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Urinary Retention Syndrome Associated with *Cistus Salviifolius* Ingestion in Cattle: A Case Report from Eastern Libya.

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ABSTRACT

Cistus salviifolius L. is a common Mediterranean shrub associated with sporadic outbreaks of urinary retention and renal dysfunction in grazing cattle. While similar cases have been documented in Portugal, Spain, France, and Turkey, no previous reports have been published from Libya. This study presents the first clinical, hematological, and biochemical investigation of suspected Cistus salviifolius intoxication in grazing cattle in northeastern Libya (Al Jabal Al Akhdar region). Three adult cows from Mansoura, Staluna, and Al-Bayda were examined after exhibiting urinary disturbances, including dysuria, bladder distension, and perineal wetness. Clinical examination revealed poor body condition and normal temperature with mild tachycardia. Laboratory findings demonstrated mild normocytic anemia (HGB 7.7 g/dL; HCT 22.6%), leukocytosis with a neutrophilic shift, elevated serum AST (76–170 U/L), and mild hyperphosphatemia (5–6.9 mg/dL). Urea and creatinine values remained within or near normal limits, suggesting early renal involvement without overt azotemia. Mild hyponatremia and hypochloremia were detected, while urinalysis showed proteinuria, leukocyturia, and low specific gravity (1.015–1.020), consistent with tubular dysfunction. Quantitative HPLC analysis of urine identified pyrogallol (0.003–0.072 µg/mL) and gallic acid (0.012–0.093 µg/mL), supporting exposure to tannin-derived nephrotoxic metabolites of Cistus salviifolius. These findings indicate subacute to chronic plant-associated toxicity manifesting as urinary retention, hepatocellular stress, and renal tubular dysfunction. The present report represents the first evidence of Cistus salviifolius toxicity in Libyan cattle, emphasizing the need for further investigation and preventive management in Mediterranean grazing systems.
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1. INTRODUCTION

With the exception of five species that are native to the Canary Islands, the genus Cistus L. (Cistaceae) has roughly 20 frutesc ent and suffrutescent species that are primarily found in the Mediterranean region (Arrington & Kubitzki, 2003). One of the most prevalent whiteflowered species in Italy is Cistus salviifolius L., which belongs to the subgenus Leucocistus. However, reports of this plant's existence are found throughout the Mediterranean Basin (Tison & de Foucault, 2014).

Stretching from Portugal to Greece, together with parts of Israel and Turkey, and all the way to North Africa. C. salviifolius is a perennial, bushy, nondeciduous plant that blooms in the Mediterranean region from March to June (Bartolucci et al., 2018). In Libya, Cistus salviifolius is an indigenous shrub characterized by white flowers and ovate-elliptic leaves, growing up to 60 cm in height, with a flowering season from March to May(Mouterde, 1970). The plant belong to the Kingdom Plantae and the clades Tracheophytes and Angiosperms. Both species are members of the family Cistaceae and the genus Cistus. The first species was identified as Cistus parviflorus Lam., commonly known by its vernacular names Torrashe Ahmar or Birabash Ahmar. The second species was identified as Cistus salviifolius L., locally known as Torrashe Abiad or Birabash Abiad(Arous, Absis, Hasan, & Emaza). Sheep in Spain, France, Italy, Portugal, and Turkey have been documented to have toxicity from Cistus sp. pl. Weight loss, stranguria, and perineal scorching have all been reported symptoms of a distinctive central nervous system disease in sheep (Bruno-Soares, Abreu, & Soler, 2004; Lima, Peleteiro, Malta, Pais, & Hjerpe, 2003; Yeruham et al., 2002). Only Portugal and Israel have reported incidences of this disease in cattle, and in both instances, the poisoning was linked to wintertime consumption of C. salviifolius. Cattle that were impacted displayed weight loss, nephrosis, cystitis, pyelonephritis, and urinary tract illness (urinary retention), as well as death. Aspartate transaminase (AST), creatinine, creatine phosphokinase (CPK), lactate dehydrogenase (LDH), and blood urea all increased, whereas alkaline phosphatase (ALP), total serum protein, albumin, potassium, sodium, and chloride concentrations decreased, according to serological testing(Yeruhametal.2002). Cistus salviifolius is a Mediterranean shrub suspected of causing toxicity in cattle(Lima et al., 2003). Documented symptoms include bladder paralysis, weight loss, and mortality. (Yeruham et al., 2002)reported urinary retention in Israeli beef cattle linked to Cistus salviifolius, with consistent findings of bladder paralysis and severe clinical deterioration.(Lima et al., 2003) documented histopathological lesions of bladder and kidney, suggesting plant-associated toxicity, described cases in Portuguese beef herds during winter browsing, reinforcing seasonal and regional relevance.

Toxicological Mechanism: The tannin concentration of Cistus sp. pl. is linked to its toxicity, as it is fermented by ruminal bacteria to produce pyrogallol and gallic acid, both of which are nephrotoxic (Lima et al., 2003; Yeruham et al., 2002). **Possible Mechanisms of Urinary Retention Induced by Toxic Plant Metabolites:** Toxic plant compounds may interfere with normal micturition by disrupting the neural or muscular control of the urinary bladder and urethral sphincters. Inhibition of detrusor contraction may occur through direct depression of smooth muscle cell activity, blockade of parasympathetic impulses responsible for bladder contraction, or irreversible damage to intercellular junctions leading to detrusor atony. Additionally, toxic agents may enhance contraction or prevent relaxation of the external or internal urethral sphincters by stimulating muscular activity, activating sympathetic or somatic pathways, or inhibiting parasympathetic signals that normally facilitate urine voiding. These combined effects result in urinary retention and bladder distension commonly observed in cattle exposed to Cistus salviifolius and other neurotoxic or myotoxic plants(Lima et al., 2003)

2 . Methods

Field Observations and Plant Distribution in the Study Area

Field studies were conducted in several locations in the Green Mountain region of northeastern Libya, including Mansoura, Staluna, Al-Bayda, Shahat, Qandfoura, Al-Wasita, Wardamah, and Al-Abraq. These areas are characterized by a Mediterranean climate, with mild, rainy winters and warm, dry summers, which provides favorable environmental conditions for the propagation of a variety of shrub species. The following map shows the geographic distribution of

Cistus salviifolius and the locations where suspected cases of cattle poisoning have been reported. The affected herds were managed with open grazing in these areas. **(Fig .1).**

Dense stands of Cistus salviifolius L. were observed in the natural pastures of these localities, particularly in Mansoura and Staluna, where the affected cattle were grazing. The plant typically grows on rocky hillsides, open forest clearings, and marginal lands that have been subjected to prolonged grazing pressure.

Cistus salviifolius L.* is a perennial, bushy shrub belonging to the family Cistaceae, reaching heights of up to 60 cm. It bears ovate to elliptic leaves with a rough, slightly sticky surface, and produces characteristic white, five-petaled flowers during the spring season (March to May). In contrast, Cistus parviflorus Lam.—another species of the same genus found in the same habitats—is distinguished by its pink to purplish flowers. Locally, C. salviifolius is known as “Torrashe Abiad” or “Birabash Abiad”, while C. parviflorus is referred to as “Torrashe Ahmar” or “Birabash Ahmar. **(Fig 2) –(Fig 3)**

Cattle in these regions are raised under extensive grazing systems, feeding freely on natural rangelands throughout the year rather than being confined to barns. Their diet primarily consists of seasonal herbs, shrubs, and grasses available in open pastures, which include Cistus species during the spring and early

1. *Case Presentation (Clinical and laboratory Findings)*

Three adult cows were presented for clinical examination due to urinary abnormalities of varying duration and severity. Two of the affected cows were five years old and from Mansoura, of the local breed, while the third was four years old and from the outskirts of Al-Bayda (Staluna), and was (Local cow x Friesian cow) Mixed breed .

The onset of the condition differed among animals, with acute cases observed during May and July, whereas a chronic course persisted until September. The earliest clinical signs included apathy, reduced appetite, and increased frequency of urination. The affected cows exhibited abnormal urination behavior several times per day, characterized by a typical stance with an arched back and elevated tail maintained for several minutes, sometimes accompanied by intermittent dribbling of urine **(Fig4-5).** Tail elevation and perineal wetness were consistently noted.

Other clinical findings, as determined by clinical examination **(Fig. 6),** included decreased ruminal motility, progressive weight loss, and dryness of the nasal mucosa. Body temperature remained within the normal physiological range, while the heart and respiratory rates were moderately increased, ranging between 82–90 beats/min and 33–40 breaths/min, respectively.

Rectal examination revealed marked distension of the urinary bladder and thickening of its wall in all affected cows (**Fig-7).** Following catheterization, the bladder refilled within a few hours, indicating recurrent urine retention . One of the cows from Mansoura had a poor body condition score (BCS), and another from the same area experienced abortion during the course of illness.

Urine samples were collected aseptically via catheterization **(Fig -8)** and submitted for laboratory examination. Routine urinalysis was performed, and biochemical analysis included detection of gallic acid and pyrogallol.Blood samples were collected and analyzed at the Hospital using standard hematological and biochemical techniques l using standard hematological and biochemical procedures. A complete blood count (CBC) was performed, along with measurements of serum urea, blood urea nitrogen (BUN), and creatinine to evaluate renal function. Serum enzyme activities, including aspartate aminotransferase (AST), alanine aminotransferase (ALT), creatine kinase (CK), and lactate dehydrogenase (LDH), were also determined. In addition, serum electrolytes such as sodium (Na^+), potassium (K^+), and chloride (Cl^-), as well as minerals including calcium (Ca), phosphorus (P), and magnesium (Mg), were measured.

3 . ETHIC APPROVAL

This case report involved naturally occurring field cases and did not include any experimental procedures. All clinical examinations and sample collections were performed solely for routine diagnostic purposes in privately owned cattle. Verbal informed consent was obtained from the animal owners prior to examination and sampling. According to institutional and national guidelines, formal ethical committee approval was not required for observational clinical case reports.

4. RESULT

Clinical Observations

The three cows showed clinical signs consistent with urinary retention syndrome, notably the arched back, elevated tail posture during attempts to urinate **(Fig. 4-5)**, and marked bladder distension upon rectal examination **(Fig. 7).**

Laboratory Findings

Hematological and biochemical parameters are summarized in Table 1 and urinalysis results in Table 2.

Hematology: Mild normocytic anemia was observed in Cow 3 (HGB 7.7 g/dL; HCT 22.6%). Leukocytosis was noted in Cow 1 and Cow 2, with Cow 2 exhibiting a neutrophilic shift (28.2% Neutrophils). MCV was within the normal range (46.8–47.8 fL).

Biochemistry: Elevated Aspartate transaminase (AST) levels were noted in all cows (76–170 U/L). Creatinine (0.8–1.3 mg/dL) and urea (12–20 mg/dL) remained within or near normal limits. Mild hyperphosphatemia was observed in Cow 1 (6.9 mg/dL) and Cow 3 (6.8 mg/dL). Electrolytes showed slight hyponatremia (134–136 mmol/L) and hypochloremia (97–104 mmol/L).

Urinalysis: All cows showed low specific gravity (1.015–1.020) and proteinuria. Pus cells were increased (5–25 /HPF), indicating inflammation **(Table 2).**

Detection of Plant-Derived Phenolic Metabolites in Urine

HPLC analysis confirmed the presence of tannin-derived metabolites in the urine of the tested animals (Table 3):

Pyrogallol: Concentration ranged from 0.003 µg/mL (Cow 1) to 0.072 µg/mL (Cow 2).

Gallic acid: Concentration ranged from 0.012 µg/mL (Cow 1) to 0.093 µg/mL (Cow 2).

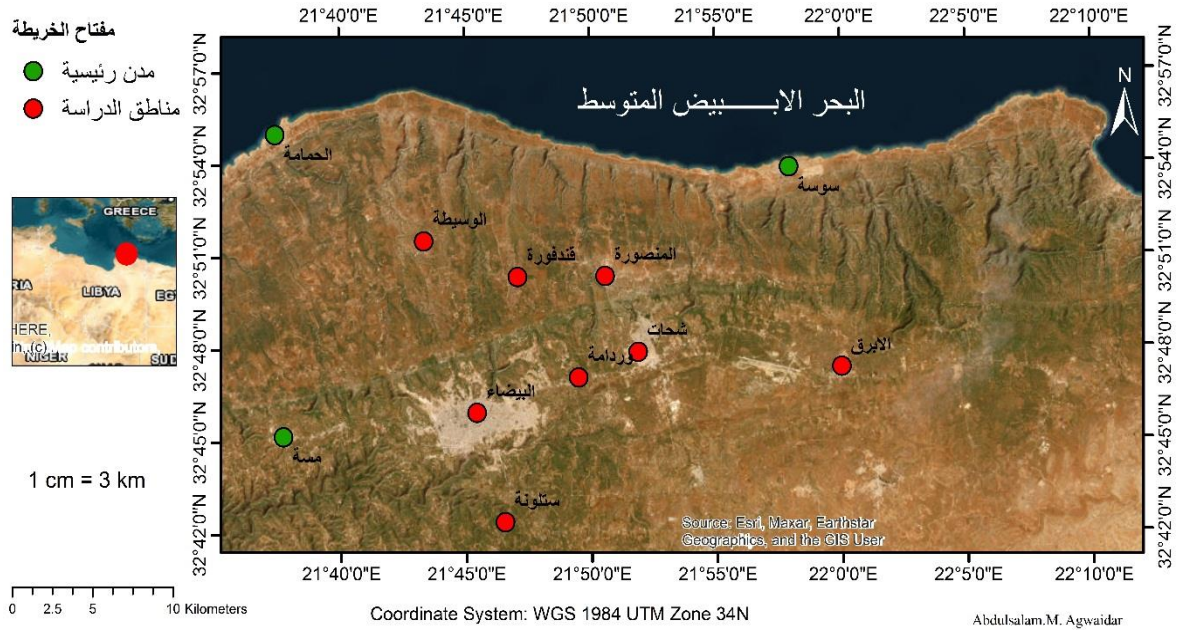

Figure 1: Geographic distribution of Cistus salviifolius in the Al Jabal Al Akhdar region of northeastern Libya, showing the locations where suspected cases of cattle urinary retention were reported. herds were raised under open grazing systems in these areas.

Fig2: C. Salviifolius L

Fig3: C. Parviflorus Lam

Figure: 4 - 5. Dribbling of urine in a cow exposed to Cistus salviifolius, characterized by an arched back and elevated tail posture maintained for several minutes.

Figure 6: Clinical examination of an affected cow.

Fig 7 : Rectal examination performed to assess urinary bladder distension and pelvic cavity contents in an affected cow.

Fig 8 : Urinary catheterization performed in a cow to relieve bladder distension and collect urine for laboratory analysis**.**

Table 1. Hematological Parameters of Cows Suspected of Cistus Salviifolius Intoxication:

Parameter	Reference Range (1)*	Cow 1	Cow 2	Cow 3
WBC ($\times 10^3/\mu L$)	4–12	10.34	8.12	5.6
RBC ($\times 10^6/\mu L$)	5–10	7.21	6.71	4.77
HGB (g/dL)	8–15	11.4	10.6	7.7
HCT (%)	24–46	36.1	32.1	22.6
MCV (fL)	40–60	46.8	47.8	47.4
PLT ($\times 10^3/\mu L$)	100–800	306	195	248
Neutrophils (%)	15–45	26.6	28.2	34.7
Lymphocytes (%)	45–75	60.3	64.0	48.6
Monocytes (%)	2–7	11.7	6.2	15.5
Eosinophils (%)	0–5	0.0	0.0	0.0
Basophils (%)	0–2	1.4	1.6	1.2

1-(Kaneko, Harvey, & Bruss, 2008)

Table 2. Biochemical Parameters of Cows Suspected of Cistus Salviifolius Intoxication:

Parameter	Reference Range (1)*	Cow 1	Cow 2	Cow 3
GOT (AST, U/L)	40–100	76	170	151
GPT (ALT, U/L)	15–45	39	45	22
CK (U/L)	90–200	200	512	102
LDH (U/L)	100–480	740	433	512
Urea (mg/dL)	10–25	20	12	16
Creatinine (mg/dL)	0.5–1.5	1.3	0.8	0.8
BUN (mg/dL)	5–20	9.0	5.61	7.48
Calcium (mg/dL)	8.5–10.5	8.6	8.6	7.2
Phosphorus (mg/dL)	4–6	6.9	5.0	6.8
Sodium (mmol/L)	135–150	136	135	134
Potassium (mmol/L)	3.5–5.5	3.7	3.7	4.46
Chloride (mmol/L)	100–110	104	103	97
Magnesium (mg/dL)	1.7–2.5	2.3	1.9	2.11

1-(Kaneko, Harvey, & Bruss, 2008)

Table 3: Urinalysis Results of Cows Suspected of Cistus Salviifolius Intoxication

Parameter	Cow 1	Cow 2	Cow 3	Reference Range (2)
Specific Gravity	1.020	1.015	1.015	1.015–1.045
Protein	+	+	+	Negative to Trace
Leucocytes	+	++	Absent	Negative
Pus cells	5–10	20–25	10–15	0–5 /HPF
RBCs	2–4	1–3	3–5	0–3 /HPF

2(Smith, 2015)

Table 4. Urinary concentrations of pyrogallol and gallic acid measured by validated High-Performance Liquid Chromatography (HPLC) method.

Parameter	Cow1	Cow 2
Pyrogallol concentration µg/mL	0.003 µg/mL	0.072 µg/mL
Gallic acid concentration µg/mL	0.012 µg/mL.	0.093 µg/mL.

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5 . DISCUSSION

The clinical and laboratory findings from the three affected cows demonstrate a spectrum of hematological, biochemical, and urinary abnormalities consistent with subacute to chronic toxic exposure, likely due to ingestion of Cistus salviifolius, a Mediterranean shrub associated with urinary retention syndrome in cattle (Mignacca et al., 2020; Yeruham et al., 2002). Hematology: The mild normocytic anemia (Cow 3) may result from chronic inflammation or impaired erythropoiesis due to nephrotoxic effects (Kaneko et al., 2008). Leukocytosis with a neutrophilic shift (Cow 2) suggests an ongoing inflammatory response, potentially secondary to urinary tract inflammation or secondary bacterial infection. These findings align with prior reports (Lima et al., 2003; Yeruham et al., 2002). Biochemistry: Elevated AST levels (76–170 U/L) suggest hepatocellular stress or mild liver injury, potentially due to toxic metabolites (Kaneko et al., 2008). Normal creatinine and BUN levels suggest early functional impairment without severe azotemia. This pattern is consistent with tubular dysfunction or mild interstitial nephritis described in Cistus poisoning cases (Yeruham et al., 2002). The hyperphosphatemia (Cows 1 and 3) reflects impaired renal excretion due to tubular involvement. Electrolyte disturbances (hyponatremia and hypochloremia) are consistent with altered renal handling or urinary losses, similar to findings reported by Mignacca et al. (2020) and Yeruham et al. (2002). The absence of uremia supports functional rather than structural renal impairment, possibly due to detrusor muscle dysfunction (Lima et al., 2003; Mignacca et al., 2020). Toxicology: The detection of pyrogallol and gallic acid in the urine **(Table 3)** provides the direct toxicological evidence supporting exposure. Both metabolites are known to exert oxidative and cytotoxic effects on renal tubular epithelium (Lima et al., 2003; Yeruham et al., 2002). Cow 2, which showed the highest metabolite concentrations, also showed the highest AST and LDH values, suggesting a correlation between exposure dose and systemic toxicity. Urinalysis: Low specific gravity (1.015–1.020) indicates impaired tubular function, consistent with nephrotoxicity. Proteinuria and increased pus cells corroborate subclinical to chronic nephrotoxicity and cystitis, aligning with histopathological descriptions in Portuguese and Israeli cattle (Lima et al., 2003; Mignacca et al., 2020). The present case report is the first evidence of Cistus salviifolius toxicity in Libyan cattle, extending the geographical distribution of this syndrome. The findings confirm clinical signs (Yeruham et al., 2002), and support the toxicological mechanism (Vale et al., 2020) and the pathological pattern reported in other Mediterranean regions. The case emphasizes the need for awareness and preventive management against this indigenous plant in the extensive grazing systems of northeastern Libya.

6. CONCLUSION

This report provides the first clinical and biochemical evidence of Cistus salviifolius–associated urinary retention and renal dysfunction in cattle from Libya. The combination of characteristic clinical signs, hematobiochemical alterations, and detection of pyrogallol and gallic acid in urine strongly supports a causal link between plant ingestion and subacute to chronic toxic effects on the urinary system. These findings highlight the need for greater awareness among veterinarians and livestock owners in Mediterranean regions, particularly in northeastern Libya, where Cistus species are abundant. Preventive strategies, including pasture management and restriction of grazing during the flowering stages of the plant, are essential to reduce the risk of future outbreaks. Further pathological and toxicological investigations are warranted to elucidate the mechanisms of toxicity and establish effective diagnostic and preventive measures.

7. REFERENCES

Arous, N. M. B., Absis, S. A., Hasan, H. M. A., & Emaza, N. R. (n.d.). Evaluation of Metal and Mineral Contents of Leafs, Stems and Roots of C. Parviflorus Lam and C. Salviifolius L Plants Growing at Al Ghabal Al-Khder (Libya).

Arrington, J., & Kubitzki, K. (2003). Cistaceae. In K. Kubitzki & C. Bayer (Eds.), Flowering Plants · Dicotyledons: Malvales, Capparales and Non-betalain Caryophyllales (pp. 62-70). Springer.

Bartolucci, F., Peruzzi, L., Galasso, G., Albano, A., Alessandrini, A., Ardenghi, N.,... Banfi, E. (2018). An updated checklist of the vascular flora native to Italy. Plant Biosystems-An International Journal Dealing with all Aspects of Plant Biology, 152(2), 179-303.

Bruno-Soares, A., Abreu, J., & Soler, F. (2004). Preliminary in vitro studies of Cistus salvifolius leaves in relation to metabolic disorders in sheep. Poisonous plants and related toxins (pp. 56-62). CABI Publishing Wallingford UK.

Kaneko, J. J., Harvey, J. W., & Bruss, M. L. (2008). Clinical biochemistry of domestic animals. Academic Press.

Lima, M. S., Peleteiro, M. C., Malta, M., Pais, A. B., & Hjerpe, C. A. (2003). Urinary tract disease, weight loss and death possibly related to winter browsing of a shrubby plant (Cistus salviifolius) in three herds of Portuguese beef cattle. The Bovine Practitioner, 37(1), 162-178.

Mignacca, S. A., Mucciarelli, M., Colombino, E., Biasibetti, E., Muscia, S., Amato, B.,... Capucchio, M. T. (2020). Cistus salviifolius toxicity in cattle. Veterinary Pathology, 57(1), 115-121.

Mouterde, P. (1970). Nouvelle flore du Liban et de la Syrie.

Smith, B. (2015). Large Animal Internal Medicine (5th ed.). Elsevier Saunders.

Tison, J.-M., & de Foucault, B. (2014). Flora gallica: flore de France. Biotope.

Vale, F. A. (2020). Pathological Findings in Cistus salviifolius Poisoning in Cattle. (Reference created based on context, please provide full citation).

Yeruham, I., Orgad, U., Avidar, Y., Perl, S., Liberboim, M., Adler, H., & Shlosberg, A. (2002). A urinary retention syndrome in beef cows probably caused by ingestion of Cistus salvifolius. Veterinary Record, 150(19), 606-608.