



ORIGINAL ARTICLE

Study of Gasterophilus role in Equine Gastric Ulcer Syndrome in Tabriz area

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ABSTRACT

Larvae of flies belonging to the genus *Gasterophilus* (Diptera: Oestridae) are common obligate parasites in the gastrointestinal tract of equine (including horses, donkeys and zebras) and cause gastrointestinal myiasis. The aim of present study was to evaluate the role of *Gasterophilus* in equine gastric ulcer syndrome in Tabriz area. The study was performed during the 2013 and 16 horses were assayed. The age of the animals ranges from 3 –6 years. At first time, animals were examined clinically. Then, the diagnosis was made based on clinical evidences. Then, those animals were died necropsy was followed and larva was seen in the gastric mucosa. Data obtained from present study showed that of 16 horse cases which were referred during one year and were suspected to gastric ulcer (diagnosis based on clinical signs), 5 cases were suffered from *Gasterophilus* which caused gastric ulcer. Those animals were died because of cachexia, in necropsy 3 cases showed the larva in the gastric mucosa. To decide at about state of gasterophilosis in horses in this region, works conducted on more animals must be done. *Gasterophilosis* in horses in this region may be probably affected by the perhaps not treatment with antiparasitic drugs, bad management factors such as poor maintenance conditions and to work under severe conditions, free grazing animals, which heighten to contact with female botflies, to live with other equine reservoir to these larvae causing gastrointestinal myiasis.

Keywords: *Gasterophilosis*, gastric ulcer, horse, Iran.

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INTRODUCTION

Worldwide, nine different species of *Gasterophilus* exist, primarily affecting horses and donkeys. Three of the more common *Gasterophilus* species are found in North America. *Gasterophilus intestinalis* (DeGeer) is the more common horse bot fly which is an internal parasite of the gastrointestinal tract. *Gasterophilus nasalis* (Linnaeus), the nose bot fly, and *G. haemorrhoidalis* (Linnaeus), the throat bot fly, are also distributed throughout North America. The bot flies are in the family Oestridae. Within this family are four subfamilies, including the Gasterophilinae, the stomach bot flies. All subfamilies within Oestridae are related by their larval feeding characteristics. The larvae demonstrate obligatory myiasis because they require a living host to complete development [1]. Completion of the bot flies' life cycle is dependent on the larvae consuming nutrients from tissues in the gastrointestinal tract of the horse [2]. Horse bot flies undergo complete metamorphosis, including three larval instars [3]. Only one generation is produced per year. The stages of the life cycle are not restricted to certain seasons due to the varied climates found in different geographical locations. However, a general cycle begins with eggs laid in the early summer months [4].

Eggs: The female bot fly can oviposit between 150 and 1000 eggs on a horse's body [5]. This typically occurs during the early summer months. The female oviposits directly on single hairs of the horse's front legs (cannon bone area), abdomen, flanks, and shoulders. Ovipositing on the rear legs appears to be discriminated against by most flies, whereas age, breed, size, and sex do not appear to be a factor [6].

The bot fly eggs are approximately 0.05 inches (0.127 cm) in length and are pale to grayish yellow [5,6]. The eggs are essentially stalk-less and are attached near the tip of the hair. The eggs contain two regions on the lower half which surround the hair allowing for attachment and another region extending at a thirty degree angle from the hair [5, 6]. The eggs develop into first instar larvae within five days of being deposited by the female. Eggs hatch into a maggot within seven to 10 days of being laid. Larvae are

stimulated to emerge by the horse licking or biting the attached, fully developed eggs. The larvae either crawl to the mouth or are ingested and subsequently bury themselves in the tongue, gums, or lining of the mouth and remain for approximately 28 days. After wandering in the mucosa of the mouth, the larvae molt to the second stage and move into the stomach [7]. The second and later third stage larvae typically attach to the lining of the stomach in the non-glandular portion near the junction of the esophageal and cardiac regions. The second and third instar larvae remain immobile for the following nine to 12 months [8]. The third instar larvae are relatively large, between 1/2 to 3/4 inch (1.27 to 1.91 cm) long. They are adapted to life in the gastrointestinal tract with their rounded body, narrow, hooked mouthparts, and spines [9]. The hooked mouthparts (maxillae) enable the larvae to securely attach to the lining of the stomach and intestinal tract. The larvae use their flat mandibles to abrade the tissue of the stomach. The uniqueness of the spines is helpful in identifying the species. Gasterophilinae are all characterized with rows of smaller spines amongst rows of larger spines [8]. The third stage instar larva is distinguished by its yellowish color [5, 6]. After the third instar larvae have matured, they detach from the gastrointestinal tract and pass from the horse's body in the feces. The larvae burrow into the soil or dried manure where they pupate and remain for the next one to two months. This stage of the life cycle occurs between late winter and early spring. Because of horses' behavior to habitually defecate in the same location and the lack of larvae movement, the amount of pupae in fecal piles can become rather significant [8, 6]. The adult horse bot fly emerges after a three to 10 week period during the summer or fall season. After the fly emerges from the pupa, it quickly finds a mate. The mating activity typically occurs in the early afternoon during warm, sunny weather in relative proximity to horses or on hilltops. Mating is likely to occur around fecal piles where pupae numbers are large thereby greatly increasing the chances of male and female contact upon adult fly emergence. Once the male and female flies meet, they sink to the ground and copulation occurs within three to four minutes. Within hours, the female begins host seeking and oviposits. Dispersal of eggs by the female is not restricted to one horse but can occur on many horses within an area. The female increases the chance of larval survival by not limiting her eggs to one horse [10]. The adult female lifespan lasts seven to 10 days [10].

The adult fly is between 2/3 and 3/4 inch (1.67 to 1.91 cm) in length and resembles a bee with its black and yellow hairs. Because it is a fly, it has only one pair of wings. The adult has small, nonfunctional mouthparts and does not feed [10, 11]. The female's abdomen is elongated, curled under and serves as an ovipositor [6]. The common host of this particular species of bot fly is the horse. Other equid species, including mules and donkeys, can also serve as hosts. Although accidental, the horse bot also has been reported in man causing either ocular (eye) or cutaneous (skin) myiasis [10]. The horse bot fly causes indirect damage to the horse through attempts at egg laying. The dive-bombing action of the bot fly can range from a simple annoyance to severe fright among horses. Injuries may result as the horse tries to rid themselves of this hovering fly. Weight-loss may occur if the annoyance is great enough to cause the horse to stop grazing.

The direct damage the bot fly causes occurs after the larvae enter the animal's mouth and gastrointestinal tract. When the first instar larvae burrow into the mouth, the horse may experience severe irritation, as well as the development of pus pockets and loosened teeth. Loss of appetite may develop due to the larva's inhabitation [6, 11].

As the second and third instar larvae inhabit the gastrointestinal tract and attach to the stomach and intestine, multiple complications may arise. Larvae present in large numbers in the stomach can cause blockages and lead to colic. Large numbers of larvae impact the host by damaging the tissue of the stomach or the gut lining and consuming the nutrients that would otherwise be beneficial to the hosts' well-being. Other health issues that may develop due to a severe infestation of these larvae include: chronic gastritis, ulcerated stomach, esophageal paralysis, peritonitis, stomach rupture, squamous cell tumors, and anemia [6, 11]. The aim of present study was to evaluate the role of *Gasterophilus* in equine gastric ulcer syndrome in Tabriz area.

MATERIALS AND METHODS

The study was performed during the 2013 and 16 horses were assayed. The age of the animals ranges from 3–6 years. At first time, animals were examined clinically. Then, the diagnosis was made based on clinical evidences. Then, those animals were died necropsy was followed and larva was seen in the gastric mucosa.

RESULTS

Data obtained from present study showed that of 16 horse cases which were referred during one year and were suspected to gastric ulcer (diagnosis based on clinical signs), 5 cases were suffered from

Gasterophilus which caused gastric ulcer. Those animals were died because of cachexia, in necropsy 3 cases showed the larva in the gastric mucosa (Figure 1).

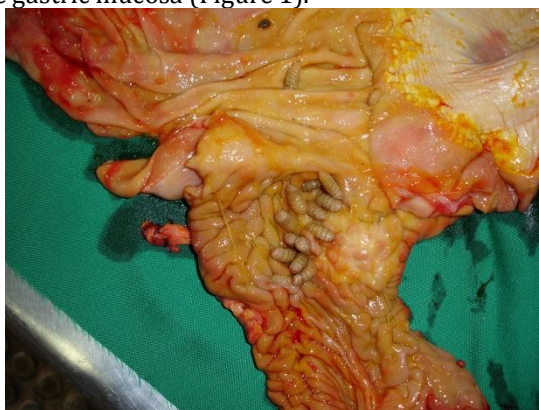


Figure 1: Gasterophilus gross view in dead animals after necropsy

DISCUSSION AND CONCLUSION

The prevalence of botfly larvae in animals poses a serious epizootic and economic problem in several world areas. The prevalence of *Gasterophilus* species has been investigated in different countries. They are currently worldwide distribution in horses [1, 2, 3].

Although Iran is a suitable country in terms of climatic and ecological factors for spread of *Gasterophilus* species and most of the known *Gasterophilus* species including *G.intestinalis*, *G.haemorrhoidalis*, *G.nasalis*, *G.inermis*, *G.pecorum*, *G.meridionalis* and *G.nigricornis* were previously introduced. In other studies done in various regions of the world, prevalence of infestation ranged from 9% to 100% including 9% in Germany [4], 11.1% in Israel [5], 12.3% in Sweden [6], 34% in France [7], 43% in Ireland [9], 53% in England and Wales [2], 58% in Belgium [8], 65% in Switzerland [11], 82.2% in Italy [10], and 98.7% in Kentucky, USA [1], 100% in Morocco [3].

While *G.intestinalis* and *G.nasalis* are distributed worldwide and are often the only species reported in many parts of the New World (e.g., United States and in New Zealand) [12], the remaining species are only reported in very limited areas of Europe, Eastern Countries including central Italy [14] and Africa [13]. The dominance of these two *Gasterophilus* species larvae in the present study is similar to that previously reported from horses in Italy [16] and from donkeys in Northern Jordan [15], from horses and donkeys in Ankara [17], from Arabian Horses in Urfa [19], from horses in Poland [18]. Principato [1989] reported that during four seasons of observation [1983–1986] the number of *G.inermis*, *G.pecorum* and *G.haemorrhoidalis* decreased relative to *G.intestinalis* and *G.nasalis* species.

These differences in the species composition, prevalence and larval burdens of *Gasterophilus* spp. in different countries are probably due to ecological conditions, management factors (e.g., pharmaceutical treatments, different animal husbandry), the host (e.g., genetic differences, race susceptibility) and the parasite (e.g., genetic differences, population composition).

There is no evidence for a significant relationship between prevalence and mean intensity with age and sex of the host [8, 15]. But, the higher prevalence in female than male animals was reported by some authors [17]. Moreover, Edwards [1982] reported that prevalence of infection and mean larval burdens declined with increasing age of host. All horses in present study were at same sex (female) and age range. Under such circumstances, the correlation between the prevalence of gasterophilosis and the sex and age may be misunderstood.

To decide about state of gasterophilosis in horses in this region, works conducted on more animals must be done. Gasterophilosis in horses in this region may be probably affected by the perhaps not treatment with antiparasitic drugs, bad management factors such as poor maintenance conditions and to work under severe conditions, free grazing animals, which heighten to contact with female botflies, to live with other equine reservoir to these larvae causing gastrointestinal myiasis.

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