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Prevalence and Larval burden of *Oestrus ovis* (Linné, 1758) in Goats of Karachi, Pakistan

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ABSTRACT

Investigation was carried out to find out the prevalence and larval burden of *O. ovis* in goats. Slaughtered goat heads were examined for *O. ovis* larvae infection from March 2018 to February 2019 at different slaughterhouse in multiple areas of Karachi. A total of 527 (285 male and 242 female) goat heads were examined for the presence of *O. ovis* larvae. Out of the examined, 191 were found infected, with 36.24% rate of infection. The infection rate in male goats was 39.64% that is higher as compared to female goats 32.23%. The highest prevalence was observed in the month of December. A total of 1434 larvae were collected from infected goat heads. The mean number of larvae in infected goats was 7.51±4.34. The density of larvae in infected goats ranged from 1 to 40. Among 1434 collected larvae, 818 (57.0 %) were 3rd instar larvae, 494 (34.4 %) were 2nd instar larvae and 122 (8.6 %) were found to be 1st instar larvae. It is concluded that the infection with *O. ovis* in goats represent a risk for the goat production in the studied areas, therefore, it is suggested to take possible measurements for protection and control of *O. ovis* larvae in goats.

Introduction

Goat is a versatile animal and assumes an important function in the economy and nutrition of landless, little and minimal agriculturists in Pakistan. Goats reared by a sizeable portion of the populace in rural regions (Khan *et al*., 2006). According to the economic survey of Pakistan 2017-18, the population of goats was found about 74.1 million (Economic survey of Pakistan, 2017-18). They play a part in the animal industry regarding skin, milk, hair and meat. In correlation with other domesticated animals, they are disliked, harmed and ignored; however, they have been accomplishing a very beneficial role in providing a section of the human population with milk, hair and meat (Akmal *et al*., 2010).

Parasitic infestation in goats hinders higher production and growth. Due to improper care, unhealthy environment, intense climate and close contact with unhygienic animals, they get infected with a spread of parasites. Among the various parasites, *Oestrus ovis* Linné, 1758 larvae are familiar parasites of the frontal sinuses, nasal cavities and occasionally the maxillary sinuses of goats. *O. ovis* can induce myiasis throughout the world called nasal oestrosis.

O. ovis is a dipteran fly, grayish brown in color and about 12 mm in length. Active *O. ovis* infection starts when female flies lay eggs on or in the nostrils of the host. Tiny clear-white larvae hatch and move into the nasal cavity, numerous spend at least some time in the paranasal sinuses (Gracia *et al*., 2019; Kamal *et al*., 2021). The larvae then move into the host's tissues causing irritating lesions leading to anorexia and weakness (Hoyer *et al*., 2016). Furthermore, the disease might be complicated by sensual tumors and interstitial pneumonia. Afterward, this local Naso-sinusal infection causes lung abscesses that leads to starvation, which may cause death (Dorchies *et al*., 1993). The larvae sometime move from the nasal cavities and sinuses into the brain causing false gid (Mozaffari *et al*., 2013).

This parasitic infection influences the health and performance of infected animals, leading to serious economic losses (Ipek, 2018). The existence of *O. ovis* larvae in the nasal passages, sinuses and head of goats and sheep has gained attention in almost every country in the world from earliest times (Ahaduzzaman, 2019). Many studies have been carried out on the prevalence of goat's oestrosis in all over the world, which showed different prevalence rate (Table 1). According to the best of the authors knowledge, in Pakistan no research work has carried out on the incidence of *O. ovis* larvae in animals.

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Table 1. Previous work done on the prevalence of *O. ovis* larvae in goats worldwide.

Author	Area	No.	Infected	Prevalence (%)	Intensity (Min-Max)	Larvae Recovered			Total no of larvae recovered
						1st instar	2nd instar	3rd instar	
Jagannath *et al*. (1989)	India	263	127	48.3	9.9	-	-	-	-
Gabaj *et al*. (1993)	Libya	320	59	18.4	(1-11)	-	-	-	-
Biu and Nwosu (1999)	Nigeria	4000	2150	53.8	2.03	1475 (38.0%)	1795 (46.3%)	610 (15.7%)	3880
Yilma and Genet. (2000)	Ethiopia	258	188	72.87	10.52 (1-48)	-	-	-	-
Dorchies *et al*. (2000)	France	672	191	28.4	5.35	-	-	-	-
Adebote *et al*. (2002)	Nigeria	287	83	28.9	2.5	51 (24.2%)	54 (25.6%)	106 (50.2%)	211
Abo-Shehada *et al*. (2003)	Jordan	520	126	24	-	-	-	-	-
Alcaide *et al*. (2005)	Spain	80	23	34.94	3.9 (1-45)	52.22%	45.73%	1.97%	-
Mot (2008)	Romania	51	22	43.1	3.95 (1-12)	-	-	-	87
Alem *et al*. (2010)	Ethiopia	431	381	88.4	6.8 (1-40)	753 (33.8%)	893 (40.1%)	581 -26.10%	2227
Shoorijeh *et al*. (2011)	Iran	1998	261	13.1	5.2	-	-	-	1356
Rossanigo *et al*. (2011)	Argentina	30	26	86.6	7.9 (1-21)	54 (23.8%)	66 (29.1%)	107 (47.1%)	227
Gebremedhin (2011)	Ethiopia	243	115	47.3	11.3 (1-45)	57.50%	38.80%	11.70%	-
Negm-Eldin *et al*. (2015)	Libya	120	34	28.33	3.5	-	-	-	-
Ipek (2018)	Turkey	80	40	50	6.5	150 (57.91)	79 (30.50)	30 (11.58)	259
Current study	Pakistan	527	191	36.24	7.508 (1-40)	122 (8.6%)	494 (34.4%)	818 (57.0%)	1434

The main objective of the present study was to find out the prevalence and larval burden of *O. ovis* in goats. Based on the above facts this will be a good contribution to the existing relevant literature.

Materials and methods

Samples Collection

O. ovis larvae were randomly collected during March 2018 to February 2019 from the slaughtered goat heads at different slaughterhouse in multiple areas of Karachi i.e. Al-Asif Square (24.9505° N, 67.0908° E), Paposh Nagar (24.9231° N, 67.0204° E), Liaqatabad (24.9077° N, 67.0528° E), Gol Market (24.9140° N, 67.0233° E) and Bhains Colony (24.8301° N, 67.2511° E) (Fig. 1). The head of slaughtered goats was separated from the rest of the carcass and cut along sagittal axes. Then the goat heads were examined for *O. ovis* larvae in the main worm sites according to the method described by Dorchies *et al*. (2000). Larvae present in the nasal passages, frontal sinuses and base of the horns were collected in small bottles, labelled accordingly, immediately stored in the icebox and transferred to the laboratory.

This study was performed following the international guiding principles for biomedical research involving animals and permission was taken from the animal ethics committee of the University of Karachi.

Laboratory Analysis

The major characters of larvae were studied under stereomicroscope (OLYMPUS SZ61, Model-SZ2-ILST), and identified as *O. ovis* larvae on the basis of the keys described by Zumpt (1965). All the three instars (1st, 2nd and 3rd) of larvae were separated according to the morphological characteristics.

Statistical Analysis

Microsoft Excel 2013 was used for raw data entry and calculation of prevalence and larval burden. Chi-square analysis was performed for the assessment of risk factors in EpiInfoTM Center for Disease Control. Below 0.05 P value was considered significant. Prevalence and larval burden were calculated by the following formulae:

Prevalence % = Number of goat head infected /Total number of goat head examined*100

Larval burden per head = Total number of larvae/infected goat heads.

Results

During the study period, a total of 527 goat head were examined for the presence of *O. ovis* larvae. Out of the examined, 191 were found infected, with 36.24% rate of infection. The sex-wise prevalence of *O. ovis* larvae infection in goats were also studied, a total of 285 male and 242 female goat heads examined, out of which 113 male (39.64%) and 78 females (32.23%) were found infected. There was no significant association of *O. ovis* prevalence with the sex of goats (χ^2=3.11, p>0.05). During Month-wise study highest prevalence was observed in the December followed by January and February and the lowest prevalence was recorded in June (Table 2).

A total of 1434 larvae were collected from 191 infected goat heads, the mean number of larvae in infected goat heads was 7.51±4.34, whereas the density of *O. ovis* larvae in infected heads ranged from 1 to 40. Different instars of larvae were identified and separated on the basis of their morphological

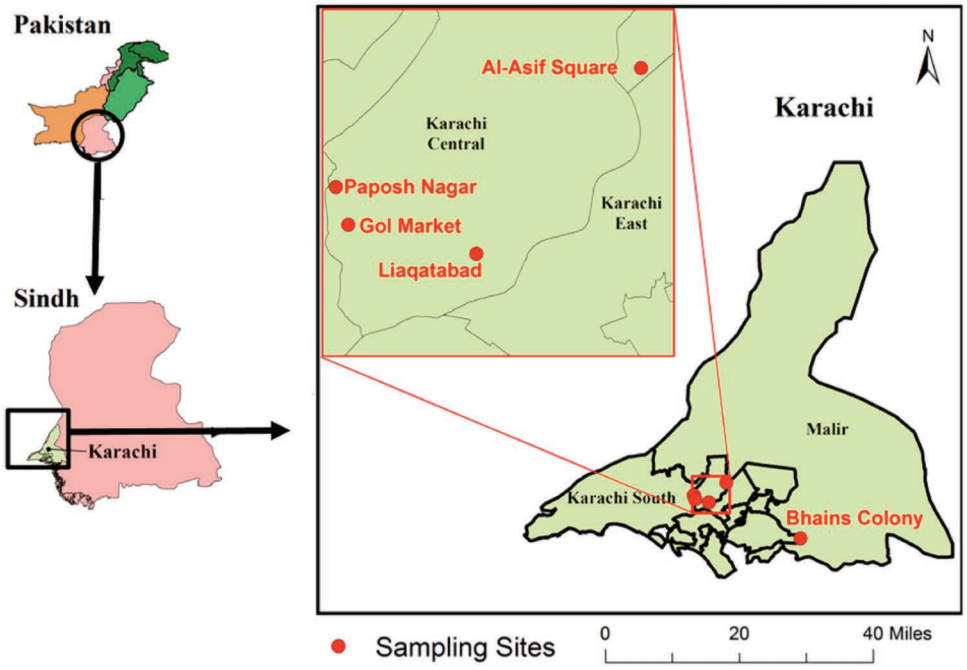

Fig. 1. GIS map of Karachi, Pakistan showing collection sites.

Table 2. Chi square analysis for month-wise prevalence of *O. ovis* in goats in Karachi.

Month	Examined goats	Infected goats	Prevalence %	Chi-Square	P Value
Mar-18	55	22	40	Reference Category	
April	32	9	28.12	1.24	0.26
May	38	11	28.94	1.19	0.27
June	63	14	22.22	4.37	0.03
July	81	24	29.62	1.57	0.2
August	-	-	-	-	-
September	102	32	31.37	1.17	0.28
October	42	16	38.09	0.03	0.84
November	32	11	34.37	0.27	0.6
December	37	25	67.56	6.72	0
Jan-19	20	13	65	3.68	0.05
February	25	14	56	1.78	0.18

Significance level $\alpha = 0.05$

characters (Fig. 2). Among the total 1434 collected larvae, 57.0% 3rd instar, 34.4% 2nd instar and 8.6% 1st instar larvae were found.

Discussion

In the present study, the prevalence of *O. ovis* in goats was 36.24%, which is similar to that recorded by two authors; 35.2% in Greece by Papadopoulos *et al.* (2006) and 34.94% in Spain by Alcaide *et al.* (2005). This finding is lower than the prevalence that previously recorded by authors in other countries; 43.1% in Romania (Mot, 2008), 47.3% in Ethiopia (Gebremedhin, 2011), 48.3% in India (Jagannath *et al.*, 1989), 50% in Turkey (Ipek, 2018), 53.8% in Nigeria (Biu and Nwosu 1999), 72.87% in Ethiopia (Yilma and Genet, 2000) and 86.6% in Argentina (Rossanigo *et al.*, 2011). The highest prevalence recorded was 88.4% in Ethiopia (Alem *et al.*, 2010). In contrast, some author's recorded low prevalence; 28.9% in Nigeria (Adebote *et al.*, 2002), 28.4% in France (Dorchies *et al.*, 2000), 28.33% in Libya (Negm-Eldin *et al.*, 2015), 24% in Jordan (Abo-Shehada *et al.*, 2003), 19.2% in Benin (Attindehou *et al.*, 2012), 18.4% in UK (Gabaj *et al.*, 1993) and 13.1% in Iran (Shoorijeh *et al.*, 2011). This variation in the prevalence rate may be attributed to the difference in fly density, host resistance, climate, temperature, moister, treatment against these larvae and difference in goat management among different study areas.

In the present study, the difference in the prevalence rate in male and female goat was insignificant. It means that gender is not a significant risk cause. The results are similar with preceding observations of Biu and Nwosu (1999); Abo-Shehada *et al.* (2003),; Gebremedhin (2011); Shoorijeh *et al.* (2011), Attindehou *et al.* (2012) and Ipek (2018). In contrast, Negm-Eldin *et al.* (2015) and Adebote *et al.* (2002) reported that prevalence in male and female were significantly different.

The mean density of larvae recorded was 7.51±4.34. This observation is similar to that reported by Alem *et al.* (2010); Rossanigo *et al.* (2011) and Ipek (2018). The obtained density was higher from that recorded by Biu and Nwosu (1999); Dorchies *et al.* (2000); Shoorijeh *et al.* (2011); Attindehou *et al.* (2012) and Negm-Eldin *et al.* (2015) and was lower than that reported by Gabaj *et al.* (1993); Yilma and Genet (2000) and Angulo-Valadez *et al.* (2009). In current study, the density of *O. ovis* larvae in an infected goat was changed from 1 to 40,

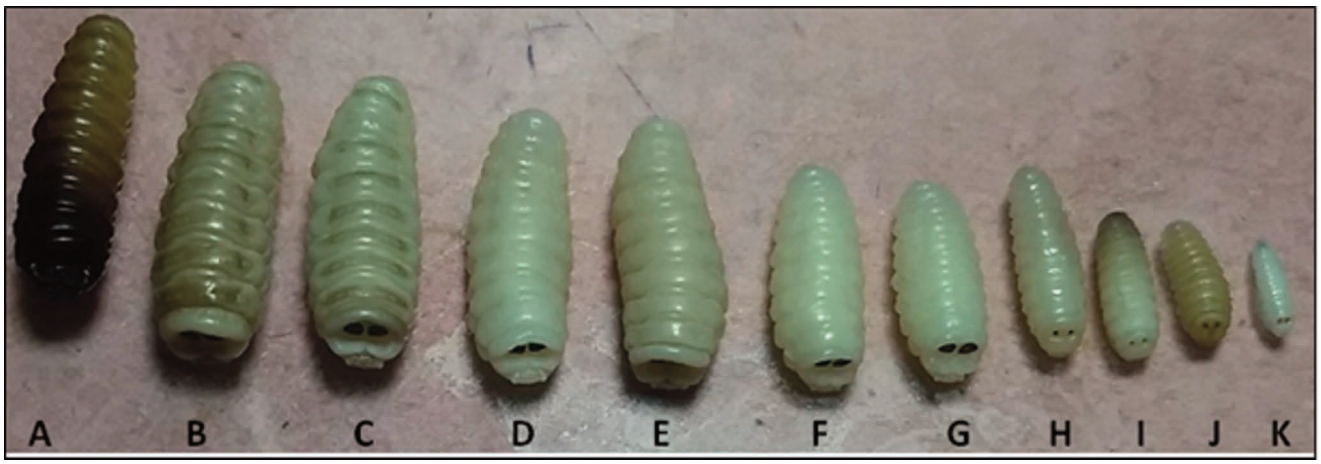

Fig. 2. Different larvae instars A-C Mature 3rd instar larvae, D-E Young 3rd instar larvae, F-J 2nd instar larvae, K- 1st instar larvae.

which are same as recorded by Alcaide *et al*. (2005); Alem *et al*. (2010) and Gebremedhin (2011). In the present study, the percentage of the 3rd instar larvae recovered was higher than the 1st instar and the 2nd instar larvae. A similarly high percentage of the 3rd instar larvae was reported by Adebote *et al*. (2002) and Rossanigo *et al*. (2011). In contrast, Alcaide *et al*. (2005); Gebremedhin (2011); Negm-Eldin *et al*. (2015) and Ipek (2018) reported a high percentage of the 1st instar as compared to the 2nd and 3rd instar larvae.

Oestrosis is additionally regarded as a zoonotic disease. *O. ovis* cause Ophthalmomyiasis in man. Cases of Ophthalmomyiasis caused by larvae of *O. ovis* are reported to be present intermittently in humans in many parts of the world (D'Assumpcao *et al*., 2019; Brini *et al*., 2019; Majumder *et al*., 2019; Sen *et al*., 2020; Pupić-Bakrač *et al*., 2020), including Pakistan (Ali *et al*., 2006; Fasih *et al*., 2014; Abbas and Amla, 2016).

Conclusion

In the present study, the prevalence of *O. ovis* in goats was 36.24%. The infection rate in male goats was 39.64% that is higher as compared to female goats 32.23%. The highest prevalence was observed in the month of December. The mean number of larvae in infected goats was 7.51±4.34. The density of larvae in infected goats ranged from 1 to 40. It is concluded that the infection of *O. ovis* in goats represent a risk for the goat production in the studied areas, therefore, it is suggested to take possible measurements for protection and control of *O. ovis* larvae in goats including good management and treatment against the infection.

Conflict of interest

Authors declared that they have no conflictof interest.

References

Abbas, G., Amla, U.F., 2016. Ophthalmomyiasis Caused by Sheep Nasal Botfly (*Oestrus ovis*). J. Coll. Physicians Surg. Pak. 26, 329-330.

Abo-Shehada, M.N., Batainah, T., Abuharfeil, N., Torgerson, P.R., 2003. *Oestrus ovis* larval myiasis among goats in northern Jordan. Prev. Vet. Med. 59, 13-19.

Adebote, D.A, Oniye, S.J., Tambu, B., 2002. Infestation of the nasal cavities of goats slaughtered in Zaria, Nigeria by larvae of *Oestrus ovis* (Diptera: Oestridae). J. Trop. Biosci. 2, 72-77.

Ahaduzzaman, M., 2019. The global and regional prevalence of oestrosis in sheep and goats: a systematic review of articles and meta-analysis. Parasit. Vectors 12, 346.

Akmal, N., Shah, H., Niazi, M.A., Akhtar, W., 2010. Assessment of goat breed improvement through distribution of beetal bucks in rainfed Pothwar, Punjab. Pakistan J. Agri. Res. 23, 158-167.

Alcaide, M., Reina, D., Frontera, E., Navarrete, I., 2005. Epidemiology of *Oestrus ovis* (Linneo, 1761) infestation in goats in Spain. Vet. Parasitol. 130, 277-284.

Alem. F., Kumsa. B., Degefu. H., 2010. *Oestrus ovis* larval myiasis among sheep and goats in Central Oromia, Ethiopia. Trop. Anim. Health. Prod. 42, 697-703.

Ali, A., Feroze, A.H., Ferrar, P., Abbas, A., Beg, M.A., 2006. First report of ophthalmomyaisis externa in Pakistan. J. Pakistan Med. Assoc. 56, 86-87.

Angulo-Valadez, C.E., Cepeda-Palacios, R., Ascencio, F., Jacquiet, P., Dorchies, P., Ramírez-Orduña, J.M., 2009. Relationships of systemic IgG antibody response and lesions caused by *Oestrus ovis* L. larvae (Diptera: Oestridae) in infected goats. Rev. electrón vet. 10, 1-13.

Attindehou, S., Salifou, S., Gbangboche, A.B., Abiola, F.A., 2012. Prevalence of the small ruminant's oestrosis in Benin. J. Anim. Vet. Adv. 11, 1647-1650.

Biu, A.A., Nwosu, C.O., 1999. Incidence of *Oestrus ovis* infestation in Borno-White Sahel goats in the semi-arid zone of Nigeria. Vet. Res. 30, 109-112.

Brini, C., Nguon, B., Miglietta, E., Sala, L., Acutis, P.L., Riina, M.V., Rossi, L., Serusi, E., Gervasio, C.F., Tamponi, C., Scala, A., 2019. Rhinomyiasis by *Oestrus ovis* in a tourist returning from Corsica. Parasitol. Res. 118, 3217-3221.

D'Assumpcao, C., Bugas, A., Heidari, A., Sofinski, S., McPheeters, R.A., 2019. A case and review of ophthalmomyiasis caused by *Oestrus ovis* in the central valley of California, United States. J. Investig. Med. High Impact. Case Rep. 7, 2324709619835852.

Dorchies, P., Bergeaud, J.P., Tabouret, G., Duranton, C., Prevot, F., Jacquiet, P., 2000. Prevalence and larval burden of *Oestrus ovis* (Linné 1761) in sheep andgoats in northern Mediterranean region of France. Vet. Parasitol. 88, 269-273.

Dorchies, P., Yilma, J.M., Savey, J., 1993. Prevalence of lung abscesses and interstitial pneumonia in ovine oestrosis. Vet. Rec. 133, 325-325.

Economic Survey of Pakistan, 2017. Finance Division Islamabad, Government of Pakistan. 2017-18, pp.13-32.

Fasih, N., Qaiser, K.N., Bokhari, S.A., Jamil, B., Beg, M.A., 2014. Human ophthalmomyiasis externa caused by the sheep botfly *Oestrus ovis*: a case report from Karachi, Pakistan. Asian Pac. J. Trop. Biomed. 4, 835-837.

Gabaj, M.M., Beesley, W.N., Awan, M.A.Q., 1993. *Oestrus ovis* myiasis in Libyan sheep and goats. Trop. Anim. Health. Prod. 25, 65-68.

Gebremedhin, E.Z., 2011. Prevalence of ovine and caprine oestrosis in Ambo, Ethiopia. Trop. Anim. Health. Prod. 43, 265-270.

Gracia, M.J., de Arcaute, M.R., Ferrer, L.M., Ramo, M., Jiménez, C., Figueras, L., 2019. Oestrosis: parasitism by *Oestrus ovis*. Small Rumin. Res. 181, 91-98.

Hoyer, P., Williams, R.R., Lopez, M., Cabada, M.M., 2016. Human nasal myiasis caused by *Oestrus ovis* in the highlands of Cusco, Peru: report of a case and review of the literature. Case Rep. Infec. Dis. 2016, 2456735.

Ipek, D.N.S., 2018. Prevalence and intensity of *Oestrus ovis* in sheep and goats in south-eastern part of Turkey. Indian J. Anim. Sci. 52, 1751-1756.

Jagannath, M.S., Cozab, N., Vijayasarathi, S.K., 1989. Histopathological changes in the nasal passage of sheep and goats infested with *Oestrus ovis* (Diptera: Oestridae). Indian J. Anim. Sci. 59, 87-91.

Kamal, M., Yasmeen, G., Naz, F., Saher, N.U., Ahmad, N., Khan, W., Yousafzai, G.J., 2021. Morphotaxonomy and allometry of *Oestrus ovis* (linné, 1758) larvae (Diptera: Oestridae: Oestrinae). J. Anim. Plant Sci. 31, 604-609.

Khan, H., Muhammad, F., Ahmad, R., Nawaz, G., Rahimullah., Zubair, M., 2006. Relationship of body weight with linear body measurements in goats. J. Agric. Biol. Sci. 1, 51-54.

Majumder, P.D., Jeswani, P., Jeyathilakan, N., Biswas, J., 2019. External ophthalmomyiasis due to *Oestrus ovis*. Indian J. Ophthal. 67, 404-405.

Mot, D., 2008. The prevalence of wormy sinusitis in goats from the west side of our country. Sci. P. Anim. Sci. Biotechno. 41, 762-764.

Mozaffari, A.A., Shojaeepour, S., Ghahremani, G.C.S., 2013. High mortality rate due to false gid in a sheep herd. Int. Sch. Res. Notices 2013, 1-3.

Negm-Eldin, M.M., Elmadawy, R.S., Hanan, G.M., 2015. *Oestrus ovis* larval infestation among sheep and goats of Green Mountain areas in Libya. J. Adv. Vet. Anim. Res. 2, 382-387.

Papadopoulos, E., Prevot, F., Diakou, A., Dorchies, P., 2006. Comparison of infection rates of *Oestrus ovis* between sheep and goats kept in mixed flocks. Vet. Parasitol. 138, 382-385.

Pupić-Bakrač, A., Pupić-Bakrač, J., Kolega, M.Š., Beck, R., 2020. Human ophthalmomyiasis caused by *Oestrus ovis*—first report from Croatia and review on cases from Mediterranean countries. Parasitol. Res. 119, 783-793.

Rossanigo, C.E., Rita, B., San, W.J.P.E.I., Mercedes, L.V., 2011. Epidemiology of *Oestrus ovis* larvae in goats in San luis (Argentina). In: "International Conference of the World Association for the Advancement of Veterinary Parasitology". Buenos. AR; 21-25, Aug, 2011, p.151.

Sen, P., Mohan, A., Jain, S., Shah, C., Jain, E., 2020. External ophthalmomyiasis in a neonate masquerading as an orbital cellulitis. Indian J. Ophthalmol. 68, 900-901.

Shoorijeh, J.S., Tamadon, A., Negahban, S.H., Behzadi, M.A., 2011. Prevalence of *Oestrus ovis* in goats of Shiraz, southern Iran. Vet. Arh. 81, 43-49.

Yilma, J.M., Genet, A., 2000. Epidemiology of the sheep nasal bot, *Oestrus ovis* (Diptera: Oestridae), in Central Ethiopia. Revue. Rev. Med. Vet. 151, 143-150.

Zumpt, P., 1965. Myiasis in Man and Animals in the Old World. Butterworths, London, pp.174-179.