HUMAN MYIASIS IN FARS PROVINCE, IRAN

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Abstract. We evaluated the prevalence and consequences of human myiasis among people involved in animal husbandry and butchers among 6 counties in Fars Province, Iran using a descriptive cross sectional survey. A semi-structured questionnaire was used to evaluate knowledge, community perceptions and practices. Three hundred two herders shepherds and butchers were included in the study. Eighty-eight point three percent of subjects had experienced myiasis during their job experiences. Seventy-one point five percent had become infected in barns. Pharyngeal myiasis was reported by 87% of subjects. The most likely cause of myiasis in subjects was the sheep botfly, *Oestrus ovis* (Diptera: Oestridae). Age and job experiences did not have an effect on the knowledge and practice regarding myiasis of subjects. Academic educational level had no significant effect on knowledge but did have a significant effect on practices. A myiasis education program needs to be created to better control and prevent this problem.

Keywords: human myiasis, sheep botfly, *Oestrus ovis*, Iran

INTRODUCTION

Myiasis is an infestation of vertebrates (including humans) by larvae of the order Diptera feeding on the host's dead or living tissue, body substances or ingested food (Zumpt, 1965). Myiasis is common among domestic and wild mammals world-wide (John and Petri, 2006).

Human myiasis is rare, but more common in warm, humid climates (Maturo *et al*, 2007). Most human cases of myiasis are only temporary or are aborted because humans are unsuitable hosts (Mullen and Durden, 2002). Human myiasis occurs mostly in rural areas, where man lives in close contact with animals (Mullen and Durden 2002; Masoodi and Hosseini, 2004; Imad *et al*, 2006). Myiasis is considered an occupational disease among farmers and shepherds (Masoodi and Hosseini, 2004, Imad *et al*, 2006). Knowledge of this disease is important for prevention, diagnosis and cure (Imad *et al*, 2006).

Maturo *et al* (2007) reported cases of aural, nasopharyngeal and ocular myiasis in the tropics. Many cases of human myiasis have been reported in Iran (Salimi *et al*, 2010). The first case was reported by

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Fig 1–Fars Province, southern Iran.

Minar (1976) when he recovered *Oestrus ovis* larva from the eye of an Iranian woman in Tehran. The epidemiology of myiasis in Iran is unclear, but may be more common than previously reported (Masoodi and Hosseini, 2004). Most of the literature consists of case reports, which are subject to reporter bias (Sherman, 2000).

The risk of human myiasis is greater in livestock areas. People working or residing close to livestock (*eg*, stables, dairies, feed lots, and poultry houses) are at greater risk (Mullen and Durden, 2002). In Fars Province, southern Iran, myiasis occurs during the warm season. Many shepherds in Fars Province are familiar with myiasis (Masoodi and Hosseini, 2004).

The aims of this study were to evaluate the prevalence and consequences of human myiasis among people involved in animal husbandry and among butchers in Iran.

MATERIALS AND METHODS

Fars Province has an area of 122,661 km^2 and is the fifth largest province in Iran. It is located in southern Iran, between 27º03´ and 31º40´ North longitude and 50º36´ and 55º35´ East latitude. The province consists of 25 counties and its center is Shiraz (Fig 1). There are three distinct climatic regions in Fars Province: northern, central and southern. The northern region is hilly and receives 400-600 mm of precipitation per year. The central region receives 200-400 mm of precipitation yearly. The southern region receives less than 200 mm of precipitation yearly.

Out of the 18 districts in Fars Province, 6 were randomly chosen for this study: Abadeh and Arsanjan in the northern part of the province, Shiraz and Kazerun in the central part and Jahrom and Darab in the southern part of the province. Three villages were randomly chosen from each

district studied. In each selected village, 20 subjects were randomly chosen who were cattle herders, shepherds or butchers and requested to participate. A total of 302 people (16-17 people per village) agreed to participate. A semi-structured questionnaire asking about knowledge, community perceptions and practices was used by a trained interviewer to obtain the information from subjects. The interviews were conducted from February to April 2011. The data were analyzed with SPSS version 16.

RESULTS

The majority of subjects (88.3%) had experienced myiasis at least once. Twenty-one point five percent had experienced myiasis once, 47.9% had experienced it 2-5 times, 20.4% had experienced it 6-10 times and 10.2% had experienced it more than 10 times. The majority of subjects believed they contracted myiasis at work. Eleven percent of subjects had contracted myiasis during 2010 and 24% stated they had contracted myaisis yearly.

Thirty-five percent of subjects had previously contractual myiasis in the throat (oral or pharyngeal myiasis), 4% had contracted it in the eyes (ophtalmomyiasis), and 1% had contracted it in the ears (auricular myiasis). Fifty-two percent had contracted myiasis in two or three anatomical locations. Eight percent did not answer the question. Due to the behavior of the flies described by the patients, the most likely causative agent is the sheep botfly, *Oestrus ovis* (Diptera: Oestridae). Some of the cattle herders caught the attacking flies, which were *O. ovis*.

Itchy, irritated painful throats, watery eyes and runny noses were common symptoms reported by subjects. Seventy-eight point five percent reported having had throat itching. Other symptoms reported included headache, fever and chills.

Twenty-nine point eight percent of subjects were illiterate. Thirty-five point one percent had a primary school education, 14.9% had a middle school education, 11.3% a high school education, 3.3% an associate's degree, 4.3% a Bachelor of Science (BSc) and 1% a Master of Science (MSc) degree.

Of the subjects, 6.3% were aged <25 years, 17.2% aged 26-35 years, 23.5% aged 36-45 years, 30.5% aged 46-55 years, 14.9% aged 56-65 years and 7.6% aged >65 years. One point seven percent of subjects were female.

Work experience varied in length from 1 to 60 years: 5.3% had <5 years, 21.2% had 6-15 years, 25.4% had 16-25 years, 24.4% had 26-35 years, 13.1% had 36-45 years and 10.6% had >46 years work experience.

Ten point seven percent of subjects were nomads, 71.7% lived in only one place while 17.5% were somewhat mobile but lived near their village.

Ninety-four point three percent of subjects had seen the flies that cause myiasis and 91.6% knew their local name. Sispo is the local name for myiasis larvae in the throat.

More than 80% of subjects knew the breeding habitats of myiasis flies and described the breeding locations as under trees, around water bodies, in the grazing fields of goats and sheep, around cratchs and in the skin of domestic animals.

Seventy-one point five percent of subjects had been infected in barns. They saw the fly around their face, and saw it spray its first instar larvae to their mouthes, noses, eyes or ears. More than 83% of subjects reported they had been attacked during mid day.

The pain of the larval infection in throat was described by 39.4% of subjects as strong, by 55% as very strong and by 5.6% of subjects as not painful. Sixty-one percent of subjects had symptoms for 5 -7 days and 24.5% had symptoms for more than 8 days.

Seventy-four point five percent of subjects said cattle barns were the best place for myiasis flies to breed while 24.5% believed trees were the best place for myiasis flies to breed.

Seventy-three percent of subjects believed if a person has myiasis, they should seek a physician. Thirty-nine percent of subjects believed myiasis should be treated with traditional treatments alone or in combination with medical treatment. Fifty-two percent of subjects believed the use of poisonous aerosols on infected tissues, including the throat, was appropriate. Other traditional treatments mentioned by subjects included the use of fresh meat to attract the larvae (mentioned by 39.4%), using cigarettes or opium smoke (37.4%) and washing with fuel (17.9%). Sixteen point three percent of subjects said the symptoms were tolerable and did not use any treatment. Eighty-three point seven percent employed at least one kind of treatment, of which 62% used traditional treatment alone or in addition to medication prescribed by a physician. Private physician's offices were preferred by patients (47%) over other treatment facilities (hospitals and primary health care centers).

The most common method mentioned for prevention of myiasis (by 88%) was the use of a mask.

DISCUSSION

In Fars Province, Iran, cattle herding is mostly the responsibility of men as reflected by the low percentage of women in this study (1.7%). Neither age nor job experience influenced health care seeking behavior ($p > 0.05$) or preventive measures ($p > 0.05$).

There was no significant association between job experience and knowledge of the local names for myiasis flies ($p > 0.05$) and their breeding habitats ($p > 0.05$).

Literacy is a possible link between education and health (Rudd *et al*, 2004). Unfortunately, literacy was low among the study population. Illiteracy can limit the ability to acquire knowledge and apply that knowledge. In this study there was no significant association between education level and knowledge regarding the local names for myiasis flies ($p > 0.05$) or their breeding habitats ($p > 0.05$). A significant association was seen between education level and health care seeking behavior ($p < 0.05$) and use of preventive measures ($p < 0.05$).

Nomadic pastoralists account for about 2% of the population of Iran; many have settled in villages, suburbs and cities (CENESTA, 2004). The population of nomads in Fars Province is unknown. Nomads consisted of 10% of our subjects.

Eighty-seven percent of the subjects reported a history of throat myiasis. This is higher than a previous survey (82%) among 33 subjects from Fars Province by Masoodi and Hosseini (2003).

Myiasis was first reported in Italy more than 150 years ago by a Sicilian physician, GA Galvagni, who noted a high incidence of myiasis among shepherds in the area (Pampiglione *et al*, 1997). The presence of a number of local names among the people in the Fars Province of Iran along with the variety of beliefs about the breeding habitats of the flies suggests a long history of myiasis in this

region. The first well documented case of myiasis in Iran was reported by Minar (1976). Three percent of our subjects had worked with animals for more than 40 years. Many reported a history of throat myiasis. The history of myiasis in Iran is not well documented.

The lack of comprehensive scientific studies (Sherman, 2000) and the absence of epidemiological data regarding myiasis show myiasis is a neglected disease in Iran. The high percentage reported myiasis in our study (88.3%) suggests the prevalence of this disease in Fars Province, Iran is not small. A history of myiasis was reported to be 54.4% among Etnean shepherds (Pampiglione *et al*, 1997), lower than our results. The prevalence of pharyngeal myiasis among sheep slaughtered in Shiraz (Fars Province) was 49.7% (Jafari Shoorijeh *et al*, 2009).

Infestation with maggots can cause severe pain and mental anguish among humans, as well as economic loss among domestic mammals. Spradbery (1991) found more than 96% of myiasis patients reported extreme pain. However, the prognosis of myiasis among humans is generally good (Hemmersbach-Miller *et al*, 2007).

Complete remission of one case of pharyngeal myiasis in the Canary Islands took place in 6 days (Hemmersbach-Miller *et al*, 2007). Eighty-five percent of patients in the present study were relieved from the disease within 5 days. Economic loss due to human myiasis is unclear. The duration of illness was fairly long among our subjects, resulting in loss of income. Twenty-four percent of subjects reported yearly infections. Our findings of repeated infections with myiasis are similar to those of a study by Pampiligone *et al* (1997) of Etnean shepherds.

Species in the genera of Oesteridae adapt to the host. They attack normal healthy hosts (Colwell *et al*, 2006). Seventy-one percent of subjects in this study were attacked at midday, similar to the findings of Cepeda-Palaciosa and Scholl (2000). When it is hot and sunny sheep and goats gather together in the shade with their heads between the other's bodies. This position is not suitable for the flies to infest their host. This behavior among sheep and goats may prevent fly attacks, since uncovered mouths, eyes, noses and ears may be at risk for myiasis.

The respiratory manifestations of human myiasis caused by the larvae of the sheep botfly (*Oestrus ovis*) have been reported by Masoodi and Hosseini (2003). They reviewed a series of 33 patients from Fars Province. The clinical signs described by our patients, such as burning and itching of the throat followed by cough and sneezing, are similar to the studies of Masoodi and Hosseini (2004) and Hemmersbach-Miller *et al* (2007).

There was a lack of knowledge about myiasis and the biology of the fies among our subjects. Seventy-four point five percent stated the flies come from barns but they did not know their life cycle. Twenty-four percent believed the flies come from trees. Trees vary regionally. In Kazerun County, the subjects believed the flies, especially the Hypodermatidae, came from oak trees because of a large oak forest in this region.

Forty-seven percent of subjects chose to seek care of their myaisis from private physicians offices. This may be because of poor services in public health centers and general hospitals. Our finding differs from those of Pampiglione *et al* (1997) who found only 1% of infected Etnean shepherds went to see a doctor.

Despite treatment proven effective by Masoodi and Hosseini (2003), some physicians in any region do not know how to treat myiasis. Patients prefer to employ traditional treatments in place of or in addition to modern treatment. Some traditional treatments are harmful. One example is the use of pyrethroid aerosols directly in the throat, gargling with fuels and smoking cigarettes or opium.

The various environmental and biological adaptations of the sheep flies contribute to their persistence (Biggs *et al*, 1998). There are three major approaches for controlling myiasis: avoiding contact with potential hosts and myiasis flies, early treatment and reduction or elimination of myiasis fly populations (Mullen and Durden, 2002).

People raising livestock in endemic areas are often aware of fly attack. Our survey showed they tried to protected themselves. Eighty-eight percent of subjects covered their face with a mask or other cloth or tissue. Twelve percent protected themselves by hanging up onions or garlic. Some prevented attack by praying. This reveals the need for a health education program.

Our findings may help health policy makers develop educational programs. The following should be considered when developing educational programs: educate people regardless of their academic education levels, help develop practical skills, especially among those with a lower education level, avoid dangerous traditional treatments, refer to experts to treat the infection, and treat sheep and goats appropriately to reduce the fly population.

ACKNOWLEDGEMENTS

The authors would like to thank the members and technicians of the Ministry of Agriculture and Ministry of Health, Treatment and Medical Education for Fars Province who helped assist with the questionnaire. This project was supported financially by Shiraz University of Medical Sciences.

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