

بسم الله الرحمن الرحيم



Sudan University of Science and Technology
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**Prevalence and risk factor of Monieziasis in Sheep in Atbara
locality - River Nile State**

نسبه الإصابة وعوامل الخطر لمرض المونيزيا في الضأن في محليه عطبرة-ولاية نهر النيل-

**A thesis Submitted to the College of Graduate Studies in
Partial Fulfillment of the Requirements for the Degree Master of
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أَعُوذُ بِاللَّهِ مِنَ الشَّيْطَانِ الرَّجِيمِ

رَبِّ أَوْزِعْنِي أَنْ أَشْكُرَ نِعْمَتَكَ
الَّتِي أَنْعَمْتَ عَلَيَّ وَعَلَىٰ وَالِدَيَّ
وَأَنْ أَعْمَلَ صَالِحًا تَرْضَاهُ
وَأَدْخِلْنِي بِرَحْمَتِكَ
فِي عِبَادِكَ الصَّالِحِينَ

Dedication

A To the soul of my father, for my Kind unfailing support mother .

To my husband , sun my aunt ,brother ,uncle ,and sisters .

With love and gratitude . .

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Firstly , my thanks are due to Almighty ALLAH for blessing and guidance for this work to be concluded . I would like to express thanks to my supervisor , Prof : Sham Elias Suleiman to her advice , direction and continuous interest and constructive criticism in reviewing the dissertation .

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Finally , I express my appreciations to the animal owners in Atbara for their Sampling allowance . .

Abstract

A cross sectional study was conducted from June 2018 to April 2019 for determination of sheep monieziasis and investigation of some associated potential risk factors in Atbara locality (River Nile state) from the Slaughterhouse , Clinic and Field . A total of 390 fecal samples from sheep were collected and examined using direct flotation test .The result indicated that natural monieziasis was prevalence among Sudanese sheep at Atbara locality with an overall prevalence 33,3% .The questionnaire was used to determine the risk factors (sex ,age , breed , body condtion , season , nutrition) of the monieziasis . The following risk factors showed highly association with sheep monieziasis in the univariate analysis under significant level of p-value $\leq ,25$: sex (p-value ,00) ,breed (p-value ,00) , season (p-value ,000) ,body condition (p-value ,000) , age(p-value ,000) and nutrition (p-value ,002) . Using multivariate analysis to determine possible significant association between monieziasis and potential risk factors , the result showed that there was significant association with all of the investigated risk factors .It can be concluded that this *Moniezia* parasite was high prevalent in Atbara locality and using of anthelmintic as a protective agent .Therefore ,the using of anthelmintic in sheep farmers from period to period is recommended as prophylactic measure in summer and autumn , using the effective acaricide to elimination the intermediate host and feeding the sheep in narrative food to increase resistance to disease .

ملخص البحث

اجريت دراسة مقطعية من يونيو 2018 ابريل 2019 لتحديد معدل انتشار المرض المونيزيا في الضأن والتحقيق ودراسة بعض عوامل الخطر المحتملة المرتبطة بهذا في محلية عطبرة في ولاية نهر النيل من السلخانة و مستشفى عطبرة والحقل . تم جمع 390 عينة براز من الضأن وفحصها باستخدام اختبار التعويم المباشر . وظهرت النتائج أن عدوي مونيزيا الطبيعية كانت منتشرة بين الأغنام السودانية في محلية عطبرة بنسبة أنتشار 33,3%. واستخدم الأستبيان لتحديد عوامل الخطر (الجنس, العمر, السلالة , حالة الجسم , الفصل , والغذاء) لمرض المونيزيا وأظهرت عوامل الخطر التالية الارتباط مع مرض المونيزيا في تحليل وحيد المتغير تحت مستوي كبير من قيمة المعنوية ≥ 25 , القيمة المعنوية لكل من (الجنس = 000), (السلالة = 00), (الفصل = 000), (حالة الجسم = 000), (الغذاء = 002), (العمر = 000). باستخدام التحليل المتعدد المتغيرات لتحديد احتمال وجود ارتباط كبير بين مرض المونيزيا وعوامل الخطر المحتملة, وأظهرت النتيجة أن هناك ارتباط كبير مع جميع عوامل الخطر. ويمكن ان نستنتج ان هذا الطفيل كان منتشرا في محلية عطبرة بنسبه عالية واستخدام مضادات الديدان كان عاملا وقائيا , كذلك يوصي باستخدام مضادات الديدان في مزارع الضأن للتحكم في انتشار المرض في فصل الصيف والخريف واستخدام مضادات الطفيليات الخارجية لإزالة الحلم كعامل ناقل للمرض وتغذية الضأن علي المركزات يعمل علي زيادة المقاومة لمرض المونيزيا.

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Introduction:

Sudan has considered from the large countries that raising of sheep population 47,2 million MARF(2005) . and producing of meat for export. Generally ,sheep are raised for meat ,milk and hides . The meat of sheep is an important food to the human ,While some meat must be produced hygienically , free from pathogens and retains its natural state and narrative value (Govindargan ,1990 ; Gill ,2004) .

In Sudan there are several breeds of sheep, such as, Kabashi, Hamari, Shukri and Zagawi in north and western Sudan, Watish in central Sudan and Nilotic sheep in southern Sudan. Sudanese sheep comprise 31% of the total population of sheep in the Arab region and they are raised in different parts of the country for their meat, milk, and hides.

Exports of live sheep and mutton contribute significantly to the national income from foreign exchange which was estimated to be uses 109 million annually in 1998, Sheep also have religion and social importance. They play an important role in public health because they could be a source for several zoonotic diseases transmuted to man, such as, Brucellosis and T.B. Sheep production in Sudan faces many problems including infectious diseases caused by bacterial, viral, and parasitic agents. Bacterial and viral diseases have almost been brought under control either by drug therapy or vaccination. Parasitic diseases, however, have largely been neglected primarily because they do not often cause acute fatal disease (AOAD, 1998) .

Helminthes are one of the most destructive internal parasites of the vertebrate animals including man ,they caused increase mortality rate and decrease in sheep received the great interest as one of the most important and preferable livestock for human consumption in the world ,*Moniezia* and other tapeworm infect sheep coat and cattle (Schuster, 1998) . Demonstration of gastrointestinal parasites is recorded previously (Eisa *et al .* ,1979) . Studies on different diseases of domestic animals diagnosed that the internal parasites are common in the alimentary tract discover in all species , Specially during the summer and autumn (Mohammed and Atta elmana ,2003 ; Siham *et al .* ,2008) .

Cestodes or tape worms are flat segmented ribbon –like worms and live in small intestine ; Adult tape worms are of little pathological significant but larval stage in mammalian tissue is responsible for condemnation of meat and offal . Cestode of Ruminant are cosmopolitan in distribution .However , *Stilesia* and *Avietellina* species are usually found in warm dry season ,while *Moniezia* species have a more uniform distribution cattle and apparently are rarely Infected . The most frequent hosts are sheep , Especially lamb (Troncy ,1989) .

Most of the species in subclass *Eucestoda* , they are ribbon –like worm as adult ,known as tapeworm .Their bodies consist of many similar units ,known as progiottids ,which are essentially packages of eggs which are regularly shed into the environment to infect other organisms . Species of the other subclass, *Cestodaria*, are mainly fish parasites .All cestodes are parasitic, many have complex life histories including a stage in definitive host in which the adults grow and reproduce often for years and one or to intermediate stages in which the larvae in other host. The adults live in digestive tracts of vertebrates ,while the larvae often live in the bodies on other animals ,either vertebrate or invertebrate .Some Cestodes are host specific, while others are parasites of a wide variety of host .Adult tapeworm has scolex ,or head, a short neck, and strobilia, or segment body formed of progiottids. Tapeworm anchor themselves to the inside of the intestine of their host using their scolex ,which typically has hooks ,suckers ,or both ,they have no mouth but absorb nutrients directly from the host's gut. The neck continually produce progiottids ,each one containing a reproductive tract mature progiottids are full of eggs ,and fall off to leave the host either passively in feces or actively moving .All tapeworms are hermaphrodites ,with each individual having both male and female reproductive organs (Wikipedia,2019) .

Monieziasis in ruminants leading to negative affect of productivity by susceping young animals (Brander *et al* . ,1991 ;Yan *et al* . ,2013) .

Objectives of the study:

* To determine the prevalence of *Moniezia* in Atbara locality .

*To determine the effective risk factors increasing *Moniezia* infestation in Atbara locality.

Chapter one

Literature Review

1.1 Tapeworm in Ruminant:

Cestod family *Anpladephalaidae* of more than 165 species of which the following are veterinary important are *Anpladephalamanga*, *A.Perfoliata* , *Anpladephaloides mamilana* ,*Moniezia expansa* , *M.benedeni*,*Avitellina centri-Punctata* ,*Stilezia globipunctata*, *S.hepaticiaca* , *thysaniezia ovilla* and *thysanosoma actinoides* (Denergri *et al* ,1998) .

Most of the species in subclass *Eucestoda* , they are ribbon –like worm as adult ,known as tapeworm .Their bodies consist of many similar units ,known as progiottids ,which are essentially packages of eggs which are regularly shed into the environment to infect other organisms . Species of the other subclass, *Cestodaria*, are mainly fish parasites .All cestodes are parasitic, many have complex life histories including a stage in definitive host in which the adults grow and reproduce often for years and one or to intermediate a stages in which the larvae in other host. The adults live in digestive tracts of vertebrates ,while the larvae often live in the bodies on other animals ,either vertebrate or invertebrate .some Cestodes are host specific, while others are parasites of a wide variety of host .

1.2 Classification of *Moniezia* species

According to Wikipedia (2019) .

Kingdom:	Animalia
Phylum:	<i>Platyhelminthes</i>
Class:	<i>Cestoda</i>
Order:	<i>Cyclophyllidea</i>
Family:	<i>Anoplocephalidae</i>
Genus:	<i>Moniezia</i>
Species :	<i>Expansa ,benedeni</i>

1.3 Morphology of *Moniezia* :

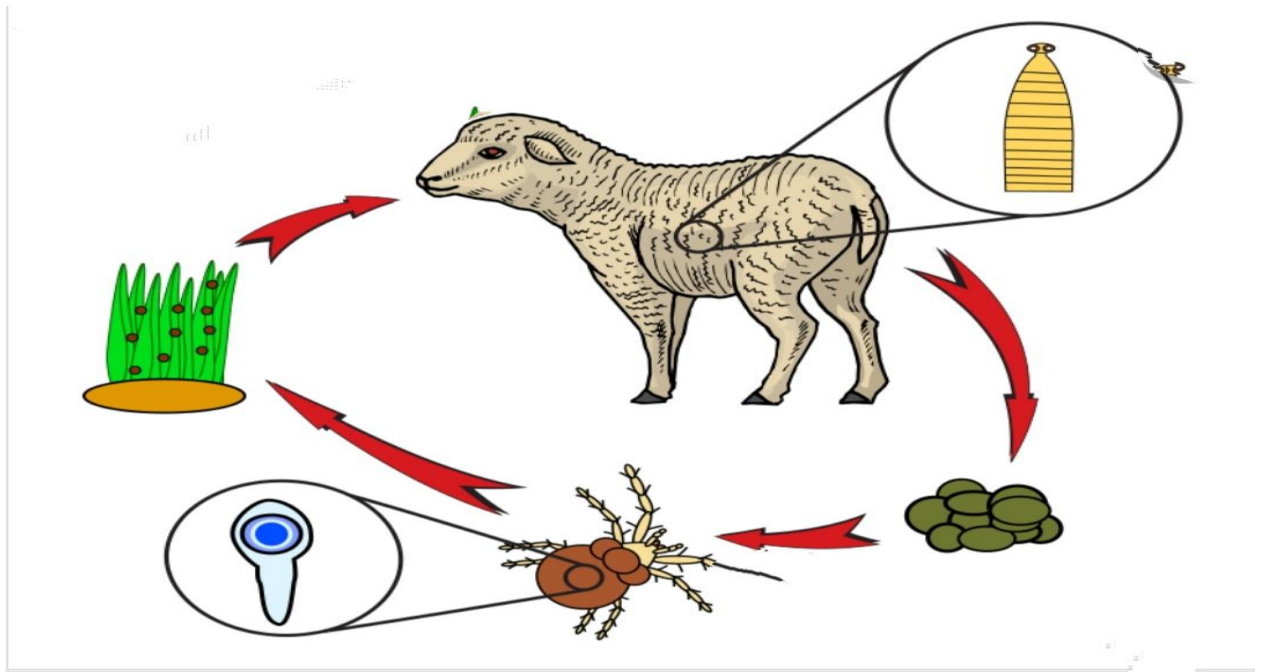
Moniezia species are parasites that living in small intestine of ruminants

It is long parasites (600x106 cm) with scolex and prominent sucker . There neither rostellum nor hooks . These parasites have two sets of genital organs with marginal genital pores in their segments . The ovaries and the vitelline glands forming a ring in each side .Also in posterior border of each proglottid is found a row of rosette –like inter proglottidal gland that extend a cross the width of the proglottid. Eggs of the parasites are triangular in shape and when uterus filled it becomes sac - like ,In addition to eggs are containing a well developing pyreform apparatus (56-75 mm) (Soulsby , 1982) .

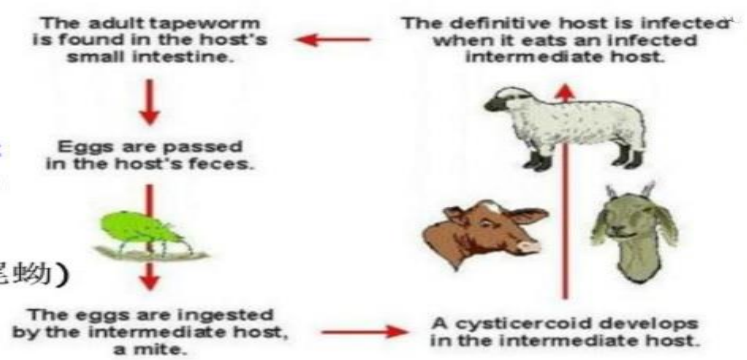
1.4. life cycle :

Mature proglottids and eggs are passed with feces of the infected animals . cysticeroid are developed in inter mediate host which *oribatid* mites of the genera *Galumna* ,*Orbatula* ,*Peloribate* ,*Protoscheloribates* ,*Scheloribates* , *Scutovertex* ,and *Zygoribatula* and other (Sengbusch ,1977).The production of infective stages are about 4mounths .The infection of the ruminants generally by ingestion of the infected mites with herbage and the pre patent period is 37-40 days .The occurrence of *Moniezia* infection is seasonally due to mites presentation on pasture

The prevalence of the parasites in young animals at the first summer on pasture (Soulasby , 1982; Denegria *et al* . ,1998) .

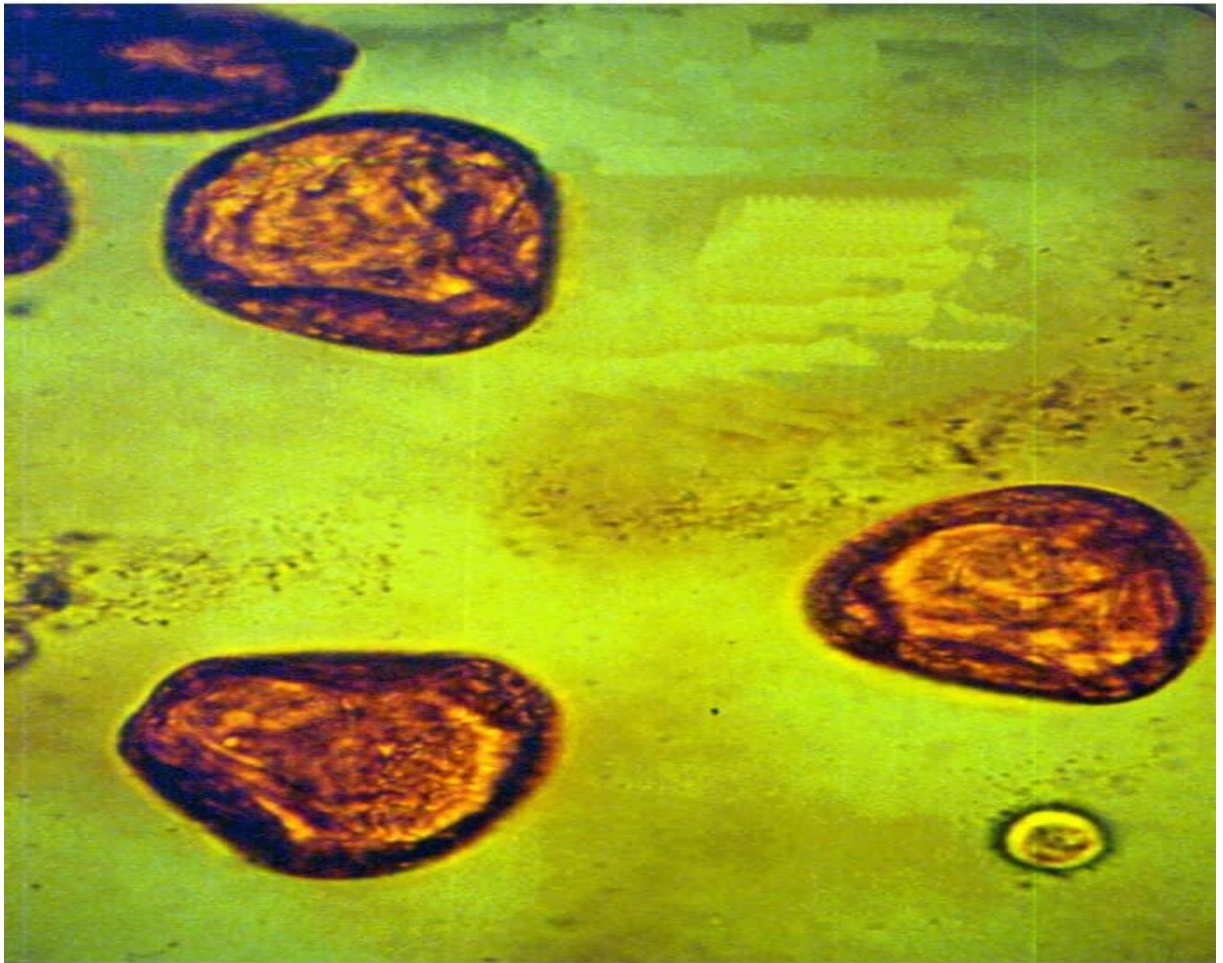


Definitive host:
ruminants.
Site of infection:
small intestine
Intermediate host:
Forage mites (地蝨)
Infective stage:
cysticercoid (似囊尾蚴)
Prepatent period :
month 3



(Parasites and Parasitological Resources)

Life cycle of *Moniezia* (Urguhar ,1996)



Egg of *Moniezia Expansa* (Urguhar ,1996)

1.5Epedimology:

Transmission of the *Moniezia* species is by ingestion of infective larvae in mites. The determination of the risk factors by influencing the susceptibility of the host and the numbers of infective larvae accumulating on pasture. young animals are most vulnerable. *Oribatid* mites are mostly numerous on permanent pasture in the summer months and disease can be occurred to all grazing animals (Radostits *et al.* ,2007) .

Moniezia species seem to be prevalent throughout the year ,but these species increased in winter season due to the presence of mites ingest *Moniezia* eggs (Soulsby ,1982;Abdelnabi *et al.* ,2011) .

Monieziasis caused by *Moniezia expansa* and *M. benedni* belongs to the most frequently occurring pasture helminthes of sheep . Both species age and season dependent dynamics their occurrence in The main infection times low sheep in spring and late summer/autumn are related with activity peaks of mites acting as intermediates hosts. Although the natural infection rate of orbited mites with tapeworm cysticercoids is low, their high density in grass guarantees the infection of herbivorous final hosts (schuste, 2001).

1.6.Pathogenesis:

In heavy infection the intestine becomes solid mass by the parasite and this causes diarrhea and thriftiness .The infection lead to loss of meat production and the wool and then death .Also the outbreaks of enterotoxaemia may occurred due to parasitism (Vibe ,1976 ; Radostits *et al.* ,2007) .

1.7.Clinical findings and Lesion :

In ruminants generally monieziasis has not signs or symptoms .But in heavy burdens may result thriftiness , poor coat ,vague digestive disturbances including mild diarrhea or constipation dysentery and sometimes anemia in young animals (Radostits *et al.* ,2007) .

The most important lesion are those found where the scolex of the worm are attached to the digestive wall at these point the mucosa

degenerates, fibrous and yellowish white nodules from scolex are deeply lodged (Troncy ,1989) .

1.8. Diagnosis :

1.8.1. Macroscopic examination :

Segments (proglottides) of tapeworms (*moniezia* spp) have the general appearance of boiled rice grain and taken place in water they quickly resume their normal shape and color and then readily identified (Kelley ,1984;Hasen and Perry ,1990) .

1.8.2.Direct smear technique :

A small quantity of faeces is smeared on to a slide and diluted with water until new spirit can be lead through the suspension . A cover glass is applied and the smear is examined under the microscope (Kelley ,1984) .

1.8.3. Flotation method :

This method separates the majority of the worm eggs from the fecal material and concentrates them on the surface of the liquid . The solution used is saturated salt solution of sodium chloride or sucrose or saturated zinc sulphate solution (Kelley ,1984) .

1.8.4. McMaster method :

The purpose of this method that to counting worm eggs by either the modified McMaster or modified Stoll method .These method are particularly useful for diagnosis of parasitic gastroenteritis of animals in routine or in outbreaks (Kelley ,1984) .

1.8.5.Dot –E LIZA:

This test is detected *moniezia* by using the antigen of the parasite in sera of sheep .The advantage of this test when it is performed is diagnosed the infection after one week after infestation of the parasite (Lone *et al* . ,2012) .

1.8.6.PCR:

According to Getachew *et al.* (2007), PCR (polymerase chain reaction) can be used by specific primers and ovine gene sequences.

1.9. Treatment :

Anti cestodal (anti tape worm) drugs are caused death by paralyzing of the worm. There are many synthetic compounds for treatment such as benimidine, niclosamide, Praziquantel are highly effective against *Moniezia* and also have an excellent activity against wide spectrum of adult and larvae cestodes of animals and human (Roborson and Courtney, 1995). Some benzimidazole and pro-benzimidazole drugs have variable efficacy against *Moniezia*. These compounds including albendazole, febendazole, febantel, mebendazole, netobimin and oxfendazole (Roborson and Courtney, 1995).

Consideration should be applied when the infected animals under treatment that providing adequate nutrition, treatment of animals in groups for preventive measure that reduce pasture contamination and moving of the herd to safe pastures from reinfection (Fraster and Mays, 1986).

1.10. Control :

The infected animals cannot be controlled by the treatment alone but using of the drugs is important for reduction of contamination should be used at critical times for survival of the free-living stages. Other methods such as alternating of grazing of different host species, integrated rotational grazing of different age groups and alternation of grazing and cropping which can give economic advantage when combined with anthelmintic treatment (Fraster and Mays, 1986).

For controlling of the mites which act as intermediate host, carbamate insecticides are used such as carbaryl and propoxur (live and Rowe, 1986).

These compounds impracticable because the oribatid mites are found in grazing pastures.

The animals should be given antihelmithices at the end of rainy season in order to improve adaptation of the animal harsh dry season condition .Second treatment by

Antihelmithices should be giving at the end of dry season so that infection of the pasture by parasites at the time of the first rains can be reduced (Fischer and Say, 1989) .

Chapter Two

Materials and Method

2.1. Discreption of study area:

River Nile State is one of the states of Sudan . It is lies approximately between 22-35 longitude east 16-22 latitude North ,and extend from Elsabauloga fall on River Nil south toward Baroda desert to the Northern state North. The River Nile passes through the from south to north and Atbara river passes Obliquely through the state from east to west where it meets the River Nile at Atbara Town which capital of the state (Mohammed *et al.*,1996).

The state surface area is about 124,000Km²and the climate is that of a dry hot desert annual rainfall varies from zero in Northern part to 150m.m in the southern one .Trees and grasses such as Acacia. cherenbergiana and Aristida Spp. Represent natural pastures beside the irrigation land around the river bank which is considerably small (Mohammed *et al.* ,1996).

The number of sheep in River Nile State is in Atbara locality is 27,803 heads (Annual report ,2009) .

2.2. The study design and sampling :

The study design was across sectional study which provided information on occurrence of disease (Martin *et al.* ,1987) .The samples were taken randomly from Atbara hospital (160), abattoir (130) ,and the farms(100) from June2018 to April 2019 . The sample size was calculated according to thrustfeild (2005) formula using 50% expected prevalence with 5% absolute precision at 95% confidence interval .

$$n= \frac{Z^2 * P_{exp}(1- P_{exp})}{d^2}$$

$$d^2$$

Where, n= the sample size

P_{exp}= expect prevalence (0.5)

d=desired absolute precision (usually 5%)

z= required confidence level, (Z=1.96 for 95% confidence interval)

Therefore, by substituting the values of variables in the formula the sample size was determined to be 390, which is used as representative animals on which the study was done to know the prevalence of moniezia.

2.3.Collection of fecal samples :

A total of 390 fecal sample from the rectum of sheep in clean plastic containers and immediately transported to Atbara veterinary laboratory for parasitological examination .

2.4.Identification of the *Moniezia* species :

For conformation the intestines of sheep were opened to see the adult worm at postmortem .The worm collected in normal saline and transported to the laboratory for identification (Troncy ,1989 ; Hansen and Perry ,1990) .

2.5.Direct flotation test:

A sample of feces was weighed by using a pre calibrated approximately 3g of feces were put into container , mixed with saturated solution of sodium chloride and strained through a sieve (1mm mesh) to remove coarse fecal material .The mixture was placed in centrifuge tube (15-50ml volume), and then cover slip and then the cover slip was placed on top of centrifuge tube for 10 minutes on the bench .The egg were floated to the surface and then touched with cover slip ,and then the cover slip was placed on a clean slide and examined using compound microscope at 10x10 magnification (Soulsby,1982) .

2.6. Data collection :

The data were collected through observation structured questionnaires that target the key persons in the farms ,abattoir and clinic

selected .Moreover the samples (390) were collected using probability random sampling techniques.

2.7.Questionnaire Survey:

A structured questionnaire with the primary objective of elucidating the multi factorial background of *Moniezia* in sheep was conducted in an interactive manner at each farms ,abattoir and clinic .(6) structured questionnaire were filled out by asking the owner .The form including sex ,breed ,body condition, and age .The general management factorial included season and nutrition .

2.8.Stastical analysis :

Frequency tables of the distribution according to potential risk factor was constructed . Cross-tabulation of monieziasis according to potential risk factor was made .Univariate analysis by the Chi-square test using statically pack for Social Sciences (SPSS) .Multivariate analysis used by logistic Regression models to perform risk factors significant at level $\leq ,25$ in the univariate model .The significant level in the multivariate analysis was $p\text{-value} \leq ,05$.

CHAPTER THREE

Result

The result indicated that natural *Moniezia* infection was prevalence among Sudanese sheep at Atbara locality (River Nile State) with an overall prevalence 33,3%(Table 3:1) .

A total of 390 sheep were tested by direct flotation test,130 animals were found positive and 260 animals were found negative for sheep monieziasis .

Table3:1: Distribution of *Moniezia* infection among 390 sheep examined in Atbara locality.

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Negative	260	66,7	66,7	66,7
Positive	130	33,3	33,3	100,0
Total	390	100,0	100,0	

Table:3.2:Summary of frequency for potential risk factors of monieziasis in 390 sheep in Atbara locality .

risk factors	Frequency	Relative frequency(%)	Cumulative frequency(%)
Sex:			
Male	281	72,1	72,1
Female	109	27,8	100,0
Breed:			
Dibasi	107	27,4	27,4
Ballade	283	72,6	100,0
Nutrition:			
Grass+ concentrate	142	36,4	36,4
Grass	284	63,4	100,0
Season:			
Summer	190	48,7	48,7
Winter	100	25,6	74,4
Autumn	100	25,6	100,0
Body condition:			
Good	245	62,8	62,8
Poor	145	27,2	100,0

Age: Young	230	59,0	59,0
old	160	41,0	100,0

Sex of animals :

The total number of females examined was 109 animals .Fifty three animals among these were found infected and rate of infection was 48,6 % (Table 3 .2) .The total number of males examined 281 and 77 of them were found infected and the rate of infection was 27,4 % (table :3.3) .

The Chi-square test showed that there was significant association between *Moniezia* infection (Table :3.4) and sex of the animals (p-value=0,000).

Breed of animals :

The total number of Dabasi examined was 107 animals (Table 3.2) , and rate of infection was 19,6% .The total number of Ballade examined was 283 among these ,109 animals were found infected and The rate of infection 38,5 % (Table 3.3).

The Chi-square test showed that there was significant association between *Moniezia* infection (Table :3.4) and breed of animals (p-value=0,000).

Nutrition:

The total number of animals eating a concentrate and grass was 142 .The positive animals for *Moneizia* was 34 animals and rate of infection was 23,9 % (Table3.2).Whereas total number of sheep eating grass was 248 animals .But among these ,96 animals were found infected with rate of infection 38,7% (Table 3.3).

The Chi-square test showed that there was significant association between *Moenzioia* infection (table 3.4) and nutrition of animals (p-value=0,003).

Season:

The animals were examined during season were 190 animals in summer ,100 in winter ,100 in autumn (Table: 3.2). Among these animals examined in summer were 22 animals and infection rate was 11,5 %. However among animals examined in winter were 56 positive to the parasite and infection rate was 56 %. A total of examined animals in autumn were found 52 positive and infection rate was 52 % (Table 3.3) .

The Chi-square test showed that there was highly significant association between *Moeniezia* infection (Table :3.4) and season of (p-value=0,00).

Body condition:

The total number of animals in good body condition was 245 animals . But only 12 animals were found infected and rate of infection was 4 % (Table 3.2), While the animals in poor body condition were 145 and 118 animals (83,6 %) were infected (Table 3.3) .

The Chi-square test showed that there was highly significant association between *Moniezia* infection (Table :3.4) and body condition of animals (p-value=0,000).

Age of animal:

About 230 of sheep less than 2 years (young) and 160 of sheep more than 2 years (old) ,(Table:3.2) . Among young animals 39 animals were found to be infected and infection rate was 17 %. However among old 91, animals were infected (table:3.3) and infection rate was 56,9 %.

The Chi-square test showed that there was highly significant association between *Moneizia* infection (Table :3.4) and age of animal (p-value=0,000).

Table: 3.3: Summary of cross-tabulation of *Moneizia* infection in 390 sheep at Atbara locality .

Risk factor	Animals tested	Animal affected	Rate of infection %
Sex:			27,4
Male	281	77	48,6
Female	109	53	
Breed:			19,6
Dabasi	107	21	
Ballade	283	109	38,3
Nutrient:			
Concentrat +Grass	142	34	23,9
Grass	248	96	38,7
Season:			
Summer	190	22	11,6
Winter	100	56	56
Autumn	100	52	52

Body condition:			
Good	245	12	4
poor	145	118	83,6
Age:			
Young	230	39	17
Old	160	91	56,9

Table 3.4: Summary of univariate analysis for potential risk factors of *Moniezia* infection in 390 sheep examined at Atbara city using the Chi-Square test .

Risk factor	No. inspected	No. affected(%)	Df	X ²	P-value
Sex: Male Female	281 109	77(27,4) 53(48,6)	1	15,9	0,000
Breed: Dabasi ballade	107 283	21(19,6) 109(38,3)	1	12,5	0,000
Nutrient: Concentrate Grass Grass	142 248	34(23,9) 96(38,7)	1	8,9	0,002
Season: Summer Winter Autumn	190 100 100	22(11,6) 56(56) 52(52)	2	79,3	0,000

Body condition:					
Good	245	12(4)	1	2,4	0,000
poor	145	118(83,6)			
Age:					
Young	230	39(17)	1	67,7	0,000
Old	160	91(56,9)			

*Mean significant value p-value $\leq 0,5$

Table3.5:Multivariate analysis of moniezasis and potential risk factors in 390 sheep examined in Atbara locality using logistic regression:

Risk factor	Animals affected%	Exp(B)	95% Confidence Interval for Exp(B)		P-value
			Lower Bound	Upper Bound	
Male	77(27,4)	1.786	.798	3.998	,00
Female	53(48,6)	.	.	.	
Dbasi	21(19,6)	1.771	.656	4.777	,..
Balade	109(38,3)	.	.	.	
Grass +Concentrate	34(23,9)	2.081	.929	4.663	,002
Grass	96(38,7)	.	.	.	
Summer	22(11,6)	1.427	.517	3.936	,00
Winter	56(56)	.627	.257	1.529	,000
Autumn	52(52)	.	.	.	
Good	12(4)	66.515	30.022	147.366	
Poor	118(83,6)	.	.	.	
Young	39(17)	2.553	1.220	5.344	,000
Old	91(56,9)	.	.	.	

*Mean significant value $p\text{-value} \leq 0,25$

All potential risk factors when using logistic regression showed significant association between these factors and the disease

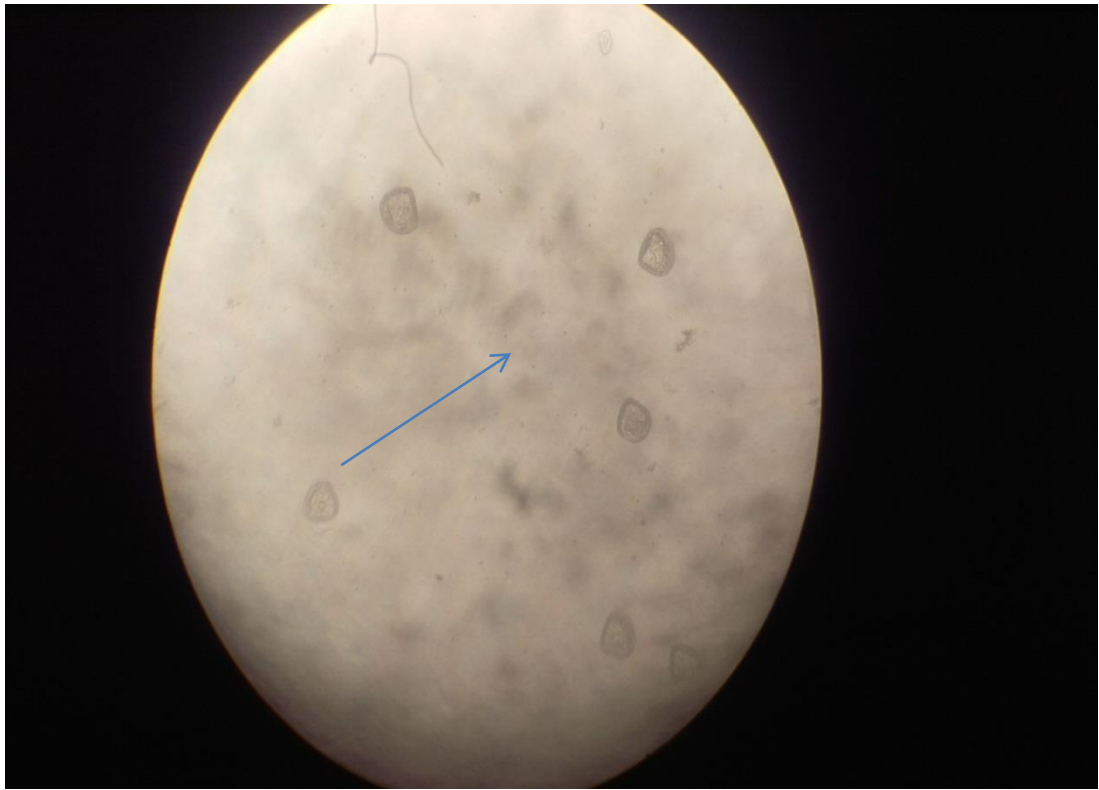


Fig1:Ova of *Moneizia* spp of sheep under microscope at 10x lens

CHAPTER FOUR

Discussion

In the present study the prevalence of monieziasis was 33,3% in sheep in Atbara locality in River Nile state .

The prevalence of monieziasis in this study is lower than the prevalence recorded by Abdel-Rahman *et al.* (2010) which was 74% in Egypt .

On other hand the prevalence of *Moniezia* species recorded during this study is higher than the result reported in Senegal which was 28% and also in Khartoum was 4%(Khitma and Abdelbasit , 2006) . The differences in prevalence's reported differential management practices (Bager ,1999 ; Mandonnet *et al.*,2003), natural resistance (Pal and Quyyum,1992) , drug treatment (Ali *et al.*,1997)

The prevalence of monieziasis in sheep according to sex was estimated (Table 3.5) and there was significant association .The highest rate of infection found in females than males ,this may be attributed to decrease in natural immunity in female due to stress resulting of pregnancy and lactating period .

There was highly significant association between the season (Table 3.5 0) and the disease . This finding is in agreement with finding of Denergi and Alzued (1992) in Argentina and Abdelnabi *et al.* (2011) in Sudan due to presence of Oribatid mites in the pastures .These mites decrease when the temperature increases and rainfall (Daveid *et al.* ,1974 ;Abdel-Rahman *et al.* ,2010).

Prevalence of monieziasis among different breed (p-value,00) highly significant , Balladi breed with higher rate of infection38,5% . This attributed to nature of pasture –grazing pattern and movement between these topographical location for pasture. In this results ,there was significant association between body condition and the disease (Table 3.5) . The disease causes severe digestive disturbances and the feeding given to these animals can be contaminated by the intermediate host

causing weight loss (Urquhart, *et al.*, 1996 ; Radositis *et al.* , 2007; Kuchai ,2013) .

This study showed that statistically significant association between the age of the animals and monieziasis (Table 3.5) . This result in contrast to result of Souloby (1982) and Radositis *et al.* (2007) who reported that young animals are more susceptible than old animals . There was significantly variation in the prevalence of monieziasis among different nutrition (p-value ,002). The higher prevalence was (38,7%)in grass and in grass+ concentrate animals(23,9%) .Animals were feed in highly nutritive food low susceptibility to monieziasis . This result agreement with result in Kashmir (Kuchai ,2013) .

Conclusion

The output in this study indicate that the overall prevalence of monieziasis was 33,3 %.The presence of high rate of monieizasis in the area was responsible for the loss of production in sheep .A high prevalence of infection was in females as compared to males .Old animals were highly infected as compared to the young . A highest prevalence of infection was in winter . The prevalence of the infection in poor body condition of animals was high (83,6)than the animals of good body condition(4,0%) . A high prevalence of infection in Balladi as compared to Dabasi .The high prevalence of infection in animals were feeding on grass than those were feeding on concentrate .

Recommendation

- *Using of anthelmintic in sheep farmers in summer is recommended as prophylactic measure and in winter .
- *Using the effective acaricide to eliminate the intermediate host (Oribatid mites) .
- *Improvement of husbandry practices is very essential .
- *The strategic deworming should be focused on poor body condition.
- * Other study of risk factors should be conducted .
- *Continuous surveillance and investigation of parasites in sheep is very important . * Feeding sheep of narrative food to increase resistance to disease .

References

- Abdelnabi ,H.; Elsayed ,E. Elown ;Hamid ,S .Abdalla .(2011) .** Prevalence of gastrointestinal helminthes in sheep from Central Kordofan ,Sudan .*Uof K .J. Vet .Med .and Anim.pro .* -Vol. 2 .No.2. pp90-104 .
- Abdel-Rahman,B.;Mohey ,H. ; Fathy, A. ;Soad ,H;Magda,A. andKreem,M.(2010).**Studies on Moniezia of sheep prevalence and anthelmintic effects of some plant extract s, a light and electron microscopic study .*parasitol Res.108:pp177-186.*
- Ali,S.;Anwar ,A.H;Hayat,B;Iqbal,Z.and Hayat,C.S.(1997).**Feild evaluation of anthelmintic activity of levamisole,Albendazole , ivermctin and Morantel Tartrate aginst gastrointestinal nematode of sheep .*pak. Vet .J.17:114.*
- Annual report (2009).**Ministry of Animal Resources ,River Nile State ,Annual Reports.
- AOAD .(1998) .** Arab Organization for agriculture Development .*The Present Status of Livestock Trade in Relation to Animal Disease in the Arab Organization for agriculture Development .* P14 .
- Bagar ,I.A. (1999) .**The role of epidemiological knowledge and grazing management for helminth control in small ruminant.*Int.J.parasitol.,29:41-47.*
- Brander , G .C . ; Pugh , D.M. ;Baywater, R.j. ; Jenkins ,W. L. (1991)** .*Veterinary Appllied Pharmacology and Therapeutics .* Fifth edition . Bailliere Tindall .London ,Philadelphia ,Toronto, Sydney ,Tokyo . pp513-514 .
- Denegra, Bemadina. W; perez ,Rodrigue and Caaberio .(1998).** Anoplocephlid Cestodes of Veterinary and Medical Signifiant .*fola parasite :45pp1180-181.*
- Denergia , G .M. ; de Alzued , A. B . (1986) .**Seasonal variation of oribatid mite (Acarina) populations and other relationship to sheep cestodiasis in Argentina . *Vet . parasital .42:157-161 .*

Eisa ,A.M.; El Badwi ,E.S.;Saad ,M.B.A; Ibrahim, A.M.;El Gezuli , A .Y. (1979) . Check list first and records of helminthes parasites of domestic and wild animals reported in the Sudan during the period 1902 - 1975 . *Sud . J .Vet .Res.*,1:55-63 .

Fischer ,M.S. and Say ,R.R.(1989) . Manual of Tropical Veterinary Parasitology .English ed. Cambrian Printers . *AberystwYth* PP390.

Fraster ,C .M .and Mays ,A .(1986) . *The Merck veterinary Manual* . Sixth edition . Merck and Co. In. ,Rahway ,N . J . ,U .S . A . ,207 -208 .

Getachew, T .P . Dorchie , and Jacquiet, P. (2007) .Trends and challenges in the effective and sustainable control of moneiziasis infection in sheep .*S.S. parasite*. PP 14.

Gill,C.O.(2004) . visible contamination on animals carcasses and microbiological condition of meat .*Food Prot.* ,6(2),413-419.

Govin daragan ,C.V. (1990) . Maintenance of hygienic and sanitary condition including personal hygiene in the meat factory .*Technical paper in first National Seminar and Marketing Meat Food Products* in India ,Aligarh ,India .

Hansen .J. and Perry, B.(1990).*The Epidemiology Diagnosis and Control of Helminthic Parasites of Ruminant International Livestock Center for Africa* .Addis Ababa Ethiopia. pp:90-100.

[https : //en.m.Wikipedia .org/wiki/ cestoda](https://en.m.wikipedia.org/wiki/cestoda). (2019).

Ivie , G . W . and Rome , L.D .(1986) .Durg used against arthropod parasites .In W . C. Campbell and R. S . Rew , eds . , *Chemotherapy of Parasitic Diseases* , pp507-529 . New York :Pleum Press .

Kelley ,W.R.(1984) .*Veterinary Clinical Diagnosis* .Third edition. Bailliere Tindall .London . pp245-247 .

Khitma ,H.M. and Abdelpasite,A.E.(2006). *Prevalence of blood and internal parasite in sheep to be slaughter* .M.V.SC. Thesis U of K

Kuchai ,J.A; Fayaz, A; Chishti,M.Z and Hidayatullah ,Tak.(2013). *Impact of host's diet and parasite intensity on Morphology of Moniezia expansa* . 4(2): pp122-125 .

Lone,B.A; Chishti,M.Z;Ahmad,F;Taha,H and Hassan.(2012). *Fecal examination of farm animal of helminthic parasite* .Iranian Journal of Veterinary Research,Shiraz University, Vol.13,NO.1,Ser.NO.38,2012.

Mandonnet,N.;Ducrocq,V.;Arquet ,R.and Amont ,G.(2003). Mortality of creole kids during infection with gastrointestinal strongyles :a survival analysis *J.Anim.Sci.*81:2401-2408 .

MARF .(2005). Ministry of Animal Resources and Fisheries , Statistical Bulletin for Animal Resources .Issue No.14: 3-350

Martin, S.M; Meek, H.A and Willeberg P. (1987). *Veterinary Epidemiology Principles and Methods* .Iowa state University Press / AMES.

Mohamed ,A.S. and Atta EL Manan , A.M.(2003) .The gastro-intestinal parasites of some domestic animals species Damazin District , Blue Nile State ,Sudan .*The Sudan J .Vet .Res.*18:99-103

Mohammed, M . A; Karim ,H.L; Mohammed ,G.A. and Mustafa, A.H.(1996) . The first proceedings Agriculture Conference at Nar-El Nile State ,*Ministry of Agriculture and Animal Resource* .pp 6-7 .

Pal, R.L.and Qayyum , M.(1992) . Distribution of gastrointestinal helminthes of sheep and goat in Swat Vally NWFP, Pakistan .*pak .vet.J*,13:138-141.

Radostits,O.M. ,Gay ,C.C. ,Hinchclilt ,K .W. ;Constable ,P.D.(2007) .*Veterinary Medicine* .Tenth edition .Saunders Elsevier .Edinburg ,London ,New York , Oxford ,Philadelphia , Stlouis ,Sydney , Toronoto . pp1510-1583 .

Roberson , E . L . and Courtney ,C . H . (1995) .*Anticestodal and antitrepatodal drugs* .H .R. Adams ,ed . *veterinary Pharmacology and*

Therapeutics . Seventh edition , pp 933-954. Ames ; Iowa state Univ. Press.

Schuser ,R.(1998) .Epidemiology of sheep Moniezia schaefferi
parkitsche Tierarzt .79:4 ,pp357-363 .

Sengbusch ,H .G .(1977) .Review of oribatid mite –anoplocephalan
tape worm Relationships (Acari; Oribatei ; Cestoda ;Anoplocephalide)
Proct.Symp .Cast . Branch Ent .Soc . Am. ,87-102 .

Siham ,E.S. and ;Rabab ,M.A.;Amel ,O.B.;Abdalla ,M.A.(2008). *Sud .
j. Vet .Sci .Anim. Husb. Vol.47(102)*, pp55-62 .

Soulsby ,E.J.L;(1982). *Helminth parasites,Arthropods and Protozoa of
domestic animals.(7thed)*. Baillier, Tinddall and Cassel Ltd. London.

Stunkand, H. W.(1943) .*Studies on the life history of Anoplocephaline
cestodes.Z. Parasitnk* 6: pp481-507.

Thrusfield,M.(2005).*Veterinary Epidemiology*.(2^{ed} Ed).Blackwell Sci

Torncy,P.M.(1989).*MANUAL OF TROPICAL VETERINARY PA
RASITOLOGY* .part1 .C.A.B international.pp19-140.

**Urquhar ,G.M; Armour, J.; Duncan ,L; A. M. Dunn and Jennings,
F.W .(1996)**. *Veterinary Parasitology*. (edition3 th) .Blackwell –
Scotland .p P 3-141 0

Vibe ,p.p.(1976) .Parasitic Coenurus in sheep .*Veterinariya ,Moscow*
,6 ,pp58-60.

**Yan , H. ; BO ,Y .;Li, z. ;Lou ,X . ;Ni,W .Shi . and .Jia,
W.(2013)**.Differential diagnosis of Moniezia benedeni and M .expansa by
PCR. *Acta Vet.Hang*:6 pp1463-472.

Appendix I

Frequency table for distribution of infection among 390 sheep examined at Atbara city according to potential risk factors.

A. Frequency distribution of Sex:

B.

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid male	281	72.1	72.1	72.1
femal	109	27.9	27.9	100.0
Total	390	100.0	100.0	

C. Frequency distribution of Age:

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Young	230	59.0	59.0	59.0
Old	160	41.0	41.0	100.0
Total	390	100.0	100.0	

D. Frequency distribution of Breed:

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid dapaci	107	27.4	27.4	27.4
Local	283	72.6	72.6	100.0
Total	390	100.0	100.0	

E. Frequency distribution of Body condition:

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Good	245	62.8	62.8	62.8
Poor	145	37.2	37.2	100.0
Total	390	100.0	100.0	

F. Frequency distribution of Nutrition:

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Concentrate	142	36.4	36.4	36.4
Grass	248	63.6	63.6	100.0
Total	390	100.0	100.0	

F. Frequency distribution of Season:

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid summer	190	48.7	48.7	48.7
winter	100	25.6	25.6	74.4
autem	100	25.6	25.6	100.0
Total	390	100.0	100.0	

Appendix II

Corss-tabulation for distribution of infection among 390sheep examined at Atbara locality according to potential risk factors

A. Sheep Moniezasis and Sex cross tabulation:

Count	Sex		Total
	male	female	
Resul _v e	204	56	260
t +v e	77	53	130
Total	281	109	390

B. Sheep Moniezasis and Age cross tabulation:

Count	Age		Total
	Young	Old	
result _v e	191	69	260
+v e	39	91	130
Total	230	160	390

C. Sheep Moniezasis and Breed cross tabulation:

Count	Breed		Total
	Dabasi	Local	
Result _v e	86	174	260
t +v e	21	109	130
Total	107	283	390

D . Sheep Moniezasis and Season cross tabulation:

Count	Season			Total
	summer	winter	Autumn	
Result _v e	168	44	48	260
t +v e	22	56	52	130
Total	190	100	100	390

E .Sheep Moniezasis and Body condition cross tabulation:

Count	body condition		Total
	good	Poor	
result _v e	233	27	260
+v e	12	118	130
Total	245	145	390

F. Sheep Moniezasis and Nutrition cross tabulation:

Count	Nutrition		Total
	Concentrate	Grass	
result _ v e	108	152	260
+v e	34	96	130
Total	142	248	390

Appendix III

Univariate analysis for the association of sheep *Moniezia* in 390 sheep with potential risk factor use Chi-Square test.

A Sex:

	Value	D f	Asymp. Sig. (2-sided)
Pearson Chi-Square	15.916 ^a	1	.000
Likelihood Ratio	15.441	1	.000
Linear-by-Linear Association	15.875	1	.000
N of Valid Cases	390		

B. Age:

	Value	D f	Asymp. Sig. (2-sided)
Pearson Chi-Square	67.662 ^a	1	.000
Likelihood Ratio	68.318	1	.000
Linear-by-Linear Association	67.488	1	.000
N of Valid Cases	390		

	Value	D f	Asymp. Sig. (2-sided)
Pearson Chi-Square	67.662 ^a	1	.000
Likelihood Ratio	68.318	1	.000
Linear-by-Linear Association	67.488	1	.000
N of Valid Cases	390		

C .Breed:

	Value	D f	Asymp. Sig. (2-sided)
Pearson Chi-Square	12.467 ^a	1	.000
Likelihood Ratio	13.255	1	.000
Linear-by-Linear Association	12.435	1	.000
N of Valid Cases	390		

D. Season:

	Value	D f	Asymp. Sig. (2-sided)
Pearson Chi-Square	79.263 ^a	1	.000
Likelihood Ratio	84.614	1	.000
Linear-by-Linear Association	60.017	1	.000
N of Valid Cases	390		

E. Body condition:

	Value	D f	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.398E-2 ^a	1	.000
Likelihood Ratio	261.290	1	.000
Linear-by-Linear Association	239.154	1	.000
N of Valid Cases	390		

F. Nutrition:

	Value	D f	Asymp. Sig. (2-sided)
Pearson Chi-Square	8.860 ^a	1	.003
Likelihood Ratio	9.113	1	.003
Linear-by-Linear Association	8.837	1	.003
N of Valid Cases	390		

Appendix IV

Questionnaire for data collection to investigate the risk factors which could be associated with *Monizia* in Atbara locality .

*Animal No ()

1. Breed of animal

0-Local ()

1- Dabaci ()

2. Age of animal

0- less or equal one years (young)
(old)

1- More than Two years

3. Sex of animal

0- male ()
)

1- Female (

4. Body condition

0- Good ()
)

1- poor (

5-Season

0- Summer ()

1- Winter ()

2- Autumn ()

6-Nutrition of animal

0- Grass ()

Grass + Concentrate ()

7- Result

0- Negative ()

1- Positive ()

