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Cutaneous myiasis due to tumbu-fly, *Cordylobia anthropophaga* in Ilorin, Kwara State, Nigeria

L. D. EDUNGBOLA

Summary

The occurrence and public health significance of cutaneous myiasis were investigated in Ilorin, Kwara State, Nigeria between June and September, 1981. The findings indicated that human myiasis caused by the maggot of African tumbu-fly, *Cordylobia anthropophaga* was relatively common and constituted potential public health problems in the affected parts of the state capital. The importance of animal myiasis due to larvae of sheep bot-fly, *Oesteris ovis* and the cattle grubs, *Hypoderma bovis*, was assessed and discussed.

Key words: cutaneous myiasis; maggots; *Cordylobia anthropophaga*; *Oesteris ovis*; *Hypoderma bovis*; public health problems; environmental sanitation; personal hygiene; health education.

Introduction

Myiasis is the invasion of living vertebrate tissues by fly maggots. Myiasis is not a recent disease and several cases have been reported from different geographical locations including the USA (Mook, 1920; Curran, Kaye and Higgins, 1964; Scott, 1964; Prasad and Beck, 1969), Canada (McIver and Dutta, 1971), Central America (Dunn, 1934; Dalmat, 1955), South America (DeCerqueira Falcao, 1927; Dao, 1954, 1963), Iraq (Abdul-Hab, 1970), Africa (Coquerel and Mondiere, 1862; Grunberg, 1903; Roubaud, 1914; Blacklock and Thompson, 1923; Zumpt, 1965; Dipeolu and Olufarati, 1975), Australia (Lee, 1968) and Japan (Morikawa, 1958).

In spite of this wealth of information and in spite of the occurrence and importance of human and animal myiasis, related information is grossly lacking

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in Nigeria and the knowledge of the disease and its aetiology is relatively poor. Consequently, its occurrence, distribution, varieties, and public health significance remain unassessed locally.

Between June and July, 1981 when rain fall was quite heavy and when the incidence of active dracunculiasis was rare locally, 4 independent reports of new cases of guinea-worm infection were unexpectedly received from a section of the state capital where an investigation (Edungbola and Adewumi, 1981) was conducted between February and March to ascertain if active transmission of dracunculiasis occurred in the state capital as was suspected. However, these reports turned out to be dermal infestations by maggots of African tumbu-fly, *Cordylobia anthropophaga*. At about the same time, «unusual objects» recovered from cheek, buttocks and trunk of patients at the state General and Maternity Hospitals and two private Hospitals and sent for diagnosis and identification, were later confirmed to be larvae of tumbu-fly. These findings and reports led to the initiation of this study to assess the occurrence, factors contributing to it, and the public health importance of human and animal myiasis in some sections of this state capital.

Materials and Methods

Background of the study area

This study was conducted in the Kuntu, Okelele and Amilegbe peri-urban areas of Ilorin municipality between June and September, 1981. The geographical location and the population of this commercially important state capital that constitute the gate-way between the north and south are given by Edungbola (1980).

Although the Yorubas, Fulanis and Hausas constitute the major indigenous groups, most Nigerian ethnic groups are represented in this predominantly muslim community. Also there are several aliens from Niger, Chad, Benin, Mali, Ghana and other African countries. Thus, interstate and international movements of people through the state capital for diverse purpose are extensive.

Subsistence agricultural farming, animal rearing, weaving, leathering, pottery and petty trading form the major native occupations.

The vegetation is of thickly wooded savannah. The rainy season commences in April and ends in November with an annual rain fall of 750–1250 mm. June–October, punctuated by the August break, are the wettest months. The temperature is high throughout the year, reaching the maximum between February and April.

Environmental sanitation, like in the other rapidly growing urban and peri-urban communities, is poor. Consequently, suitable conditions, abundance of food, breeding places, and shelter, encourage vast numbers and menance of flies, rodents, and vagrant animals around human habitations.

Data collection

For this initial study, a comprehensive prevalence survey based on established demographic characteristics of the study area was not feasible. Thus a simple procedure of house to house visits was employed, subject to religious flexibility in each home and the degree of cooperation given by the house-hold heads.

In each house visited, personal data forms were administered to record the subject's name, age, sex, occupation, duration of residence, the kind and number of pets kept, dermatological problems, and the menance of flies and rodents in the house. Thereafter, the subjects were ex-

amined, when necessary with the aid of a magnifying hand lens, for typical lesions. When an active case of myiasis was suspected, a film of vaseline jelly or shea-butter was applied to the lesion and the subject or parent given transparent plastic specimen containers with lids to keep any object that emerged from the lesion and the time of the emergence. These were collected during subsequent daily visits which, usually, were between 2 and 6 p.m. when most people were at home and when minimum interference with personal commitments occurred. When a case of myiasis was confirmed, the number of lesions, their anatomical locations, duration, symptoms, and severity were ascertained and recorded.

In some homes where human cutaneous myiasis were particularly common, attempts were made to capture adult tumbu-flies and their pupae. Also, in places where dogs, goats and sheep were found, these animals were examined for typical cutaneous lesions, snotty noses and signs of nasal or dermal irritations. At the city abattoir at Ipata, the skin of freshly slaughtered cows were examined with the assistance of the butchers and the Meat Inspectors on duty. The specimen recovered were brought to the laboratory, processed, and identified morphologically under the microscope. Representative specimens extracted from human skins were preserved in 70% alcohol and sent to the Departement of Entomology, British Museum (Natural History), London, for confirmatory identifications.

Results

A total number of 132 houses were visited for the occurrence of human cutaneous myiasis. Altogether, 976 people agreed to be examined for dermal infestations and responded to questionnaires. Of these, 48 (4.9%) had the characteristic furuncular lesions from which maggots, morphologically confirmed to be those of *Cordylobia anthropophaga* extruded following the application of vaseline jelly or shea-butter.

The occurrence of cutaneous myiasis by age and sex is shown in Table 1. Whereas there was no significant difference in the overall infestation rate between males and females ($p>0.2$), children below 10 years of age had significantly higher infestation rate than the older subjects ($p<0.01$).

Dermal lesions were found predominantly on the buttocks, forearms and legs (Fig. 1) but some were encountered on the head, cheek, and trunk. The number of active lesions per person varied from 1–7 and the highest number of maggots extruded from a lesion was 5. These were of different larval instars with the third stage (Fig. 2) measuring about 10 mm by 3.5 mm. Maggots emerged from the skin some 2–16 h after the application of the vaseline jelly. The identification of active lesions was enhanced by the expulsion of air bubbles generated by the spiracular activities of the maggots. Observations made suggested that the severity of cutaneous lesions depended on the number of lesions, their anatomical locations, the number of infesting maggots and secondary bacterial infection, probably arising from negligence and poor environmental conditions. Frequently, these dermal infestations were accompanied by local swelling, pain, itching, sleeplessness, febrile conditions and periodic discharge of serious exudates.

Various domestic animals such as dogs, cats, goats sheep, chicken, rabbits, and guinea pigs were kept in close contact with man. The structure and con-

Table 1. The occurrence of cutaneous myiasis due to maggots of *Cordylobia anthropophaga* among male and female subjects in different age groups

Age groups (years)	Male			Female			Both sexes		
	No. examined	No. infested	% infested	No. examined	No. infested	% infested	No. examined	No. infested	% infested
0-4	111	8	7.2	125	10	8.0	236	18	7.6
5-9	81	5	6.2	89	6	6.7	170	11	6.5
10-19	61	2	3.3	71	3	4.2	132	5	3.8
20-29	53	1	1.9	68	2	2.9	121	3	2.5
30-39	49	2	4.1	96	2	2.1	145	4	2.8
40	64	2	3.9	108	5	4.6	172	7	4.1
Total	419	20	4.8	557	28	5.0	976	48	4.9



Fig. 1. Multiple infestation of the leg and foot of a 2-year-old boy by maggots of *Cordylobia anthropophaga*.

struction of houses, the deplorable environmental conditions, lack of disposal facilities and the unsanitary practises worsened by ignorance, collectively encourage the nuisance of flies, rats and strayed animals in the human neighbourhood. All these provide favourable conditions for the oviposition of tumbu-flies and for the invasion of human skin by their larvae following their emergency from the eggs. Of the 72 dogs examined, 50 (69.4%) had dermal myiasis. The observations made in different homes and at the sheep and goat selling markets showed that nasal myiasis due to the sheep botfly was rampant. Likewise, the findings at the city abattoir revealed that many of the cattle whose skins were examined, had multiple cattle grubs with extensive destruction of their hides and the underlying carcass meat which were discoloured and sometimes rendered undesirable for consumption.

Only eight adult tumbu-flies were caught but several pupae from which imagos were reared were found inside clay pots and gourd (for storing grains and legumes), under bricks, and among piles of fire-wood where rats normally hide.

In general, the local perceptions of the aetiology and mode of acquisition of human myiasis were poor both among members of the community and among the health workers. Consequently, there was no specific local remedy or treatment. However, some natives were seen physically removing maggots from the infested skins of their hunting dogs, unknowingly, or burning with hot charcoal the unsightly wriggling maggots of *Oesteris ovis* snorted out by their goats and sheep.

Discussion

The occurrence of human and animal myiasis was established in Ilorin where 48 (4.9%) of human subjects examined were confirmed infested with

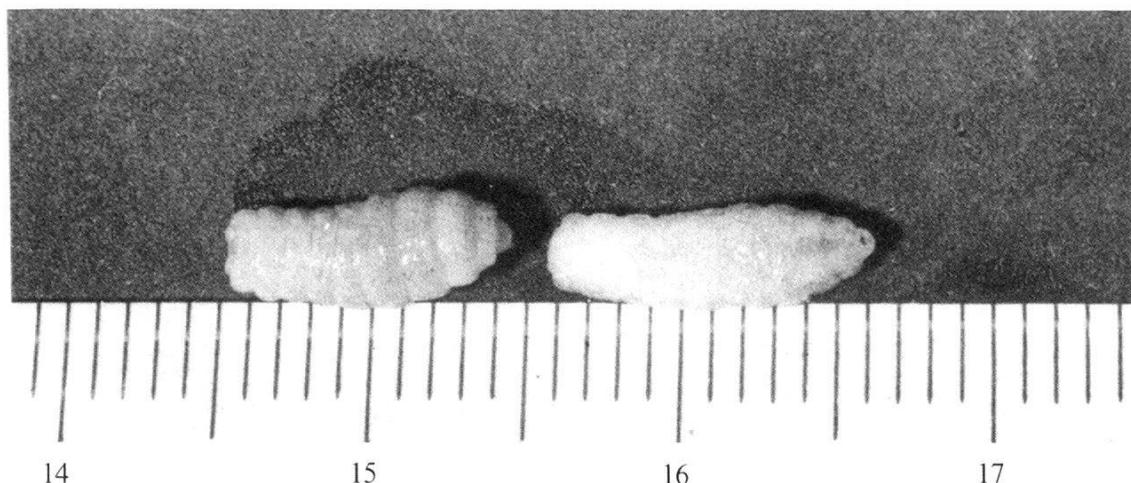


Fig. 2. Larvae of tumbu-fly recovered from the forearm of a 9-month-old girl.

maggots of *C. anthropophaga*. This prevalence could be higher if a more sensitive diagnostic technique had been available for use and if complications due to other dermatological problems had not been so common. Among factors contributing to the occurrence and prevalence of myiasis locally are the structure and construction of houses, poor environmental sanitation and personal hygiene, ignorance of the aetiology of myiasis and its mode of acquisition, large family sizes and the resulting over-crowding conditions, promiscuous human-animal intimacy, unhealthy socio-customeary and religious observances (including the ornamentation of floors and walls with animal wastes), and poor food storage system. All these collectively encourage the menance of dogs and rats, reservoir hosts of tumbu-fly (Roubaud, 1914; Blacklock and Thompson, 1923) in the neighbourhood and enhance suitable conditions for the oviposition of *C. anthropophaga* and the invasion of human skin by their maggots.

Human myiasis occurred most commonly in July, during the rainy period. This conforms with previous observations (Coquerel and Mondiere, 1862; Berenger-Feraud, 1872; Rhodain and Bequaert, 1913; Blacklock and Thompson, 1923) that myiasis due to maggots of tumbu-fly was most prevalent during the wet season when borrows of rats (main natural reservoirs) become flooded and the breeding sites for flies too wet for oviposition. Then, flies and rats congregate in houses for shelter, food and favourable conditions for their developments. Also, the only two previous reports on tumbu-fly myiasis in Nigeria (Dipeolu and Olufarati, 1975; Ogunniyi, 1981) were recorded between June and July.

Due to the general poor awareness of the disease, its aetiology and mode of acquisition, there was no specific local treatment for myiasis. However during this survey, the application of vaseline jelly or shea-butter induced the rapid extrusion of maggots from lesions. Like the effect of animal fat reported by Ruch (1967) in the Central America, it was believed that the vaseline jelly

blocked the spiracular opening and cut-off the supply of atmospheric oxygen from maggots, thus promoting their extrication.

Of the various age groups examined human myiasis was most common among children under 5 years of age and the prevalence of infestation due to maggots of *C. anthropophaga* (Table 1) was significantly higher among children below 10 years than among the older subjects ($p < 0.01$). Partly, this was due to variations in the degree of exposure which apparently is greater for children because of the frequent contamination of their bodies, dresses, sleeping and playing areas with urine, faeces, food, body odour, and other fly-attracting conditions; their closer intimacy with dogs and other domestic animals; and the exposure of a greater part of their tender skins (being more frequently undressed) to invasion by maggots of tumbu-fly. Blacklock and Thompson (1923) and Blacklock and Gordon (1927) made similar observations that children were more susceptible, more heavily infested and exhibited more severe symptoms than the adults. They attributed the relative refractoriness of older hosts to a non-hereditary age-related immunity which, initially, is localized but gradually spread throughout the skin and retained even when the skin is grafted onto another unimmunized animal or person.

Although myiasis was observed on human cheek, trunk and head, the major sites of predilection seemed to be the buttocks, arms, legs and backs. The extrusion of multiple larvae of different instars from a lesion could be due to the coalescence of closely apposed lesions or due to differential development of maggots that infested the area at different or same time. Blacklock and Gordon (1927) observed the inability of larvae of *C. anthropophaga* to develop in an already infected skin. Multiple infestation, the anatomical location of lesions and secondary bacterial infection, apparently, determine the severity and complication of myiasis. Dunn (1934) reported death of a child due to myiasis of the scalp and brain and outlined the enormous economic loss due to animal myiasis in Panama. In Kwara State and in other parts of Nigeria, the economic and public health implications of human and animal myiasis, if assessed, may be more considerable than presently assumed.

Whereas the control of animal myiasis is seemingly more cumbersome locally, a health education strategy designed to enlighten members of the community of the aetiology, mode of acquisition and prevention of human myiasis, through the provision and utilization of adequate disposal system, improved environmental sanitation, better maternal care, abrogation of unhealthy socio-customeary and religious observances, and extermination of rodents from the residential areas, will probably be most effective in eliminating the problems of human myiasis in the community.

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