



Occurrence of Phytobezoars in the Digestive Tract of Sheep Reared on Natural Pasture in Kordofan

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ABSTRACT

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This study was carried out at Kordofan, West Sudan during period from 2012 to 2014. It's aimed to identifying the real causes of phytobezoars and find out the prevalence of sheep phytobezoariasis. Husbandry management of this condition was determined in survey using a questionnaire distributed to breeders in Study area. For chemical characteristics of phytobezoars representative samples of bezoars from slaughtered sheep, and samples from plant (tabar) that had shown to initiate formation and retention of this ball has been taken. Laboratory analysis results showed that the proteins content of phytobezoars and tabar were on an average of (8.73%, 10.38%), respectively. A detected ether extract signed (0.00%, 0.60%) for phytobezoars and tabar, respectively. Results showed that phytobezoars and tabar plant had higher contents of heteropolysaccharits as cellulose and hemi cellulose of (47.5, 29.11%), (28.6%, 12.16%) in both, respectively. The percentage of lignin was on an average of (28.6%, 14.34%), and tannin recorded of (2.05%, 0.025%) in phytobezoars and tabar, respectively. After has been identified to bezoars as suspected of causing the most common foreign bodies (35.3%) of respondent confirmed presence of phytobezoars. 23% of breeders indicated this cause due to grazing the animals on special type of (tabar) (*Merrimia emarginata*). Also 44.6% of respondents recorded the phytobezoars are caused the death of sheep. For husbandry management of phytobezoars (81.8%) of breeders didn't have knowledge to treat with phytobezoars, only 6.4% said that surgery is the only treatment of phytobezoars. For the preventive procedures, 96.3% of breeder answer they had no prevention methods. The study predicted that the plant (tabar) special type (*Merrimia emarginata*) was caused an incidence of phytobezoars in sheep. Results showed that phytobezoars and tabar plant had higher fiber content of (cellulose, hemi cellulose, lignin and tannin), that may affects the formation of phytobezoars.

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INTRODUCTION

Sudan is the largest counter with an area of 1.88 square kilometers Km. It has a human population of 39.27 million people (CBS, 2014). MARF (2010) provided official estimates of the size of Sudan's livestock populations currently are of 51.56-52.08 million sheep, 43.27- 43.44 million goats, 41.56-41.76 million cattle and 4.52-4.62 million camels (MARF, 2005). Kordofan is the homeland for Sudanese Desert sheep that is accounted for 65% of the national herd of the species and the main export ecotype from the country (Jadalla, 2012). In kordofan region the livestock studies showed that there were 15%, 10%, 21% and 36% of the nation cattle, sheep, goats and camels respectively and all traditional livestock types are found in Kordofan (Farah, 2006). The major problem of the rangeland as degradation included over's loading and grazing leading to certain ecological disaster too little lands (El hag *et al*, 2012). In Sudan, animals farm were suffer from serious constraints. The most important it's the shortage of feedstuffs, particularly at the dry season. Because the most of Sudanese herds depend on range and pasture so they will be affected by their conditions when its poor and nutrients are not enough to cover maintenance and productive requirements of the animal that will decreased the total amount of production. Foreign material of plant and/or animal origin as (bezoars) has been reported to cause impaction of the digestive tracts domestic and wild animals (Bath *et al*, 1979; Jone *et al*, 1983).. In highlands some African countries many lambs manifest anorexia and die without the cause being established (Najua *et al*, 1988). Degree of incidence cause and mode of formation of those phytobezoars were not yet fully investigated (Jadalla, 2012). In other parts of the tropics phytobezoars together with other foreign bodies are well known cause of

losses in small ruminants (Radostitis *et al*, 2000). Phytobezoars in sheep have assumed importance recently in Kordofan due to the fact that some plant species have shown to initiate formation and retention of these ball-shaped bodies in ruminants leading to mortality. Among these nutritional constraints was pointed out recently by producer is the prevalence of phytobezoars that causes high mortality rate and serious losses of weight, production and reproductivity.

So the objectives of this study are to determine the degree of incidence of phytobezoars in sheep raised on natural rangelands in Kordofan region.

Also for better understanding of the formation mechanisms of the Bezoars through chemical analysis and determination of constituents of the bezoars and the plant that suspected it had been responsible for initiation of the formation of the phytobezoars was done.

MATERIALS AND METHODS

Study area

This study was conducted in greater Kordofan (North and South) to investage the cause of incidence of Bezoars and degree of phytobezoars in El Khuwei, Abu Zabad and Aldebaibat. All areas are within Kordofan region which located between latitudes 9°:30' and 16°: 30' North and longitudes 24° and 32°: 25' East. The region consists of North and South states forming a total area of 380,000 Km² (90 million Fadden).

Field surveys and sampling

the information data of this study was obtained from three areas and markets for sheep in Kordofan: the El Khuwei, Abu Zabad and Aldebaibat 187 questionnaire were randomly distributed to respondent whom selected among herders and livestock owners where in each area of study. 30 samples of phytobezoars were collected

randomly from locality of El Khuwei, Abuzabad, and Gebeash for chemical characterization and plant classification. To assess the prevalence of incidence by phytobezoars among animals brought to abattoirs, an examination to diagnose the incidence of phytobezoars was done by palpation before slaughtering the animals.

Collection of phytobezoar samples

After the slaughter, and immediately after removal of the viscera, animal digestive organs were removed carefully to detect the phytobezoars and herbal balls to locations in digestive system. Samples of phytobezoars and herbal balls were collected from slaughterhouses and classified according to the plants and grasses that the animals ingested and then analyzed chemically to determine their fiber content, crude protein, organic matter, ether extract and minerals and tannin.

Questionnaire data

A questionnaire was designed clearly, included: the prevalence of phytobezoars and causes of phytobezoars, husbandry management, methods of prevention and treatment of zone and personal characterization.

Inventory and Classification of Plants causing phytobezoar

To identify the species of plants that is believed causing the herbal Balls (phytobezoars) , samples were collected covering the three study areas and then subjected to identification and classification, by experts from forests specialist at Ministry of Agriculture and forestry at Al obeid.

Chemical analysis of phytobezoars

Samples of phytobezoars were analyzed by used approximate method to determine the contents of crude protein, crude fiber, dry matter, ether extract, moisture, ash and tannin. From different Families of tabar two species (*Ipomoea cordofana*, *Merrimia emarginata*) were also analyzed and their Physical structures were figure out and the chemical composition was also determined.

Methods of proximate analysis

According to Abdulrazak (1999) the standard methods used routinely in Animal Nutrition laboratory are described in this manual. The bulk of the manual focuses on the laboratory producer in a simple step by step approach with more emphasis on methods used in evaluating feed resources.

Statistical Analysis

All data were managed using the SPSS, (1999).

RESULTS AND DISCUSSION

Incidence of phytobezoars

The prevalence of incidence as shown in table (1) confirmed that 35.3% of breeders insured that their herds have been infected by phytobezoars throughout the sheep's life productive. Similar results were observed by Jadalla, (2012) who stated that the prevalence of phytobezoars was found 15.5 % in Sudan desert sheep in kordofan. For instance Igbokwe *et al.*, (2003) reported a prevalence rate of 19.3% of foreign bodies in sheep in Nigeria. On the contrary, a much higher prevalence rate (97%) was reported in Nigeria in sheep and goats brought from urban areas for slaughter (Remi-Adewunmi *et al*, 2004). Hailat *et al* (1996) recorded a prevalence rate of 8.9% in Jordan. Phytobezoars were reported to 5.1% in sheep and goats in Syria (Hindi, 2004), and was mainly caused due ingestion of plants that had higher portion of indigestible fibers.

Table 1: Incidence of phytobezoars

Incidence	Frequency	Percent %
Yes	66	35.3
No	121	64.7
Total	187	100.0

The results confirmed that different ages of sheep were suffering from incidence of phytobezoars, 92.5% male, 96.8% female of lambs at the age less than one year had phytobezoars compared to 85.5% of sheep at one year and 65.7% of sheep at 2 years (table 2). Similar result was stated by Jadalla, (2012) who said that Breeders insisted that small ruminants especially at younger age suffered from the Bezoars disorder much than animals aged less than one year. Were found frequently to have phytobezoars than older age categories. Animals in this age group had more phytobezoars than the older ones because of

their higher protein requirement for growth and their inclination for selection of forbs higher in protein and at the same time liable to cause phytobezoars such as *M. emarginata*. The herders stated that the symptoms of the incidence are clear and animals can easily be diagnosed for the disorder. In the line with above mentioned by (Nowicki, et al. 2003 and Botha et al, 2002) whom stated that, herbal balls infect all ruminant cattle, camels, sheep, goats horses and cats which grazing large amounts of fibrous weeds. It also spread more among young animals.

Table 2: Percentage of sheep suffers from phytobezoars in herd Plants Suspected of Causing Incidence of Phytobezoars in Kordofan

Sex	Age of sheep	percent %
Male	Less than one year	92.5
	One year	85.5
	2 year	65.7
Female	Less than one year	96.8
	One year	75.8
	2 year	60

Study listed plants suspected of causing incidence of phytobezoars in table (3). Results showed that 23% of breeders recorded that the plant tabar *Blepharoccephala Ipomoea*, *Merrimia emarginanata* and *Ipomaea kordofana* was caused the incidence of phytobezoars. Similar result was reported by Jadalla, (2012) who indicated that, the prevalence of phtytobezoars in sheep were raised on rangelands positively associated with high density and frequency of definite species of plants such as: *Ipomaea kordofana*,

Merrimia emarginanata and *Blepharoccephala, eriocarpus*. For instance 3.2% of breeders believed that plants (tabar) and usher were caused the incidence, 1.6% of breeders insured just plant usher was a major cause of these cases, while 63.6% of breeders had didn't know the reasons of formation of these phytobezoars. In another study was described by [Daniel et al](#), (2013) who stated that the clinical and pathological findings of intestinal obstruction caused by phytobezoars in cattle consuming

Stylosanthes sp., on three farms in Mato Grosso, Brazil.

Table 3: plants Suspected for causing phytobezoars

Plants	Frequenc y	Perce n%	Plants	Frequen cy	Precent %
Tabar	43	23.0	Don't know	119	63.6
Usher	3	1.6	Tabar and abushreeta	1	.5
Hantoot	2	1.1	Tabar and usher	6	3.2
Abushareeta	3	1.6	Tabar , usher and water mellon	1	.5
Watermelon	2	1.1	Tabar ,abushreeta and hantoot	1	.5
Other plants	1	.5	Tabar and water melon	1	.5
Tabar and hantoot	1	.5	Tabar and argasi	3	1.6
Total	55	29.4%	Total	132	70.6%

Table 4: Classification of plant species suspected of causing phytobezoars in sheep in kordofan.

local name	Botanical name
Tabar	<i>Ipomoea belepharocepela</i>
Alhantot	<i>Ipomoea Cordofana</i>
Liflaif	<i>Merrimia emarginata</i>
Ushar	<i>Ipomoea spp</i>
Aerksi	<i>Calotropis procera</i>
Water Melon	<i>Chrozophora brocchiana</i>
Abanno	<i>Cucumis melo</i>
Sorrel	<i>Citrullus colocynthis</i>
Heglig	<i>Balanites aegyptiaca</i>

Degree of phytobezoars incidence was affected by season in table (5). Results showed that 19.3% of breeders stated that the higher prevalence rate of phytobezoars was observed in winter, and 17.6% of breeders believed that in wet season because abundance of grasses and plant on pastures, which it was decreased in summer. These were similar to Botha *et al*, 2002) who stated

that, phytobezoars occur most commonly in the following spring or summer. Same result was reported by Azizi (2010) who said that the higher prevalence of abomasal phytobezoariasis is in winter compared with other seasons and the higher prevalence of affected sheep in autumn compared with spring.

Table 5: the effect of season on degree of phytobezoars incidence

Season	Frequency	%
Winter	36	19.3
Summer	7	3.7
Rainy season	33	17.6
All the year round	1	0.5
Do not know	106	56.7
Winter and summer	1	0.5
Summer and rainy season	3	1.6
Total	187	100.0

The mortality in the herd causes by phytobezoars.

Study showed the mortality in herd's causes by phytobezoars in table (6). Numbers of breeders about (44.6%) believed that phytobezoars were caused the death of sheep, While 46% don't know the cause of sheep's death. Similar results were reported by (Jadalla, 2012) who stated that the phytobezoars causes severe loss of production and high mortality rates. Same

results observed by (Radostitis *et al*, 2000) who stated that the phytobezoars causes high mortality rates and serious losses. Another similar result is a serious problem due to the possibility of phytobezoar formation, thus leading to intestinal obstruction and high mortality rates in cattle, the morbidity varied from 3.3 to 15% and the mortality was 100% (Daniel *et al*, 2013).

Table 6: the mortality in the herd causes by phytobezoars

mortality	Frequency	%
Yes	84	44.9
No	17	9.1
Do not know	86	46.0
Total	187	100.0

Prevention&Treatment of phytobezoars by herder

Treatment ways of phytobezoars by herders in (table 7) showed that 81.1% of breeders

do not know how to treat cases of phytobezoars, while 6.4% of breeders stated that the surgery is the only solution to treat phytobezoars. The veterinarian locality of Ghibaish confirmed that existence of phytobezoars during the vaccination were (67 cases) after palpation was extracted. Uses surgery treatment was stated by (Rippolles *et al*, (2001) who confirmed surgery is the only way to treat a

phytobezoar obstruction, most animals that are still on their feet at the time of surgery will recover and many are back on their milk within 48 hours. Same results were observed by (Doustar *et al*, 2012) who stated that surgical treatment is routine and can be performed safely with reasonably good success.

Table 7: Treatment of the phytobezoars

Treatment	Frequency	Percent%
Antibiotics	15	8.0
Sulfa	4	2.1
Do not know	153	81.8
Surgery	12	6.4
Anthrax inoculator	1	0.5
PPR inoculator	2	1.1
Total	187	100.0

In this study 96.3% of breeders mentioned that no method for prevention of phytobezoars had been used in table (8). Whoever, a few of them thinking that grazing their animals at places free of plants causes phytobezoars, avoidance animals from drinking muddy water and the fowl pox vaccine may prevents their animals.

Similar result observed by Botha, (2002) who reported that avoidance of exposure of lambs to only seradella pastures or camps with causative plants especially during periods when pappus hairs are prevalent could be preventative measure against phytobezoars.

Table (8) Methods for prevention of phytobezoars

Prevention	Frequency	%
No	180	96.3
Prevent grazing at places free of plants causing bezoars	3	1.6
Fowl pox vaccine	3	1.6
Avoidance of drinking muddy water	1	0.5
Total	187	100.0

Chemical Composition of the phytobezoars

Chemical analysis of phytobezoars in table (9) showed that the percentages of the

Cellulose, Hemicelluloses and lignin were of 47.06, 23.96 and 28.97 respectively. This higher percentage of non digestive heteropolysaccharides may be the main causes of phytobezoars, which there fibrous materials would accumulated in the rumen and rolling around and from forming the shape of balls (De Toledo *et al*, 2012). Chisholm *et al*, (1992) stated that a phytobezoar is a type of [bezoar](#), or trapped mass in the stomach, that consists of components of indigestible plant material, such as fibers, skins of seeds. Percentage of crude protein was obtained in this study on an average of 8.73%. Ash content was on an average of 6.6%. Other study showed that Ash, nitrogen, phosphorus and zinc

concentrations in both bezoars and plant material were similar (Botha *et al*, 2002). Similar results were reported by (Veeraiah *et al* 2008) who stated that the Phytobezoars consisted of plant materials, polythenes and mineral deposits. Phytobezoar consisted of 8.22% moisture, and 5.58% crude protein, 5.80% crude fiber and 80.40 % total ash on chemical analysis. The percentage of tannin was high on an average 2.05%. Similar results were stated by (Makkar *et al.*, 1988), whom confirmed that the tannins can react with microbial (both bacterial and fungal) enzymes, inhibiting their activity similar numerous articles exist on the ability of tannins to reduce the digestibility of the diet.

Table 9: Chemical Composition of phytobezors

Region	Sample	DM	C.P	E.E	C.F			Ash	TANIN
					C	H.C	lignin		
El khuwi	1	98.12	8.75	0.00	47.06	23.96	28.97	7.09	2.03
		98.10	8.73	0.00	47.03	23.99	28.97	7.05	2.01
	2	97.7	8.40	0.00	47.93	23.90	28.17	6.14	2.10
		97.5	8.35	0.00	47.90	23.91	28.19	6.12	2.08
	3	97.7	9.10	0.00	47.81	23.87	28.32	6.59	2.08
		97.6	9.07	0.00	47.77	23.88	28.35	6.54	2.06
Abuzabad	4	98.12	8.40	0.00	47.65	23.92	28.43	6.70	1.98
		98.09	8.38	0.00	47.70	23.90	28.40	6.66	1.99
	5	97.52	8.55	0.00	47.38	23.95	28.67	7.38	2.12
		97.4	8.52	0.00	47.33	23.97	28.70	7.34	2.10
	6	97.4	8.67	0.00	47.70	23.90	28.70	6.46	2.09
		97.4	8.60	0.00	47.65	23.92	28.67	6.41	2.06
Ghebaish	7	97.16	8.73	0.00	47.77	23.88	28.35	5.84	2.07
		97.10	8.70	0.00	47.81	23.87	28.32	5.81	2.04
	8	97.6	8.55	0.00	47.03	23.99	28.97	7.01	2.03
		97.5	8.49	0.00	47.06	23.96	28.97	7.00	2.06
	9	97.3	9.05	0.00	47.90	23.91	28.19	7.04	2.07
		97.2	9.01	0.00	47.93	23.90	28.17	7.02	2.05

Chemical composition of the plants (tabar)

Approximate analysis was used to determination the chemical composition of tabar in table (10). The percentage of protein on an average 10.37%, ash represents 7.5%. The percentages of ether extract on an average of 0.64%. The percentage of the cellulose, hemicelluloses and lignin were of 28.9%, 12.2% and 14.7% respectively. The percentage of tannin is 0.00% in *Ipomoea cordofana* (plate 1), and 0.04% in *Merrimia emarginata* (plate 2). Similar effects of

tannin by others whom reported that though tannins mainly exert their effects on proteins, they also have effects on carbohydrates, particularly hemicellulose, cellulose, starch and pectins (Barry *et al.*, 1984). Other study about tannin reported by (Spier *et al.*, 1987) who stated that it is important to point out that intoxications caused by tannins usually only occur when animals are obliged to eat tannin-rich feed because of the lack of alternative plant resources.

Table 10: Chemical composition of the plants (tabar)

Plant	DM%	C.P%	E.E%	C.F%			ASH%	TANNIN%
				C	H.c	Lignin		
<i>Ipomoea cordofana</i>	95.92	10.50	0.64	41.86	13.96	12.98	7.90	0.00
	95.92	10.60	0.61	41.96	13.86	12.90	7.86	0.00
<i>Merrimia emarginata</i>	93.86	10.15	0.57	15.86	10.44	15.05	7.19	0.04
	93.80	10.23	0.63	16.26	10.36	15.07	7.23	0.04

Personal characteristics of breeders:

Personal characteristics of breeders in table (11). Results shows that the age, Educational level and Occupation of breeders. For the age factor 33.5% of breeders their ages were between 31 to 40 year and who following 40 to 50 year old whom recording 21.9%. For

the educational level 59.3 % of breeders are illiterate. This indicator adversely affects the knowledge and the now how to tack care of sheep. For the occupation 81.3% of respondent are breeders. While just 1.3% are farmers.

Table 11: Personal characteristics of breeders

Age	20 - 30	31 – 40	41 – 50	51 – 60	61 - 70	Over 70
%	13.8	33.5	21.9	14.9	8.5	6.9
Educational level	illiterate	khalwa	basic	secondary	university	
Percent%	59.3%	4.3%	23%	8.6%	4.8%	
Occupation	breeder	farmer	Merchant of animals	Breeder /merchant	employees	Breeder/farmer
Percent %	81.3%	1.3%	1.1%	5.9%	6.9%	3.2%



Plate 1: *Merrimia emarginata* at growth stag



Plate 2: *Merrimia emarginata* at flowering stage



Plate 3: *Ipomoea cordofana* at growth stage



Plate 4: *Ipomoea cordofana* at flowering stage

CONCLUSION

RECOMMENDATIONS

Conclusions

1. This study aims to identifying the real causes of the herbal balls (phytobezoars) and find out the prevalence of sheep phytobezoariasis in the Greater Kordofan.
2. The study confirmed that the prevalence of incidence of phytobezoars was cause a real problem in kordofan states.

AND

3. Phytobezoars occurs main commonly and increased in autumn and winter because abundance of grasses and plants in the pasture.

4. The results obtained from analyzed of phytobezoars showed that the bezoars contains high level of undigested fiber which may affect the formation of this herbal ball.

5. Results also indicated that plant tabar is number one suspected plants that caused incidence of phytobezoars.

6. Personal characteristics showed that the breeders were know the case but they did not know how to deal with.

Recommendations

The study recommends more researches and studies about phytobezoars and the plant (tabar) for knowing more information's about these cases. And also recommends Specialists in field of livestock and extension units veterinarian increase awareness and guidance campaigns especially in regard to disease because the study showed that 59.3 % of breeders are illiterate.

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