

Unveiling the Threat of Oral Myiasis in Oral Carcinoma: A Retrospective Observational Study of Causes and Care

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Abstract:

Background: Oral myiasis is caused by flies' larvae. Which is rare but predominantly affects patients with open malignant wounds, such as those with oral carcinoma. This condition is prevalent in warm humid climates and is exacerbated by poor oral hygiene, neglected open wound, lower socioeconomic status, immunocompromised status, addiction and psychiatric illness.

Objective: To analyze the demographic, clinical and treatment characteristics of oral myiasis in patients with oral carcinoma and identify risk factors, seasonal trends and outcomes.

Materials and Methodology: This retrospective observational study was conducted in the Department of Otorhinolaryngology, GMERS Medical College, Navsari from January 2020 to December 2024. Total 20 cases were enrolled for the study. Proper history-taking and general physical examination was performed. Turpentine-oil-soaked gauze piece was used as an asphyxiating agent, and all the maggots were removed mechanically with toothed forceps. Regular dressing was performed.

Results: In this study, it was found that males are more prone to myiasis. People from rural areas were mainly affected and mostly from lower socioeconomic backgrounds. September to December was the period when the number of admissions of such patients was higher. Two death was reported due to systemic complications.

Conclusion: Chronically open wounds were the common infestation site in all cases of oral myiasis. Therefore, this study provides clues to identify etiological risk factors and helps us manage conditions under observation. Such conditions can be prevented by creating adequate awareness about wound hygiene, proper sanitation, and a clean environment around patients.

Keywords: Oral Myiasis, Maggots, Open malignant wound, dipterous larvae.

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Introduction

Oral myiasis means infestation of the oral cavity with maggots- a larval form of fly. The term "Myiasis" was first coined by Rev F.W. Hope when he reported about this condition in 1840, and Laurance first described it in 1909 [1]. Myiasis is derived from the Greek word "myia", which means fly. Zumpt first defined myiasis as "the infestation of living tissues of humans and animal by dipterous egg or larvae, which at least for a certain period feed on hosts dead or living tissue, liquid body substances or ingested food". [2] Though it may affect any part of the body, the oral cavity is one of the rare entities among them because oral tissues are not permanently exposed to the external environment. This condition was, however, known to humanity even in medieval times and had originally been thought to be a form of divine punishment, as noted in Hindu mythological works. It was thought to develop as a result of the sins committed by a person or as a result of the wrath of saints [3]

Dipteran fly causes myiasis. These flies belong to the order Diptera - commonly known as "true flies". True flies' distinguishing feature from other insects is a single pair of functional wings with reduced hind wings. Fly acts as a carrier and thrives in warm and humid climates. During the larval stage, they are parasitic to human beings. They are attached to tissues with the help of special hooks. Moreover, they are found deeper in tissues because they are photophobic and prefer dark environments. They continue to erode in surrounding tissue and release proteolytic enzymes that lead to tissue necrosis and destruction [4]. In India, the most common housefly associated with myiasis is *MuscaNebulo*. [5] They are most active during summer and rainy season. [6] The incidence of myiasis is higher in warm and humid areas.

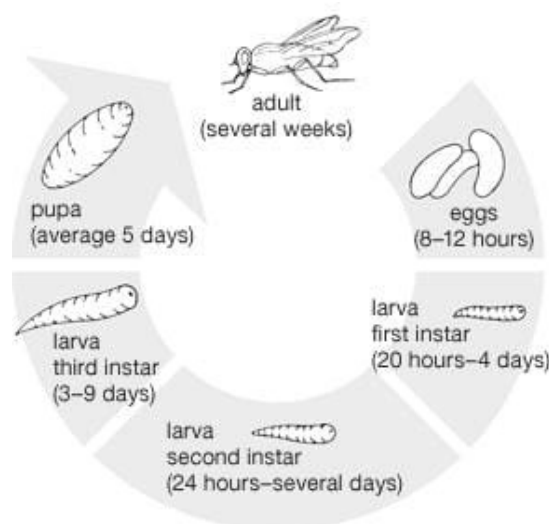


Figure 1: Life cycle of a fly

Clinically, myiasis is classified into two types: 1} Primary myiasis-larvae that feed on living tissue caused by biophagous larvae. 2} Secondary myiasis- larvae that feed on dead tissue caused by necrobiophagous flies. Based on anatomical sites involved: 1) Cutaneous myiasis; 2) Myiasis of external orifices; and 3) Myiasis of internal organs. [7]

The incidence of oral myiasis is lower in literature than cutaneous myiasis because the oral cavity is not easily accessible to fly. However, one vital factor that increases the risk of myiasis in the oral cavity is an incompetent oral seal/closer. Among all carcinomas, squamous cell carcinoma (SCC) is the most common type of oral cancer, which forms more than 90% of all oral malignancies [8]. In post-operative patients with carcinoma of the oral cavity, a bulky muscle flap in the anterior part of the oral cavity leads to improper oral closure. Thus, prolonged mouth opening coupled with infected wounds facilitates the deposition and feeding of larvae.

Additionally, those who have not taken any surgical or palliative treatment for oral carcinoma have an extensive spread of cancers, and the formation of oro-cutaneous fistula ultimately results in facial disfigurement, loss of function, pain, bleeding, and necrosis leads to oral myiasis. This usually occurs in end-stage disease when the general condition of the patient is cachexia and debilitating. In addition to carcinoma, other predisposing factors are poor oral hygiene, severe halitosis, facial trauma, extraction wounds, senility, alcoholism, immunocompromised status, lower socioeconomic status, lack of knowledge, untreated contaminated wounds, and psychiatric illness [1]

The study aims to highlight the incidence of oral myiasis in oral carcinoma patients of socioeconomic class, male-female ratio, addiction, site of carcinoma,

and treatment possessed for carcinoma, and also to create awareness.

Material and Methodology:

The study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki, ensuring the protection of human participants.

This retrospective observational study was carried out on 20 patients suffering from oral myiasis reported to GMERS Medical, College, and Hospital in the Department of ENT over four years, from January 2020 to December 2024. We included all Patients with oral myiasis who had head and neck malignancies. Patients with head and neck malignancies without maggots were excluded.

All the Patients were admitted to an isolation ward. Detailed history regarding oral disease, addiction, associated complaints, trauma, radiotherapy and chemotherapy, and systemic illnesses like hypertension, diabetes mellitus, anaemia, blood transfusion, and HIV were taken. Also inquired about social status, religion, work, condition of surroundings, and sanitation.

A detailed local and systemic examination was done. All the data were entered into a structured questionnaire. Diagnosis of oral myiasis was made clinically by the presence of dipterous larvae in the oral cavity. If needed, all the routines and special investigations were carried out, like hemogram, blood sugar level, liver and kidney function test, ECG, chest X-ray, serology, etc. All the patients were treated symptomatically, and systemic conditions were managed in collaboration with medical specialists. The maggot-infested wound was cleaned with irrigation of normal saline, slough, and necrotic tissue, which were thoroughly cleaned

and removed. The maggots, who were accessible on the surface, were removed. To remove maggots from deeper areas, a gauze piece soaked with turpentine oil was kept over the wound for a few minutes, and when maggots came over the surface, they were removed manually with tooth forceps and kept in the boiling water. Turpentine oil was used for the mechanical detachment of the larva as it creates an atmosphere deficit in oxygen, which forces the maggot to come to the surface.



Figure 1: Showing carcinoma left buccal mucosa maggots

Collected maggots were killed by putting them in boiling water and then sent for bio-waste management to prevent further spread. We regularly removed maggots and dressed the wound until the wound was free from maggots. All the patients were given systemic antibiotics to prevent secondary infection. Patients discharged with advice to maintain proper hygiene, regular dressing of the wound, use of mosquito net, protein-rich diet, and multivitamins to prevent further fly infestation.



Figure 2: Extensive case of Oral cavity infested with maggots



Figure 3: Collection of maggots



Figure 4: Maggot

Results

Human myiasis is common, but Oral myiasis is rare. It is seen in people living in underprivileged and deprived conditions. Oral myiasis is reported less in the literature, and only isolated case reports have been found.

Statistical analysis and interpretation done by using Python's scipy.stats library.

In our study, out of 20 patients, 16(80%) were male, and 4(20%) were female. chi-square Test value $\chi^2 = 7.2$, p-value:0.007. this supports the

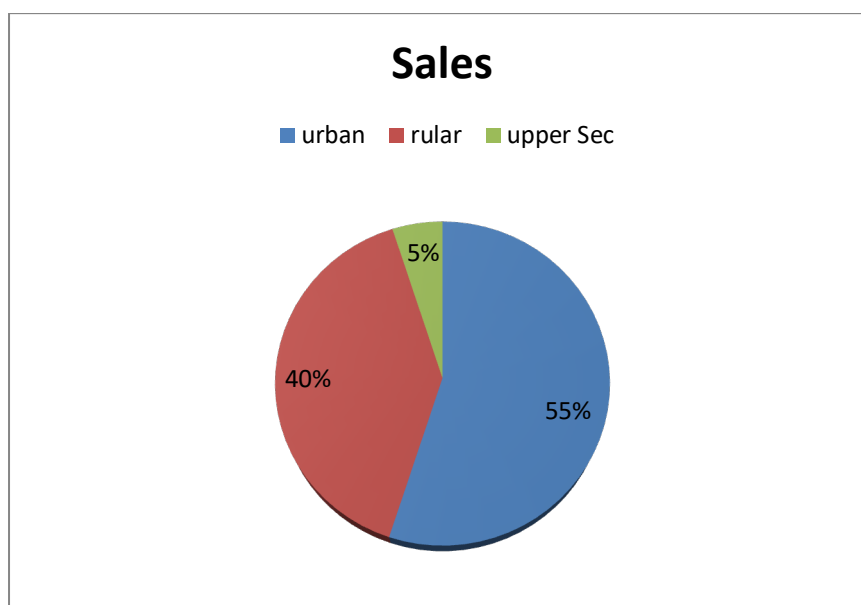
observation that males are more affected than female.

Age varies between 20-60 years with a slightly higher distribution in the middle (31-50 years) age

group. The overall mean age is 36.1 years. The mean age in females was 36.75 years, and in males was 35.93 years. T-test=(-3.49), p-value:0.002. this indicates a younger age group is predominantly affected.

Age (Years)	Male (number of patients)	Female (number of patients)
1-10	-	-
11-20	-	-
21-30	3	-
31-40	6	3
41-50	4	1
51-60	2	-
>60	1	-
Total	16	4

There were 11(55%) cases residing in an urban slum area, 8(40%) cases were from a rural slum area and 1(5%) case were from a well-urbanized area. So, 19(95%) cases were from the lower socioeconomic class and 1(5%) from the upper socioeconomic class. chi square test $\chi^2 = 16.2$, p-value = 5.7×10^{-5} indicates strong association between lower socioeconomic class and oral myiasis ($p < 0.001$)



Graph 1: Socioeconomic class distribution of patients

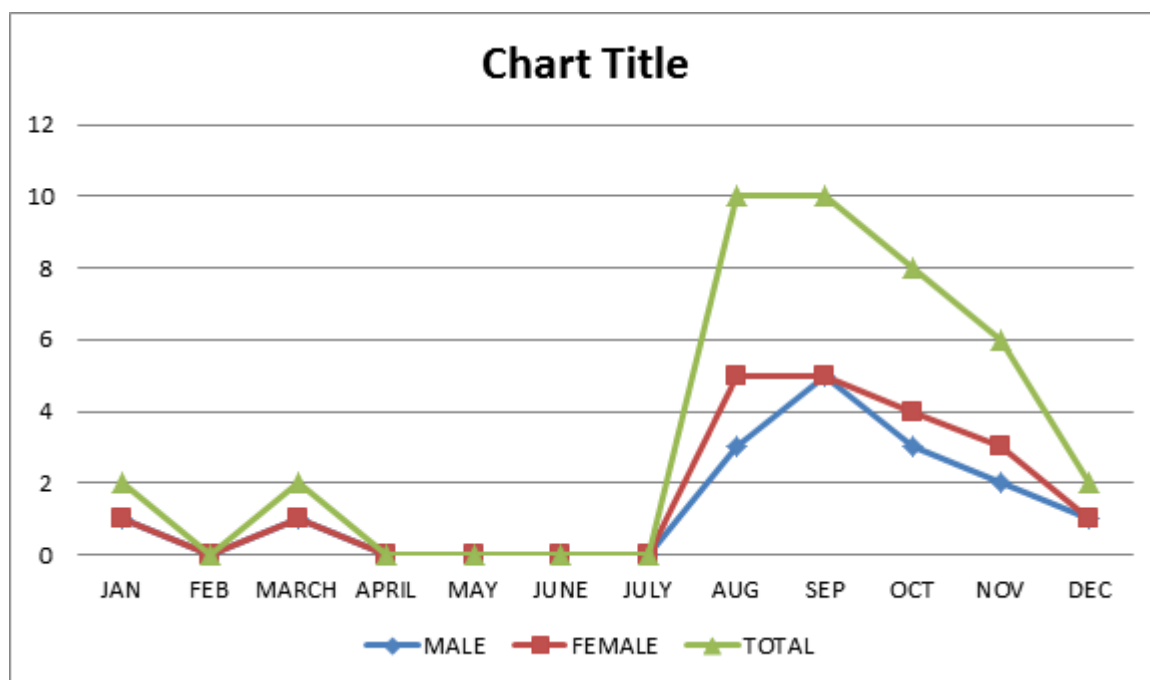
16(80%) patients were Hindu where as 4(20%) were Muslims by religion. Out of 20 patients 4(20%) were house wives, 4(20%) were labourer, 12(60%) were non-workers. 1(5%) patient was mentally retarded.

House wives	4(20%)
Labourer	4(20%)
Non worker	12(60%)

In our study, we found that 5(25%) patients had a tobacco addiction, 11(55%) had an addiction to alcohol and tobacco, 2(10%) had a habit of Tapkir/Bajar/chikan application over teeth, only 2(10%) had no history of any addiction but had a history of trauma due to tooth. chi square test $\chi^2 = 10.8$, p-value:0.013. ($p < 0.05$) means combination of tobacco and alcohol is the most prominent addiction type, strongly linked to oral myiasis.

Tobacco	5(25%)
Tobacco+Alcohol	11(55%)
Tapkhir/Bajar/Chikani	2(10%)
No addiction but trauma due to tooth	2(10%)

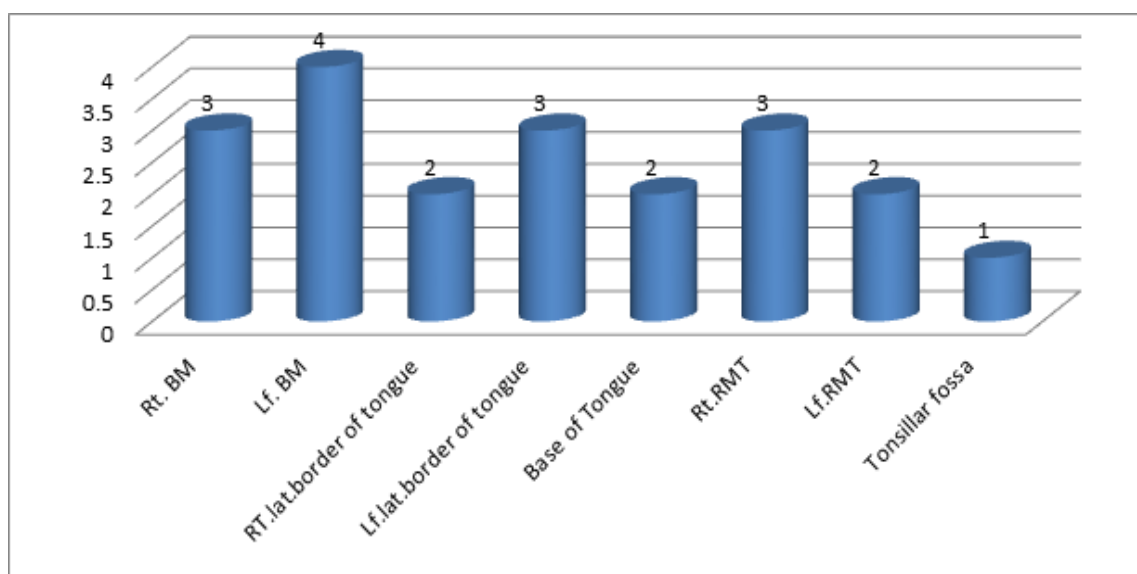
We observed that myiasis is commonly encountered from September to December. chi square test $\chi^2=5.0$, p-value:0.025 confirms the role of seasonal climatic condition in prevalence of oral myiasis.



Graph 2: Shows the incidence of occurrence according to months.

The average maggot load was 96.75 per patient. The highest number of maggots (approximately 230) were reported on the left side of buccal mucosa carcinoma recurrence. (fig:1) t-test value=2.50, p-value:0.022 suggests severe infestation in the affected population. out of 20 cases 13(65%) were well differentiated squamous cell carcinoma, 7(35%) were moderately differentiated squamous cell carcinoma. we observed that out of 20 cases, 3(15%) were right buccal mucosa carcinoma, 4(20%) were left buccal mucosa carcinoma so total

7(35%) were buccal mucosa carcinoma cases, 2(10%) were right lateral border of tongue carcinoma, 3(15%) were left lateral border of tongue carcinoma and 2(10%) was base of tongue carcinoma so total 7(35%) were tongue carcinoma cases, 3(15%) was right retro molar trigon, 2(10%) was left retro molar trigon, so total 5(25%) cases were retro molar trigon carcinoma and 1(5%) was tonsillar fossa carcinoma case noted. Chi-square test $\chi^2=4.8$, p-value:0.187 indicates that oral myiasis affects various carcinoma sites relatively equally



Graph 3: Shows infestation sites

In our study, we observed that 8(40%) had a history of surgical+radio/chemotherapy treatment, 4(20%) had radio/chemotherapy treatment, 6(30%) had only taken surgical treatment, and 2(10%) had not taken any treatment. Chi-square test $\chi^2=4.0$, p-value:0.261 suggests similar effectiveness myiasis, irrespective of treatment type.

Surgical+ radio/chemotherapy	8(40%)
Radio/ Chemotherapy	4(20%)
Surgical treatment	6(30%)
No treatment	2(10%)

In our study, one patient was repeatedly indoors for oral myiasis because that patient did not have any relatives and stayed on the footpath, so he had repeated infections, and it was an indication of the social boycott.

2(10%) death was reported in our study due to systemic complications. We also observed in our study that the average hospital stay for these patients was 4 days.

After removal, maggots were killed, kept in boiling water, and sent for bio waste management. (fig.3)

Discussion:

In our study, out of 20 patients, 16(80%) were male, and 4(20%) were female. A study conducted by Sinha V [8] et al. in 2018 found that out of 24 patients, 20(83.33%) were male and 4(16.67%) were female patients. Age varies between 20-60 years with a slightly higher distribution in the middle (31-50 years) age group. The overall mean age is 36.1 years. The mean age in females was 36.75 years, and in males was 35.93 years. Similar findings were noted by Bhati R [9] et al where the middle age group (41-50 years) was commonly affected. The overall mean age is 43.72 years. The mean age in females was 41.3 years, and in males was 44.3 years. In the study by Singh [10] et al., there was no sex predilection. All patient's personal and demographical data was collected and analyzed thoroughly. There were 11(55%) cases residing in an urban slum area, 8(40%) cases were from a rural slum area and 1(5%) case were from a well-urbanized area. So, 19(95%) cases were from the lower socioeconomic class and 1(5%) from the upper socioeconomic class. 16(80%) patients were Hindu where as 4(20%) were Muslims by religion. Out of 20 patients 4(20%) were house wives, 4(20%) were labourer, 12(60%) were non-workers. 1(5%) patient was mentally retarded. In our study, we found that 5(25%) patients had a tobacco addiction, 11(55%) had an addiction to alcohol and tobacco, 2(10%) had a habit of Tapkir/Bajar/chikan application over teeth, only 2(10%) had no history of any addiction but had a history of trauma due to tooth. Gabriel J [11] et al in 2008 on oral myiasis and a case report by Jabr IA [12] in 2015 on aural myiasis also support that poor socioeconomic class, illiteracy, and poor oral hygiene were significant predisposing factors for myiasis. On the other hand, a study conducted by

AroraS [13] et al. in 2009 on myiasis also mentioned that 60%house wives, 25%labourers, 5%farmers, and 7.5%students and 2.5 % businessman were reported. We observed that myiasis is commonly encountered from September to December. A study conducted by Bhati R [9] et al. in 2022 on Human myiasis shows that myiasis is commonly reported from September to November, and a study by Pradip Mallik [14] et al. in 2019 shows that myiasis is commonly encountered from October to December. This indicates that during this time, the atmosphere is favourable (humid and warm)for the flies. The average maggot load was 96.75 per patient. The highest number of maggots (approximately 230) were reported on the left side of buccal mucosa carcinoma recurrence.(fig:1) out of 20 cases 13(65%) were well differentiated squamous cell carcinoma, 7(35%) were moderately differentiated squamous cell carcinoma. we observed that out of 20 cases, 3(15%)were right buccal mucosa carcinoma, 4(20%) were left buccal mucosa carcinoma so total 7(35%) were buccal mucosa carcinoma cases, 2(10%) were right lateral border of tongue carcinoma, 3(15%) were left lateral border of tongue carcinoma and 2(10%) was base of tongue carcinoma so total 7(35%) were tongue carcinoma cases, 3(15%)was right retro molar trigon,2(10%) was left retro molar trigon, so total 5(25%)cases were retro molar trigon carcinoma and 1(5%)was tonsillar fossa carcinoma case noted. Arbit [15] et al.in 1986 on Myiatic scalp states that oral myiasis is common in open skin malignancie. In our study, we observed that 8(40%) had a history of surgical+radio/chemotherapy treatment, 4(20%) had radio/chemotherapy treatment, 6(30%) had only taken surgical treatment, and 2(10%) had not taken any treatment. Daltoe [16] et al described the occurrence of extensive myiasis in a patient suffering from un-attended squamous cell carcinoma. In our study, one patient was repeatedly indoors for oral myiasis because that patient did not have any relatives and stayed on the footpath, so he had repeated infections, and it was an indication of the social boycott.

2(10%) death was reported in our study due to systemic complications. We also observed in our study that the average hospital stay for these patients was 4 days. A similar finding was noted in a study conducted by Sinha v [8] et al. in 2018, where the average hospital stay was 3.9 days. [17,18]

Conclusion

To conclude, Oral myiasis is a rare but frightful condition in the modern era can be prevented by raising awareness, adequate hygiene maintenance, access to primary health services, control of the fly population, and educating susceptible populations regarding basic sanitation, cleaning, and covering wounds, use of mosquito net. Mechanical debridement with systemic medication is necessary to cure oral myiasis completely. It is important to thoroughly manage patients with head and neck cancer to prevent extensive progression of maggot infestation. It is better to be safe than to be sorry.

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