based on the history of ingestion of large amounts of carbohydrate rich feed, clinical manifestations and lower blood pH and higher LDH (Lactate dehydrogenase enzyme) and Potassium levels from their blood samples.

Materials and Methods: Sampling, was done in their sedated condition. Blood was collected in EDTA and Clot Activator vials. Along with it, trunk wash and faecal samples were also being collected for examination in the laboratory. Prior, to collection of blood, the area was cleaned with spirit alcohol. The blood was collected from the ear vein. For Trunk wash, a sterile 50ml Centrifuge Tube Skirted Polypropylene (PP) was used.

Results and Treatment:Sodi-bicarb injection and infusion of sufficient fluids to counter acidosis and dehydration was the main protocol of treatment along with administration of Anti-inflammatory, Anti-histaminic and Vitamin-B complex. After the treatment, it was observed that the clinical manifestations got abated and the appetite and movement of the elephants got improved.

Conclusion: Early detection and timely treatment is very essential, for rapid improvement of acidosis and sodi-bicarb can be used as an antagonist against metabolic acidosis.

Keywords:-[Tusker, juvenile,Sodi-bicarb, acidosis, LDH, abated}.

INTRODUCTION:-

Comment [I1]: Follow the journal's instructions in writing references within the text

Lactic acid, an important product of normal bio-metabolic pathway of mammalian tissues, was first associated with a metabolic acidosis by Barr, Himwich and Green in 1923 (Barr et al., 1923). Lactic acidosis, chemically, is defined as a metabolic acidosis characterized by a significant reduction in arterial pH and the presence of a significant accumulation of lactate in extracellular fluids.Accumulation of lactic acid may occur in the rumen following a rapid build up of the lactic acid-producing bacteria, *S. bovis*and *Lactobacillus*, when starch-based diets are introduced. (Ahrens 1967, Braun et al 1992). Animals exhibit acute acidosis as an overt illness following consumption of readily fermented carbohydrates in amounts sufficient to reduce ingestapH(Cooper and Klopfenstein, 1996).

1. Adult Tusker:-

On 18th July 2023, Khajurikata Section Forester, Hindol Range, Dhenkanal Forest Division, Odisha, India, informed about a lone tusker of age 28-30 years (approx), showing signs of slow movement, and spending most of its time inside a water pond and having intake of only date palm as its feed, as the spot was having rich cultivation of date palm trees(Figure 1).Immediately, DFO Dhenkanal informed regarding the issue with the Kapilash Zoo Veterinarian to reach the spot and do necessary interventions and treatment, but cautioned

not to tranquilize the elephant, as formal permission was being awaited from the Chief Wildlife Warden.

The Kapilash Zoo Veterinarian on reaching the spot found some signs of lameness, inflammation of the fore-legs and slowmovement(Figure 3 and 4).The appetite, urination and defaecation was found to be apparently normal. A combination of Anti-inflammatory, Anti-analgesic, Anti-histamines, Calcium and Neuro-vitamins were darted to the elephant in desired dose. After, that it was left for observation and the section forester was instructed to keep a track of the elephant and to give an update on its health condition.

On the following day, the condition of the elephant improved a bit, but inflammation of the fore-legs was very much visible and its movement became very much slower and the condition deteriorated. It was decided, it needs to be tranquilized to have a proper observation of the elephant, so that a planned treatment schedule can be made and administered to the elephant.

After, getting the permission of tranquilization from Chief Wildlife Warden, it was decided to tranquilize the elephant on 22nd July, 2023 (Figure 2).

2. Juvenile Calf Elephant:-

On 18/06/2024, DFO Dhenkanal received an information from DFO Athagarh, about a juvenile elephant calf, aged about 3 years (approx) in Narasinghpur West Range, showing signs of remaining inside a water pond area for the maximum time (Figure 6) and asked the Rapid Response Team (RRT),to intervene in this regard (Figure 1).

On reaching the spot, Veterinarian from Kapilash Zoo saw that the calf was present inside a water reservoir area and there was very minimum activity. He decided to go for tranquilization of the elephant for a detailed examination, to find the probable cause for this distress and the abnormal behaviour.

After, getting the formal permission for tranquilization, it was decided to go for tranquilization, in that very instant.

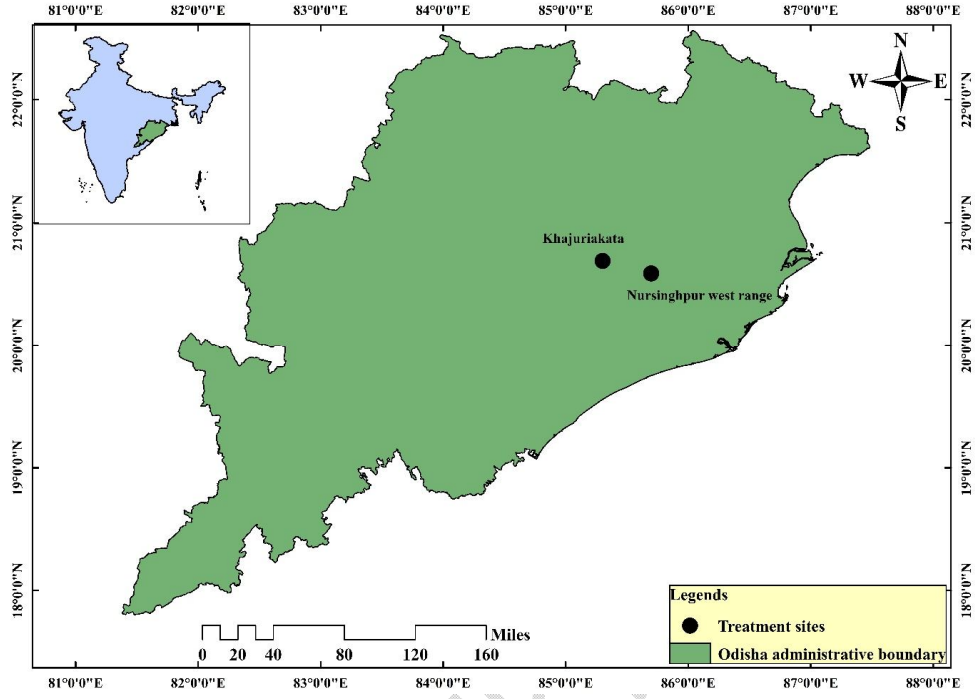

Figure1:- GIS Mapping of the treatment sites of the two cases.

Materials and Methods

In both the cases, some common symptoms were being observed like slow movement, spending maximum time submerged in a water locked area, slight inflammation of the limbs, lameness which increases with time. Marked dehydration is a consistent clinical finding of ruminal lactic-acidosis (Constable et al., 2017).Sampling, was done in their sedated condition. Blood was collected in EDTA and Clot Activator vials. Along with it, trunk wash and faecal samples were also being collected for examination in the laboratory.

Prior, to collection of blood, the area was cleaned with spirit alcohol. The blood was collected from the ear vein.

For Trunk wash, a sterile 50ml Centrifuge Tube Skirted Polypropylene (PP) was used.

Procedure for collection of TrunkWash:-

1. Take two sterile 500 ml Normal Saline (NS) solution.
2. Use one of them, to completely rinse the trunk, to remove debris like mud, dust etc., that may be present inside the trunk.
3. Now, empty the anotherNS solution in the trunk wash and hold the trunk upright making a 90^{o} angle.
4. Hold the tip of the trunk, and make a to and fro movement of the trunk maintain the upright direction for a minute.
5. Slowly, bring the trunk downwards, holding the tip, and place the sterile 50 ml centrifuge tube near to the trunk.

6. Allow, the trunk content, to flow inside the centrifuge tube, until its completely filled up.
7. Tighten the lid of the centrifuge tube properly and place in a sterile sample collection box with ice packs, to be sent to the laboratory for examination.

The faecal samples were collected in a sterile Zip-lock bags, and placed in a sterile sample collection box with ice packs.

Result

Laboratory report from the first case:-

1. List 1- Haematological parameters

SL.NO.	BLOOD PARAMETERS	VALUE	NORMAL RANGE
1.	Haemoglobin (g%)	10.0	11-17
2.	TLC (cu/mm)	5,200	5- 12
3.	PCV (%)	29	32-53
	Differential Leukocyte Count (%)		
4.	Heterophil	65	50-70
5.	Eosinophil	04	0-10
6.	Lymphocyte	25	20-40
7.	Monocyte	06	2-8
8.	Basophil	--	1-2
9.	Platelet (lakh/cu mm)	6.61	5-10

2. List 2- Biochemical parameters:-

SL. NO.	PARAMETERS	VALUE	NORMAL RANGE
1.	ALT (IU/L)	7.5	1.5-3
2.	AST(IU/L)	52.5	4- 56.5
3.	ALP (IU/L)	209.1	0- 285
4.	Urea (mg/dl)	15.3	5- 15
5.	Creatinine (mg/dl)	1.2	1- 1.5
6.	Lactate dehydrogenase (LDH)	650	250-500
7.	Sodium (mmol/L)	136	120-140
8.	Potassium (mmol/L)	7.2	3-6

Laboratory report of the second case:-

1. List 3- Haematological parameters:-

SL.NO.	PARAMETERS	VALUE	NORMAL RANGE
1.	Haemoglobin (g%)	9.0	11-17
2.	TLC (cu/mm)	4,820	5- 12

3.	PCV (%)	27	32-53
Differential Leukocyte Count (%)			
4.	Heterophil	56	50-70
5.	Eosinophil	01	0-10
6.	Lymphocyte	41	20-40
7.	Monocyte	02	2-8
8.	Basophil	-	1-2
9.	Platelet (lakh/cu mm)	4.20	5-10

2. List 4- Biochemical parameters:-

SL.NO.	PARAMETERS	VALUE	NORMAL RANGE
1.	ALT (IU/L)	13.0	1.5-3
2.	AST(IU/L)	21.0	4- 56.5
3.	ALP (IU/L)	32.0	0- 285
4.	Urea (mg/dl)	12.0	5- 15
5.	Creatinine (mg/dl)	1.45	1- 1.5
6.	Lactate dehydrogenase (LDH)	600	250-500
7.	Sodium (mmol/L)	136.0	120-140
8.	Potassium (mmol/L)	5.7	3-6

So, in both the cases, it can be seen that the ALT, LDH and Potassium levels are higher than their normal values, significantly proving that acidic levels are higher in the blood and also there is a liver issue.

Treatment protocol followed:-

1. Treatment done in first case –

   A dart of a combination of Xylazine, Ketamine and Atropine was used in the ratio of 4:2:2 to prepare a 8 ml dart. After successfully darting, and complete sedation, the treatment was started in standing condition. Prior, to the start of treatment, a piece of cloth was used to cover the eyes of the animal and water was poured all over its body for thermoregulation(Figure 3).

   1. Sodi-bicarb – 25 ml – 7 vials was mixed with Normal Saline (NS) solution and infused intra-venously.
   2. Flobac-SA (Enrofloxacin) Inj.- 20 ml was injected intra-muscularly at stat.
   3. Melonex (Meloxicam) Inj.- 20 ml was injected intra-muscularly at stat.
   4. Avilin Vet (Pheniramine Maleate) Inj.- 20 ml was injected intra-muscularly at stat.
   5. Tribivet-M (Vitamin-B complex along with Methylcobalamine) Inj.- 50 ml along with NS solution intravenously.
   6. Belamyl (Liver extracts) Inj.- 20 ml was injected intra-muscularly.
   7. Intacal-IM (Calcium, Vitamin D_2 and Vitamin B_{12} Inj.- 30 ml was injected intra-muscularly.

8. Tonophosphan (Toldimfos Sodium) Inj.- 15 ml was injected intra-muscularly.
9. Povidone Iodine solution was used to clean some injury lesions present in the body of the elephant.
10. Scavon spray (Anti-septic spray) was sprayed in the lesions, after washing it off by povidone-iodine solution.
11. Neomec (Ivermectin) Inj.- 10 ml sub-cutaneously was injected as part of a preventive dose against endo-parasites of the wild elephants.

After completion of the treatment, the reversal drug Yohimbine@ 4ml intra-muscularly, was given to reverse the elephant from its sedated condition. Around 5 minutes, after the reversal drug was being given, the elephant moved away from the spot. It was being tracked by the local field staffs and its health condition monitored. The treatment rendered, gave satisfactory results, as the inflammation of the fore-limbs reduced, no visible signs of lameness was observed and the movement pattern of the elephant was found to be normal(Figure 5).

Figure 2:- Wild tusker showing symptoms of lameness, inflammation, slow movement. The picture is being taken just before the start of treatment, in its sedated state.

Figure 3:- Treatment of the wild tuskerfollowing a protocol to curb lacto-acidosis.

Figure 4:- The swollen fore-limbs is clearly visible during body condition examination.

Figure 5:- The Wild tusker after treatment, showed no symptoms of lameness, inflammation got reduced and its activity improved.

2. Treatment done in the second case:-

A dart of 3 ml with a combination of Xylazine, Ketamine was prepared in the ratio of 2:1, and was successfully darted. After, around 5 minutes of darting, the animal came to its sedated state in standing condition. Prior, to the start of treatment, a piece of cloth was used to cover the eyes of the animal and water was poured all over its body for thermoregulation.

1. DNS (Dextrose 5%) Inj.- 500 ml- 10 numbers infused intra-venously at stat.
2. NS (Normal saline) Inj.- 500 ml- 4 numbers infused intra-venously at stat.
3. Sodi-bicarb Inj.- 25 ml- 4 vials, to be given 2 vials mixed in a 500 ml NS solution and infused intra-venously at stat.
4. Pan-40mg (Pantoprazole) Inj.- 5 vials injected intravenously at stat.
5. Tribivet-M (Vitamin-B complex along with Methylcobalamine) Inj.- 50 ml along with NS solution intravenously.
6. Flunimeg (Flunixinemeglumine) Inj.-15 ml injected intramuscularly at stat.
7. Intacal-IM (Calcium, Vitamin D2 and Vitamin B12 Inj.- 20 ml was injected intra-muscularly.
8. Tonophosphan (Toldimfos Sodium) Inj.- 15 ml was injected intra-muscularly.

9. Neomec (Ivermectin) Inj.- 7 ml sub-cutaneously was injected as after per-rectal clearing of faecal matter, it was found that it was heavily infested with Strongyle spp. Worms.

After completion of the treatment, the reversal drug Yohimbine, 1.5ml was injected intra-muscularly was given. Immediately, the elephant came into its senses and moved from the site of treatment. The elephant was kept under observation by the field staffs and its appetite and movement improved after treatment. It was maintaining a distance from the herd, and moved side by side to the herd for about 2-3 days and eventually it was accepted by the herd and it merged along with the herd. Its movement and appetite is totally normal without any visible signs of discomfort.

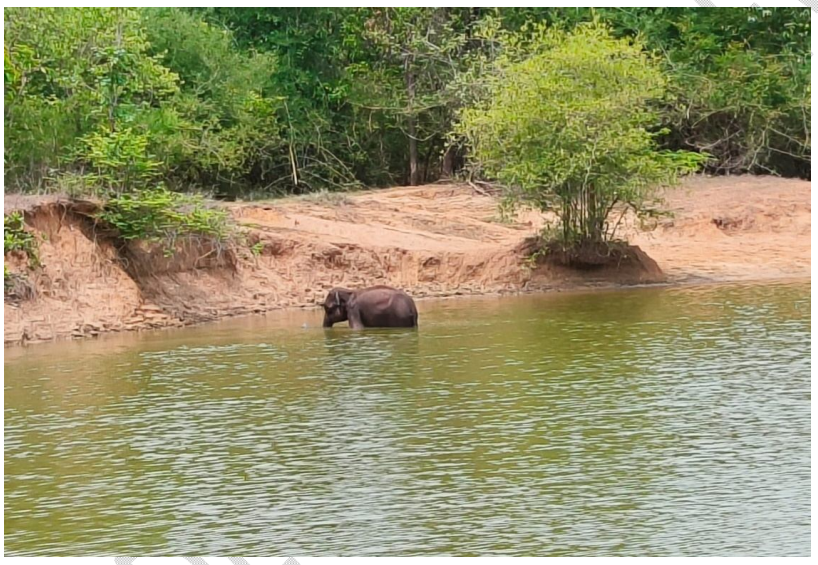

Figure 6:- Juvenile wild calf remaining submerged for most of the timein a water reservoir.

DISCUSSION:-

Comment [I2]: Follow the journal's instructions in writing references within the text

Wild elephants respond to the treatments well, and it is worth attempting to render medical care to nullify any discomfort caused to them [Sarma.K.K(2007)].Proper scientific approach on elephant health and diseases are far less and hence evolving remedial measures to promote health and welfare remains a challenging task [Chakraborty, A (2024)]. Haemoglobin and Packed cell volume (PCV) helps us to know about the nutritional status, feed intake ratio and the level of dehydration in elephants. The AST, ALT and ALP values indicate about the proper functioning of the liver. The Lactate dehydrogenase enzyme (LDH)

and Potassium levels indicate about the acidity level in the blood and diagnosing lacto-acidosis. So, clearly it can be observed that following treatment, the clinical signs of swelling of the limbs, in-coordinated and slow movements and the tendency to remain submerged in a water reservoir for long intervals were not present, and in the second case, the calf was successfully accepted by the herd.

CONCLUSION:-

Wild elephants are susceptible to Lacto-acidosis or acidosis. Mainly, food originated acidosis due to over feeding of high carbohydrate feed item like date palm , wild berries, etc. was the cause of discomfort with swollen limbs in the elephants, causing stress and making them isolated from their herds is a matter of concern and medical intervention in the nick of time is of upmost importance in saving their lives in the wild. Interestingly, it predominantly occurs during the summer season, when there is easy access to highly fermentable carbohydrate sources [Nithin.S.B. (2020)]. Lameness, Swollen limbs, tendency to remain submerged in water, abdominal distention, in-coordinated and slow movements are some of the pre-dominant clinical manifestations observed in lacto-acidosis of elephants.

REFERENCES

Comment [l3]: Follow the journal's instructions in writing references

1. **Ahrens F.A.,(1967).** Histamine, lactic acid, and hypertonicity as factors in the development of rumenitis in cattle. American Journal of Veterinary Research,28,1335-1342.
2. **B.S.Nithin, S.U. Digraskar and T.A.Shafi, (2020).** Occurrence and Clinical Assessment of Ruminal Lactic-Acidosis in Goats. Indian Journal of Small Ruminants,26(2):270-272.
3. **Barr, D.P., Himwich, H. E., and Green, R. P. (1923).** Studies in the physiology of muscular exercise. III. Development and duration of changes in acid-base equilibrium, J. Biol. Chem., 55:539.
4. **Braun U., RIHS T. & SCHEFER U.,(1992).**Ruminal lactic acidosis in sheep and goats. Veterinary Record 130, 343-349.
5. **Chakraborty, A, Mahato, G. and Fullonton, S., (2024).** Clinical Management of Geophagia in a Sub-Adult Male Asiatic Elephant (*Elephasmaximus*) in Kapilash Zoo, Odisha, India. World Journal of Pharmaceutical Research, Volume 13, Issue 11, 490-496.
6. **Constable, D., Hinchcliff, K. W., Done, S.H. and Grunberg, W, (2017).** Veterinary Medicine. A Textbook of Diseases of Cattle, Horses, Sheep, Pigs and Goats. 11thedn., Elsevier publications, London, pp. 461-472.

7. **Sarma, K, K., Human Inflicted Injuries in the Wild Elephants of Assam (2007):** Retrospection by an Elephant Veterinarian. Gajah 26 ,37-42.