Prevalence study of gastrointestinal Nematodes in goats in Baghdad province-Iraq

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Abstract

This study carried out in order to investigation the prevalence of gastrointestinal nematodes in goats (*Capra hircus*) in Baghdad province during the period between October 2014 to March 2015.The results found four genera of GIT nematodes detected from 300 fecal samples of examined goats, which confirmed the highest prevalence rate with *Toxocara vitulorum* was 43.33%, followed by closed rate with *Haemonchus contortus* and *Strongyloides papillosus* which was recorded 22.66%,and the lowest prevalence rate was recorded with *Skrjabinema ovis* 12.66%, the two genera of *Toxocara vitulorum* and *Skrjabinema ovis* were recorded for the first time in Baghdad province. According to the age group, most species of GIT nematodes recorded the highest prevalence rate in age <1-6 months except *S. ovis* detected in age ≥ 3 years. Relation to the sex, the highest percentage for all species of nematodes infection was detected in males more than females without significance differences. According to the months of study, the maximum percentage for *H. contortus* was noticed in March 44% and the lowest in January was 4%, while the highest percentage rate for *S.papillosus* in February was 28% and the lowest in January was 16%, February had highest percentage rate 84% for *T. vituloum* compared to November reached to 24%, *S. ovis* had closed prevalence rate in October, December, January, March which was recorded 16% while the lowest infection in February was recorded 12%.

Key word: *Haemonchus contortus, Strongyloides papillosus, Toxocara vitulorum,* prevalence, goats
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دراسة انتشار ديدان المعدة والأمعاء الأسطوانية في الماعز في محافظة بغداد– العراق

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الخلاصة

أجريت هذه الدراسة من اجل التحري عن مدى انتشار ديدان المعدة والأمعاء في الماعز في محافظة بغداد ابتداءً من شهر تشرين الأول 2014 ولغاية شهر آذار2015. أظهرت النتائج 4 أجناس من أسطوانيات المعدة والأمعاء المشخصة من 300 عينة من براز الماعز, سجلت اعلى نسبة إصابة بديدان *Toxocara vitulorum* 43.33%, تلتها 22.66% لديدان *Haemonchus contortus, Strongyloides papillosus,* أما اقل نسبه انتشار لاسطوانيات المعدة والأمعاء هي *Skrjabinema ovis* 12.66% وسجلت الدراسة الجنسان *T.vitulorum, S.ovis* لاول مرة في محافظة بغداد. أظهرت الدراسة ان اغلب أجناس ديدان المعدة والأمعاء سجلت بنسبه عالية بعمر اقل من 6–1 اشهر عدا ديدان *S.ovis* سجلت بعمر اكثر من 3 سنة. اعتمادا على الجنس, أظهرت النتائج نسبة الإصابة للذكور اعلى من الاناث لجميع أنواع الاسطوانيات وبدون وجود فروق معنوية. سجلت إصابة *H. contortus* اعلى نسبة لشهر آذار 44% واقل نسبة في كانون الثاني 4%،أما

S.papillosus سجلت اعلى نسبه بشهر شباط 28% واقل نسبه بشهر كانون الثاني 16%.*T. vituloum* سجلت اعلى نسبة إصابة بشهر شباط 84% واقل نسبة خلال شهر تشرين الثاني 24%. أما *S.ovis* سجلت نسب إصابة متقاربة خلال اشهر تشرين الأول وكانون الأول وكانون الثاني وآذار 16% واقل نسبة إصابة خلال شهر شباط 12%.

Introduction

Goats are one of the earliest domesticated animals which have served human longer than sheep and cattle. It is reared for production milk, meat and hair especially in tropical and sub-tropical area (1).The population of goats in the world in 2004 was reached to over 743 million in developing countries, furthermore, goats harbor different species of GIT nematodes infection which effect on production and growth of animals. *H.contortus* known (barber–pole worm), blood suckling parasites present in abomasum of ruminants causes diarrhea, anemia, loss of weight, recumbency, odema, anorexia, death in chronic cases (2). *S.papillosus* is one of the destruction disease in ruminants cause severe disease in goats when slight infection take placed, it is skin penetrating nematodes, kids and lambs can be succumbed lactogenically by larvae invigorated from tissues of the dam during the time of pregnancy (3). It causes dehydration, cachexia, diarrhea, chewing movement with foaming at the mouth, anorexia, bruxism, and nervous signs like ataxia, anemia, wide-based stance, weak growth, loss of appetite, wandering, aimless, pushing the head against solid objects (4) the *T.vitulorum* is principle parasite of Asian *Bos* spp. and *Bubalus bubalis* but it has been recorded in sheep and goats also(5). It cause coughing, fever, paralysis, opisthotonos, conjunctivitis diarrhea (white scours), colic, constipation, dehydration, weight loss, butyrous odour during breath, anorexia, skin eczema(6). While *S.ovis* is small ruminant pin worm belong to the family of *Oxyuridae*, worldwide distribution in Africa, Kenya, Nigeria, Tchad, Reunion. The *Skrjabinema caprae* is recognize for goat but is similar in synonymous with *S. ovis*. The severity of infection with GIT parasites in goats could be due to susceptibility of goats to internal parasites because poor immunity compared to the other species of livestock (7).

Materials and Methods

A total 300 fecal samples from goats were collected randomly from three regions (Abu-Ghraib 96, Al-Tagi 96 and Al- Radwaniyah 108), in different age groups ranged from one to six months, six to twelve months, one to three years and more than three years, also for both sexes (72 males - 228 females) during the period from the beginning of October 2014 to end of March 2015. Fecal samples were collected directly from the rectum, put in a clean plastic container and were tightly closed. All information included case history, age, sex, giving of treatments and date of sampling were reported, and the samples were transported to parasitology laboratory in College of Veterinary Medicine-University of Baghdad.

- Laboratory examination: fecal samples were subjected to macroscopic examination included color, consistency and odor.
- Microscopic examination included direct method, staining methods by using Lugol's Iodine stain and flotation methods by using saturated Sheather's solutions, prepared by dissolving 500 gram sugar in 320 ml distilled water and adding 6.5 gram phenol as preservative and saturated salt solutions, prepared by dissolving 454 gram of salt (NaCl) in 1140 of distilled water to identified eggs of gastro intestinal nematodes(8), also by use fecal culture, taken about 20 gram of feces placed into jar and broken up with spatula, kept sufficient moist and added sphagnum and mixed well, not close the cover completely and allow air enter to the jar, placed the culture in incubator at 25-27c^{o} for seven to ten days to make larvae reached to infective stage (larvae three), the fecal culture was turned every day to inhibit the growth of fungi or by

added sodium carbonate 1%, the culture exposed to light for one hour and filled the mixed culture with warm water 30 c^{o} and inverted into glass petri dish and waiting about 24 hours until the larvae moved towards moat, then by micropipette draw out the larvae into test tube put in centrifugation and taken the sediment, and examined under 10× and 40× by put Lugol's Iodine stain on the border of cover slide to kill the larvae to identification of third stage larvae of goat gastrointestinal nematodes (9). Ocular micrometer was used to measured eggs and larvae of GIT nematodes (8). Statistical analysis, the data were analyzed statistically by use chi square test (SPSS and version) also standard error by use t. test and Anova test (10).

Results

During the period of study, the results showed the highest percentage rate with *T.vitulorum* was 43.33% (Fig. 1) which was diagnosis for first time in Baghdad province, followed by closed rate with *H.contortus* and *S.papillosus* was 22.66% (Fig. 2, 3), the lowest prevalence rate of nematodes infection with *S. ovis* was 12.66% (Fig. 4), which was recorded for first time in Baghdad province. According to the age group, the age of < 1-6 months had highest rate of prevalence 40.38% for *H. contortus* compared with age ≥3 years had lowest prevalence rate of 8.69%. For *S. papillosus*, the highest rate of infection in age < 1-6 months was 36.53% while the lowest in age 6-12 months was 10.34%. The age of < 1-6 months had highest rate by *T. vitulorum* of 46.15% compared with age 6-12 months had lowest rate of 37.93%. For *S. ovis*, had highest percentage of infection in age ≥3 years of 17.39% and the lowest in age 1-3 years of 8.69%. All different species of GIT nematodes recorded significance differences p≤0.05 between age group (Table 1). Relation to the sex, the highest rate of prevalence for *H. contortus* in males was 30.55% while the lowest in females was 20.17%. For *S. papillosus* the highest percentage rate in males was 27.77% while the lowest in females was 21.05%. Males had highest infection rate of 55.55% by *T.vitulorum* in contrast with females was 39.47%. For *S. ovis*, males had highest infection rate 16. 66% while females had lowest rate 11.40%. All these different species of GIT nematodes recorded no significance differences between sexes (Table 2). According to the months of study, March had highest rate of infection with *H.contortus* of 44% compared to January had lowest prevalence rate of 4%. For *S.papillosus* percentage of infection was highest in February reached to 28% and lowest in January was 16%. For *T.vitulorum* the highest rate in February was 84% compared to November reached to 24%. For *S.ovis*, had closed prevalence rate in October, December, January, March of 16%, and no infection detected in November, while the lowest in February was 12%. All these differences for all spp. of GIT nematodes recorded significance differences between months p≤ 0.05 (Table 3).

Table (1) Total rate of prevalence with different gastrointestinal Nematodes according to the age groups

Age groups	No. of samples examined	No. of +ve.with *Haemonchus contortus* (%)	No. of +ve. with *Strongyloides papillosus*(%)	No. of +ve. with *Toxocara vitulorum* (%)	No. of +ve. with *Skrjabinema ovis* (%)
<1 – 6 months	104	42 (40.38)	38 (36.53)	48 (46.15)	14 (13.46)
6 – 12 months	58	12 (20.68)	6 (10.34)	22 (37.93)	8 (13.79)
1 – 3 years	92	10 (10.86)	12 (13.04)	40 (43.47)	8 (8.69)
≥3 years	46	4 (8.69)	12 (26.08)	20 (43.47)	8 (17.39)
Total	300	68 (22.66)	68 (22.66)	130 (43.33)	38 (12.66)
X^2=22.1	**Significance differences p≤ 0.05**				

Table (2) Total rate of prevalence with different gastrointestinal Nematodes according to the sex

Sex	No. of samples examined	No. of +ve. with *Haemonchus contortus* (%)	No. of +ve. with *Strongyloides papillosus*(%)	No. of +ve. with *Toxocara vitulorum* (%)	No. of +ve. with *Skrjabinema ovis* (%)
Males	72	22 (30.55)	20 (27.77)	40 (55.55)	12 (16.66)
Females	228	46 (20.17)	48 (21.05)	90 (39.47)	26 (11.40)
Total	300	68 (22.66)	68 (22.66)	130 (43.33)	38 (12.66)
X^2=3.95	**No Significance differences**				

Table (3) Total rate of prevalence with different gastrointestinal Nematodes according to the month

Months	No. of samples examined	No. of +ve with *Haemonchus contortus* (%)	No. of +ve with *Strongyloides papillosus*(%)	No. of +ve with *Toxocara vitulorum* (%)	No. of +ve with *Skrjabinema ovis* (%)
October	50	14 (28)	12 (24)	16 (32)	8 (16)
November	50	10 (20)	10 (20)	12 (24)	-
December	50	8 (16)	12 (24)	16 (32)	8 (16)
January	50	2 (4)	8 (16)	20 (40)	8 (16)
February	50	12 (24)	14 (28)	42 (84)	6 (12)
March	50	22 (44)	12 (24)	24 (48)	8 (16)
Total	300	68 (22.66)	68 (22.66)	130 (43.33)	38 (12.66)
Chi square=25.4	**significance differences p≤ 0.05**				

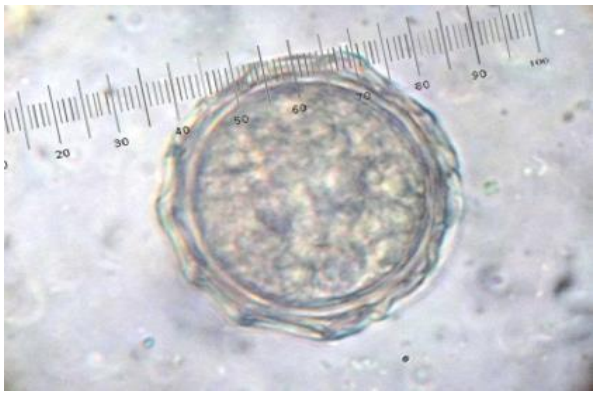
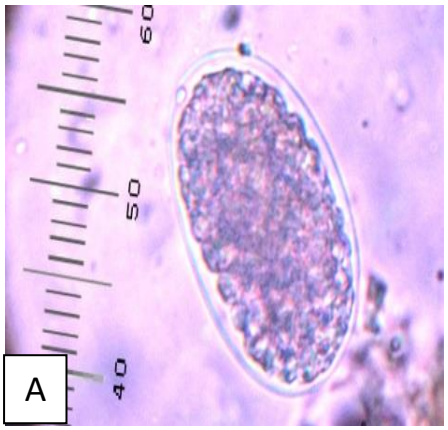
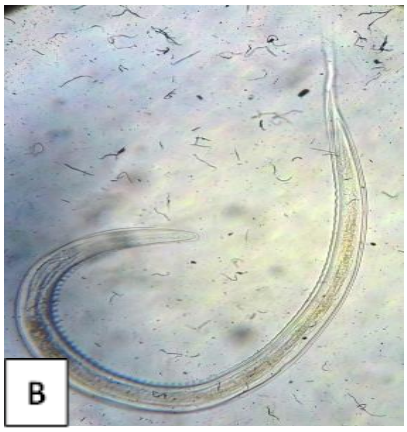


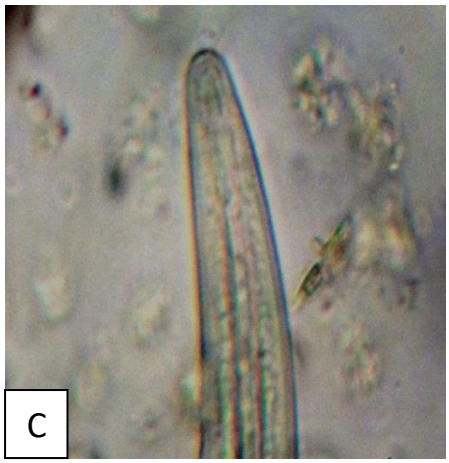
Fig. (1) Egg of *Toxocara vitulorum*, by Sheather's solution flotation method (40 x)



A-Egg of *H. contortus*, by salt solution flotation method (40x)



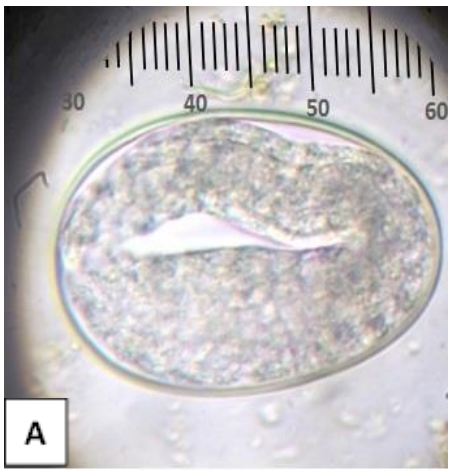
B-Total length of *H.contortus*, by fecal culture



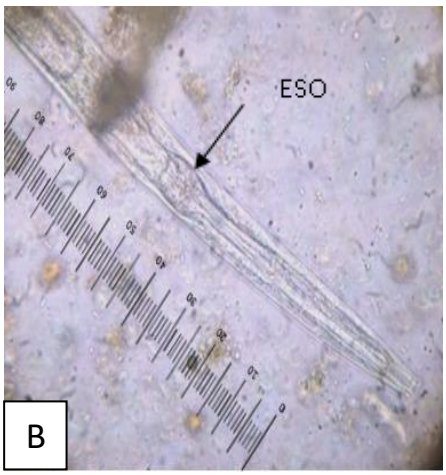
C- Anterior end of L3 of *H.contortus*

D- Posterior end of L3 *H.contortus* (kinked pointed tail)

Fig. (2) *Haemonchus contortus*



A- Egg contain larvae, by direct method



B- Anterior end of free living female, Rhapditiform esophagus (ESO)

C- Egg in the body of free living female **D- Posterior end of free living female**

Fig. (3) *Strongyloides papillosus* (40 x)

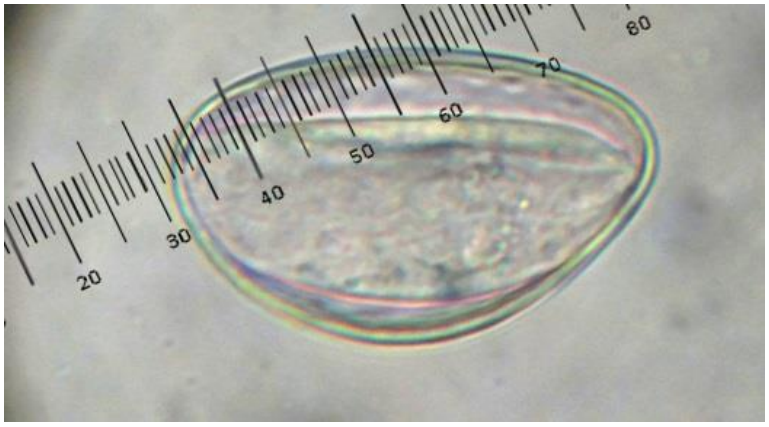


Fig. (4) Egg of *Skrjabinema ovis,* by Lugol's Iodine stain (40x)

Discussion

Current results detected that *T. vitulorum* had highest prevalence rate in infection with GIT nematodes, could be due to thick Albumin's shell of eggs which tend them resistant to various environmental condition and persistence of eggs for at least seven months and more than two years in other studies (6). Young animals take infection by milk ingestion from dams and adult worm present only in young ruminants, so the main transmission by trans mammary routes which play role in epidemiology of *T. vitulorum*, in addition of high biotic potential of females worm excrete 8000-100000 eggs daily per gram of feces (EPG) (11). The percentage rate for *T. vitulorum* was in a compatible with (12) in Egypt who carried out in order to investigation the percentage rate in cattle was 47.9% and disagree with (13, 14) whom detected of 2.4%,14%, respectively. Results were shown the rate of infection by *H. contortus* was 22.66% which in consonance with (13) in Mosul province, was revealed that percentage rate of *H. contortus* was 18.2% in sheep and (15) in Hilla city who recorded of 29.67% in goats, and disagree with (16) who noticed the percentage rate of 3.48% in goats and (17) who recorded the percentage rate was 2.3% in Egypt. Present results were lower than studies showed by (18, 19) whom detected in Baghdad the infection rate of *H.contortus* was 34.94%; 34.66% respectively in goats. For *S. papillosus* the infection rate 22.66% and it was in a harmony with (20) that recorded of 20.45% in goats and in contrary with (21) who found of 66.66% in goats. The rate of infection by *S.ovis* was in compatible with (20,22) whom reported the percentage rate was 11.6%,12% respectively and disagree with (17)

who reported the percentage rate was 1.1% in goats. These differences in the percentage rate for different species of GIT nematodes may be due to physiological factor of animals (lactation and pregnancy), immune system of host, taken of fecal matter and litter during wet seasons, age, breed, sex of host, mal nutrition effect on development of acquired immunity against GIT parasites, number of samples collection, overcrowding, illiteracy of keepers of host, short generation interval of most nematodes infections, and practice of measurement. Regarding to the age group of months, present results noticed the highest rate of *H. contortus* in age <1 – 6 months and lowest in age ≥3 years, many studies have been carried out the prevalence rate represented as our results found by (23) who reported the highest rate in age < 1 years of 80.48% and the lowest in age > 4 years of 23.80%. And disagree with (18, 19) whom recorded the highest percentage in adult 41.12% while kids had percentage of 23.14%, and 92.35% in age 1-2 years and 31.70% in age >2 years respectively. Lowest rate of prevalence in age ≥3 years result of when animals cross one years of age, the infection reduce due to phenomenon self-cure and resist to infection although permanent exposure to some level of infection is acquired to sustain their resistant status (24). Age <1-6 months had highest percentage for *S. papillosus* compared to age 6-12 months had lowest percentage rate, this was in line with (25), that recorded age 1-6 months of 71.5%,67.9% in age 7-18 months in Nigeria, and did not agree with (17) who confirm that adult goats had highest rate of 24.9% while in kids was 11.8%. There is known that *S. papillosus* transmission by trans mammary routes during period of parturition and lactation, therefore in age 6-12 months lowest prevalence was noticed may attributed due to separating of young animals in this age from their dams and acquired immunity. The *T. vitulorum*, the highest rate of infection occurred in age< 1-6 months in contrast with the lowest occurred in age 6-12 months, and this was in compatible with (17) in Egypt, that recorded the infection rate of 0.65% in kids,0.5 % in adults, and with (26) in Florida, who detected age< 3 months had highest rate was 17.6% compared to age 3-4 months and age 5-6 months was 0.4%, 0.9% respectively and not noticed eggs of *T.vitulorum* in age 7-9 months in calves. These finding disagree with (14), who revealed age 10-30 day had prevalence rate of 7.14% in goats while age 31-90 days was 85.71%, but at age 90-180 day was 7.14%. The highest rate in age <1-6 months may could due to larvae 3 of *T.vitulorum* transmission by colostrum milk to new born calves in 2-5 day after calving and evolution to new mature worm in intestine of calves after 10 days of age of host, then eggs passed in three weeks in feces of calves (27). At age≥3 years had highest rate of infection by *S. ovis* in contrast with age 1-3 years had lowest percentage and this in compatible with (17) that recorded highest rate of 1.5% in adults and 0.65% in kids and (20) in Sudan that explained that adult goats particularly bear high worm burden, and in contrary with (22) who carried out the highest rate in age 1-1.5 years and the lowest in age > 3 years in goats. The highest rate in age ≥3 years may be due to highly humidity and moderate temperature play role to subsequences development of life cycle of nematodes infection lead to pasture contamination around the years and presence of carrier animals in herd also open grazing lead to recycle infection and resistant animals to treatment (28). The lowest percentage in age 1-3 years in adult goats due to evolution of immune system and elimination of worm burden when they reach 12 months of age and resistant to reinfection (29). According to the sex, The highest rate of *H. contortus* in males was 30.55% compare to females was 20.17%, this was in agreement with (21), who carried out the highest rate in males was 75% and the lowest in females was 64.10% in goats without significance differences, and in contrary with (18, 19) whom detected the highest rate in females more than males.

The highest rate in males due to males more susceptible to infection than females and different in resistant level were significant after puberty only due to stimulation of estrogen effect on immune response against GIT nematodes while androgen suppress immune response (30). Present results showed highest rate for *S. papillosus* in males

was 27.77% in contrast with females was 21.05% and this was in line with (21), who explained the highest rate for *S.papillosus* in males was 66.66% in goats and 61.54% in females without significance differences, and also with (20) that recorded the highest worm burden in males more than females. For *T. vitulorum* infections, highest rate in males was established of 55.55% and the lowest in females 39.47%, and this in agree with (31) who confirm the highest rate of nematodes prevalence in males was 82.8% more than females was 75.3% without significance differences, and disagree with (32), who recorded highest rate in females was 80.43% while in males of 47.45% in buffalos. (33) was explained that females exposure to stress factor during pregnancy and parturition and lowered resistant due to in balance of hormones and insufficient diet against higher needs, suppression of immunity and Spring in apparent increase of number of worm by resumption of development of previously inhibited larvae and occurred of newly acquired larvae and failure of elimination of existing mature worm which lead to fecundity of eggs laying by adult females nematodes. For *S. ovis* infection, males had highest rate of 16.66% while in females was 11.40% and this was in accordance with (34), who detected the maximum rate in males was 57.69% while the lowest in females was 32.3%. All these variation in the percentage rate for different spp. of GIT nematodes according to the sex due to differences in geographical distribution, number of samples collection, age, breed, seasons of samples collection, health status of animals, grazing habits, nutritional status of host.

Regarding to the months of study, current results were shown the highest rate for *H. contortus* in March and lowest in January, which in compatible with (16, 18) whom confirm the highest percentage rate was 22.75%, 80.95% respectively in March. Low prevalence rate in January due to cold weather lead to inhibition L4 (hypobiosis), according to study of (35), who reported the late Autumn and beginning of Winter seasons when temperature low, L4 hypobiosis in abomasum of sheep, and least inhibition take place in warm rainy seasons and Spring. Current results disagree with (19), who detected the highest rate in December 57.33%, 17.10% in October, and with (34) who recorded the highest rate 33.30% in Autumn in goats. For *S. papillosus* recorded in present results, the highest percentage in February was recorded 28% and the lowest in January was16%, this was in accordance with (21), who recorded highest rate in February was 100% and lowest in June was 61.11% in goats with significance differences. The highest rate of *S. papillosus* in February may be attributed to period of parturition and lactation in this month. There is known that larvae of *S. papillosus* transmission by trans mammary route by colostrum milk and can noticed eggs in feces of young animals after 6-7 days, in addition to favorable climatic condition in February month for evolution of free living stage (3).

The lowest prevalence rate in January may due to adverse climatic condition in winter subsequences to arrested evolution of larvae in host and environment, short photo period in winter and reduce period of grazing support in reduce chance of contact between host and parasite, also phenotype or strain have difference response to temperature changes and high temperature shortened their evolution while low temperature prolong developed of free living stage (36). (17) was confirmed that *Strongyloides* spp. infections increase gradually in Autumn and reach peak in Winter and Spring and declined in Summer in goats, and didn't agree with (13) who noticed all nematodes infection reach peak in Spring seasons and also with (29) that detected the highest rate in Spring and Summer seasons was 95.23% and lowest in Winter was 52.77%. For *T.vitulorum*, results were shown maximum prevalence rate in February was 84% compared to November was 24%. The highest rate in February may be due to period of parturition and lactation. The main source of transmission by trans mammary routes and suckling ruminants ingestion milk contain L3 from dams and developed to adult worm in the small intestine of young animals and can noticed eggs in feces in 29 day after birth (37). The highest rate in consonance with (38), who recorded all

nematodes eggs count increase in parturition period due to stress factor and poor nutrition and per parturient relaxation which synchronized with climatic condition lead to develop of free living stage. These finding disagree with (17) in Egypt, who recorded highest rate of *T.vitulorum* in goats was 1.2% in Spring and Autumn and with (26), Who detected that no significance differences between months with infection of *T.vitulorum* in ruminants. For *S.ovis*, October, December, January and March had closed prevalence rate compared to February had lowest rate and no infection detected in November with *S.ovis*. The highest rate of *S.ovis* was in harmony with (34), who carried out the highest rate of *S.ovis* in Autumn seasons was 72.20%.

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