

Psychogenic Lithophagia in a German Shepherd Dog

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ABSTRACT

Licking, chewing or ingesting non-nutritive substances is defined as pica. Although pica is generally reported to be due to trace element deficiencies, both medical and behavioral causes for pica must be considered. In the current case, it was aimed to report the clinical reflections of lithophagia associated with behavioral disorder in a dog and the haematobiochemical and some radiographic findings. The research material was consisted of a German shepherd dog with symptoms of vomiting and diarrhea. The result of blood hematobiochemistry was not indicative of alterations that could be associated with the pica, while diagnostic imaging revealed the presence of pebbles in the rectum. Blood samples were also examined to determine possible trace element deficiencies, but no significant changes were observed in these parameters. Given that pica, the ingestion of non-edible materials, is a recognized sign of behavioral problems, this aspect must be appropriately investigated, diagnosed and treated.

Keywords: Behavioral disorder, Dog, Lithophagia, Pica

Bir Alman Çoban Köpeğinde Psikojenik Litofaji

ÖZ

Besin niteliğinde olmayan maddelerin yalanması, çiğnenmesi veya yutulması pika olarak tanımlanmaktadır. Pikanın genellikle iz element eksikliklerine bağlı olarak şekillendiği bildirilse de hem medikal hem de davranışsal nedenler göz önünde bulundurulmalıdır. Mevcut olguda bir köpekte davranış bozukluğuna eşlik eden litofajinin klinik yansımaları ile hematobiyokimyasal ve bazı radyografik bulguların bildirilmesi amaçlanmıştır. Araştırma materyalini kusma ve diyare semptomları olan bir Alman çoban köpeği oluşturdu. Kan hematobiyokimyasının sonucu pika ile ilişkili olabilecek değişiklikleri göstermezken, tanısal görüntüleme rektumda çakıl taşlarının varlığını ortaya çıkardı. Olası iz element eksikliklerini belirlemek için kan örnekleri de incelenmiş, ancak bu parametrelerde önemli bir değişiklik gözlenmemiştir. Yenilebilir olmayan maddelerin yenmesi olarak tanımlanan pika davranışsal sorunların bilinen bir işareti olduğundan uygun şekilde araştırılmalı, teşhis edilmeli ve tedavi edilmelidir.

Anahtar kelimeler: Davranış bozukluğu, Köpek, Litofaji, Pika

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INTRODUCTION

Ingestion of non-nutritive substances for various reasons in humans and animals is defined as pica, also known as allotriophagy (Kumar et al., 2020; Masson et al., 2021). Individuals with pica are reported to taste or tend to swallow non-food substances, including but not limited to hair (tricophagia), stones (lithophagia), pieces of fabric, and even feces (caprophagia) (Kumar et al., 2020). Animals with pica tend to lick and gnaw almost everything they come into contact with, and are reported to be especially prone to eating soil, bones (osteophagy) and garbage. Female dogs, cats, goats, cattle and buffaloes can also act placenta eating (placentophagy) behavior. Although this condition in dogs may be related to protein deficiency, it should not be forgotten that it is a behavioral adaptation developed by the mother to protect the newborn from predators in the environment (Firyal, 2007).

Although the etiology of pica has not been fully elucidated, it is stated that it may develop due to deficiencies of some amino acids, vitamins and trace elements, as well as hunger or changes in mood (boredom) are also effective in the emergence of this disorder (Eyarefe, 2016; Kochan et al., 2023). It has also been reported that hypersensitivity-hyperactivity syndrome in dogs may be a behavioral problem associated with pica and thus foreign body ingestion (Merola and Giussani, 2010). Some researchers suggest that a number of factors such as anxiety, oral obsessive-compulsive disorder, or the owner's work routine (e.g., attachment problems) may cause foreign body ingestion (Masson et al., 2021). While pica in dogs is a common complaint in behavioral consultations, it can also result in situations that can negatively affect the dog's welfare (e.g. punishment or isolation) (Masson et al., 2021).

Due to all the abovementioned, pica in dogs is a subject that should be emphasized, and its causes should be investigated. This study aims to investigate the hematobiochemical, radiographic, and behavioral aspects of psychogenic lithophagia in a German shepherd dog.

CASE PRESENTATION

The research material consisted of a 1.5-year-old intact female German shepherd mine detection dog with a body weight of 18.5 kg with complaints of vomiting and diarrhea. It was learned that the symptoms of vomiting and diarrhea were observed by the dog's owner for a long time without any abnormal findings such as loss of appetite, depression, poor performance or a change in diet. The dog with lithophagia previously had another owner, and the previous owner stated that the patient had been showing the same symptoms approximately for 9 months and that the sibling of the dog with lithophagia also suffered from pica. It has also been

reported recently that pebbles have been seen in the stomach and intestinal contents

and that the dog tends to swallow all kinds of non-nutritive substances, while on duty, especially pebbles. A detailed examination was started by obtaining informed consent from the owner.

On physical examination, it was determined that mucosa and conjunctiva appeared mild hyperemic, respiratory rate was 28 breaths/minute, pulse rate was 96 beats/minute, and rectal temperature was 38.6°C. Increased sensitivity was observed during abdominal palpation of the mesogastric area. During the physical examination, it was noted that the dog could not be restrained without the assistance of the owner. Considering the anamnesis, digital disimpaction was performed and numerous pebbles were detected in the rectum. Laterolateral radiographic images of the abdomen were taken to determine the amount and location of the pebbles. Subsequently, an ultrasonographic examination was performed to evaluate the intestinal wall.

To perform serum biochemical and hematological analysis, blood samples were taken from the vena cephalica antebrachii into tubes with and without anticoagulant. The blood sample taken into an anticoagulant tube was analyzed immediately with a blood counting device (Mindray BC-2800Vet, China). The blood sample collected in a tube without anticoagulant was centrifuged at 3000 revolutions per minute for 10 minutes after clotting at room temperature, and the serum sample obtained was analyzed using biochemistry devices (Fujifilm, Dri-Chem NX500, Japan; Abbott, Architect C16000, USA).

A decrease in hematocrit value and microcytosis were detected in the complete blood count compared to reference ranges (Table 1). Compared with the reference ranges of the serum biochemical analysis results showed that the serum globulin level decreased (Table 2). Serum iron, unsaturated iron binding capacity, total iron binding capacity, zinc and copper levels are shown in Table 3. On the L/L image of the abdomen, mild ventral displacement of the column detected due to numerous pebble ingestion (Figure 1). Ultrasonographic examination revealed increased echogenicity in the serosa layer of jejunum (Figure 2).

Since the determination of serum iron, unsaturated iron binding capacity, total iron binding capacity, zinc and copper levels takes time and it is known that pica is usually associated with trace element deficiencies (Eyarefe, 2016; Firyal, 2007; Kochan et al., 2023; Kumar et al., 2020), supportive treatment initiated without waiting for the complete results of laboratory analysis. It has been reported that excessive faecal vitamin D3 loss may occur in gastrointestinal system diseases of dogs (Dittmer and Thompson, 2011), and that the addition of vitamin B12 and vitamin D3 to

the treatment protocol may be beneficial (Tamura, 2025). Similarly, it has been reported that faecal zinc

loss may occur in dogs with gastroenteritis (Pereira et al., 2021).

Table 1: Hematological findings of a dog with lithophagia

Parameters	Results	Reference ranges (Turgut, 2000)
WBC ($10^9/l$)	14.8	6.0 – 17.0
Lenf ($10^9/l$)	3.8	0.8 – 5.1
Mon ($10^9/l$)	0.9	0.0 – 1.8
Gra ($10^9/l$)	10.1	4.0 – 12.6
Lenf (%)	25.5	12.0 – 30.0
Mon (%)	6.3	2.0 – 9.0
Gra (%)	68.2	60.0 – 83.0
RBC ($10^{12}/l$)	6.4	5.5 – 8.5
HGB (g/dl)	13.8	11.0 – 19.0
HCT (%)	38.2	39.0 – 56.0
MCV (fl)	59.7	62.0 – 72.0
MCH (g/dl)	21.5	20.0 – 25.0
MCHC (fl)	36.1	30.0 – 38.0
RDW (%)	12.8	11.0 – 15.5
PLT ($10^9/l$)	388	117 – 460
MPV (fl)	7.2	7.0 – 12.9
Eos (%)	1.7	1.0 – 10.0

WBC: total leukocyte count, Lenf: lymphocyte, Mon: monocyte, Gran: granulocyte, RBC: total erythrocyte count, HGB: hemoglobin, HCT: hematocrit, MCV: mean erythrocyte volume, MCH: mean erythrocyte hemoglobin, MCHC: mean erythrocyte hemoglobin concentration, RDW: red cell distribution, PLT: platelet, MPV: mean platelet volume, Eos: eosinophil

Table 2: Serum biochemical analysis findings of a dog with lithophagia

Parameters	Results	Reference ranges (Turgut, 2000)
ALT (IU/l)	44	10-88
AST (IU/l)	35	10-88
ALP (IU/l)	48	20-150
GGT (IU/l)	10	1.0-10
BUN (mg/dl)	17	12-25
Cre (mg/dl)	0.96	0.5-1.5
TP (g/dl)	4.7	5.4-7.4
ALB(g/dl)	2.6	2.3-3.8
Glob (g/dl)	2.1	2.3-5.2
Amyl (IU/l)	760	300-2 000
LIP (IU/l)	67	25-750
GLU (mg/dl)	78	60-110
IP (mg/dl)	5.2	2.2-5.5
Mg (mg/dl)	1.7	1.2-2
Ca (mg/dl)	10.4	8.6-11.2
Na (mEq/l)	146	141-153
K (mEq/l)	4.9	3.7-5.8
Cl (mEq/l)	111	105-115

In light of these findings, a treatment plan was devised, involving the administration of zinc sulfate heptahydrate (Zinco®; Berko İlaç) twice daily per os (PO), at a dose of 3 ml, butaphosphan and vitamin B12 (Symphos®; İPM İlaç) every other day by subcutaneous (SC) injection at a dose of 1.5 ml, and vitamin D3 (Devit-3®; Deva) every other day PO, at a dose of a single drop, for a duration of 14 days. After the treatment was terminated, the owner was called, and an anamnesis was taken regarding the dog's current condition. It was reported that the dog continued to show pica symptoms and still has diarrhea following lithophagia. It also learned that the dog was kept away from potential foreign bodies that could be ingested by changing its shelter, but despite

this, the dog licked and gnawed the shelter material and showed lithophagia behavior again while on duty. The fact that the laboratory results were within reference ranges and the persistence of lithophagia suggested that this condition might be due to a behavioral disorder. Therefore, the 4A grid scoring (Masson et al., 2021) for dogs was used to assess behavioral disorder based on information obtained from the owner. In this context, aggressivity, anxiety, attachment and autocontrol were evaluated and each of them was scored as 12, 12, 15 and 17 out of 20, respectively. Therefore, it was concluded that the lithophagia in the present case occurred due to a behavioral disorder.

Table 3: Serum trace element levels in the dog with lithophagia

Parameters	Results	Reference ranges
Fe (µg/dl)	137	94.7-223.4 (Silvestrini et al., 2014)
UIBC (µg/dl)	186	184.3-307.2 (Silvestrini et al., 2014)
TIBC (µg/dl)	319	318.4-480.4 (Silvestrini et al., 2014)
Zn (µmol/l)	25.3	4.9-19.7 (Zentrichová et al., 2023)
Cu (µg/dl)	46.6	20-80 (Amundson et al., 2024)

Abbreviations: Fe: iron, UIBC: unsaturated iron-binding capacity, TIBC: total iron-binding capacity, Zn: zinc, Cu: copper

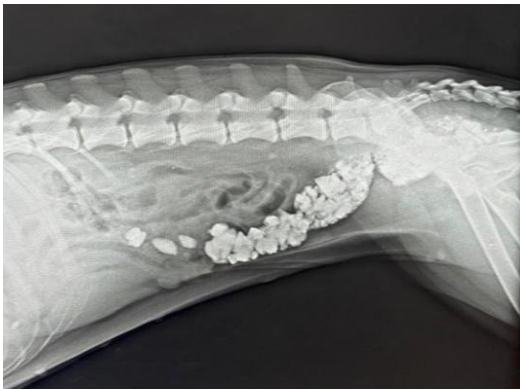


Figure 1: Laterolateral image of the abdomen, mild ventral displacement of the column due to numerous pebbles ingestion.

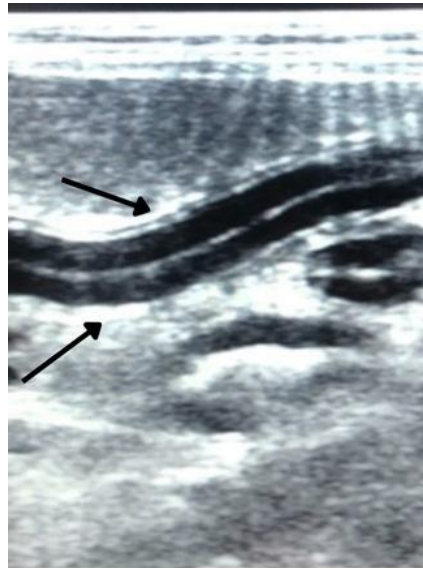


Figure 2: Sagittal plane image of the right dorsal abdomen of the dog with lithophagia. Arrows: Increased echogenicity in the serosa layer of jejunum.

DISCUSSION

The causes of pica remain unexplored, but it may occur due to certain amino acid, vitamin and trace element deficiencies or as a behavioral disorder (Eyarefe, 2016; Kochan et al., 2023). In this study, it was determined that pica was caused by behavioral disorder in accordance with the reports of the researchers (Masson et al., 2021).

In human pica cases, the risk of lithophagia may increase in individuals with a family history of pica (Rajendra et al., 2016). Therefore, in addition to behavioral disorders, family history is a factor that should be taken into consideration when investigating underlying causes of pica in dogs. The pica in the present case was found to be related to behavioural disorder as reported by the researchers (Eyarefe, 2016; Masson et al., 2021; Rajendra et al., 2016). Although the current study was limited by the inability to determine all trace elements and vitamin levels and the inability to collect data from the other dog reported in the anamnesis, the fact that the dog was fed a good quality, balanced commercial diet and pica was reported in family members supports that this phenomenon developed due to behavioral disorder.

In a study (n=42), researchers (Masson et al., 2021) found that fabric (54.8%), plastic (28.6%), rubber (21.4%), stone (4.8%), metal (4.8%) and wood (2.4%) were the most common materials ingested by dogs. It has also been reported that some dogs tend to swallow multiple foreign body (Masson et al., 2021). In this case the dog was found to be prone to ingesting stones. However, it is important to be aware that any foreign body can be ingested.

It has been reported that the clinical findings encountered in dogs with pica are pain, cramps, constipation or diarrhea (Firyal, 2007; Kochan et al., 2023) and common complications include gastrointestinal obstruction, intestinal necrosis,

perforation, peritonitis and hypovolemia (Masson et al., 2021). In this case, pain on abdominal palpation and diarrhea due to lithophagia were detected, but no complications were encountered. Authors believe that in addition to the quantity, shape and size of the foreign bodies taken, the time elapsed since ingestion and the consciousness level of the patient owners are also effective in the formation of complications.

In the hematological findings of the dog with lithophagia, a decrease in hematocrit value and microcytosis were detected. Since all erythrogram indices must be evaluated together, there is no significant decrease in the parameters, and there are individual differences (Turgut, 2000), changes in hematological findings were not associated with lithophagia and were not found to be significant. Serum biochemistry showed a decrease in serum globulin levels. It has been highlighted that serum globulin levels may decrease in canine lymphocytic plasmacytic enteritis (Craven and Washabau, 2019). Therefore, the authors thought that the decrease in

serum globulin levels in the present case was related with enteritis. To the authors' knowledge, it was determined that there were serious differences in the reference ranges specified for serum zinc levels in dogs (Mert et al., 2008; Tomza-Marciniak et al., 2012; Zentrichová et al., 2023). Researchers reported that this difference may be related to the number of animals used in the study, the diet applied, breed and gender (Zentrichová et al., 2023). In the same study, they emphasized that the most important factor was gender and reported that serum zinc levels were significantly higher in intact females than intact males (Zentrichová et al., 2023). In the present case, although it was noted that the serum zinc level was high compared to the reference range, this was considered normal as the dog was an intact female.

CONCLUSION

Pica, defined as licking, chewing or ingesting non-food items, is a significant life-threatening problem with potential gastrointestinal complications and a direct negative impact on the dog's welfare. Behavioral consultation of dogs with a tendency to swallow foreign bodies is an area that needs to be expanded, although it is rare in veterinary practice. It should not be forgotten that pica may be of psychogenic origin, especially in dogs with a family history of pica, as in the present case, and those that have received strict training to be used in different services, and the incidence of pica in such service dogs may be higher compared to other dogs. It is also thought that in cases where pica is observed, the environment should be arranged according to the needs of the dog, potential foreign bodies that may be ingested should be eliminated, and patient owners should be made aware of this issue. It was concluded that behavioral disorders in dogs exhibiting pica despite being fed a balanced diet and having a normal hematobiochemical profile is an issue that needs to be addressed.

Conflict of interest: The authors have no conflicts of interest to report.

Authors' Contributions: AŞ and AK contributed to the project idea, design and execution of the study. AG, ÖFK and BÇ contributed to the acquisition of data. AŞ, AK and ÖFK analysed the data. AG drafted and wrote the manuscript. AŞ and AK reviewed the manuscript critically. All authors have read and approved the finalized manuscript.

Ethical approval: This study is not subject to the permission of HADYEK in accordance with the "Regulation on Working Procedures and Principles of Animal Experiments Ethics Committees" 8 (k). The data, information and documents presented in this article were obtained within the framework of academic and ethical rules.

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