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Biting habit of mosquitoes on the specific parts of the Cattle body in Taikky Township, Yangon Region

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Abstract
A monthly field study was conducted to determine the preferred biting behavior of mosquitoes on different specific parts of different coloured cattle body in Taikkyi Township, Yangon Region from March 2017 to November 2018. Outdoor cattle bait mosquitoes collection was done using WHO sucking tube from 18:00 hours to 24:00 hours for 3 days. *Anopheles* and *Culex* mosquitoes were collected for 45 minutes in every hour on the specific parts of the cattle body. Collected mosquitoes were placed in specific body parts labeled paper cups. Next day morning species identified was done all collected mosquitoes according to different mosquito identification key. Result revealed that the highest number (n=1798) of mosquitoes were collected in September followed by n= 1409 in March and lowest was collected in n=226 in May by cattle bait collection. The biting behavior of mosquitoes were found to be the highest (n=2592, 34.39%) on black cattle, followed by (2566, 34.05%) on white cattle lowest was observed (2378, 31.56%) on Brown coloured cattle. The highest number of biting behavior on specific part of body was found Elbow from Bracelets (1611, 21.38%) followed by Knee from Anklebone (1108, 14.70%), Fingertip (846, 11.41%), Tiptoe (887, 11.77%) lowest was observed on Head (108, 1.43%). When compared with specific parts of different parts of different coloured cattle was found the highest number of mosquitoes were collected from Elbow to Bracelets (n=552, 21.51%) white, 522, 21.95% on Brown and 537, 20.72% on Black cattle followed by 549 21.18% on Tiptoe of black cattle, 395, 16.61% and 430, 16.59% on Knee to Anklebone of Brown and black cattle body parts. Lowest mosquitoes were observed (13, 0.51%), (47, 1.98%) and (48, 1.85%) on Head of all White, Brown and Black coloured cattles. In conclusion biting behavior of mosquitoes were observed differ to different parts of the cattle body. Tiptoe, fingertip, Elbow from Bracelets and Knee from Anklebone were mostly bitten by mosquitoes. Mosquitoes were found highly attack to Elbow from Bracelets and Knee from Anklebone followed by tiptoe, fingertip of the cattles. Although very low on Head.

Keywords: determine, behavior, Taikkyi, Yangon

Introduction

Mosquitoes are members of family Culicidae of order Diptera. The family is a large and abundant group that occurs throughout temperature and tropical region of the world. It consists of three subfamilies (1) Anophelinae (2) Culicinae (3) Toxorhychitinae. There are 3500 species of mosquitoes in the world (Harbach 1994) and 49 species (34 Anopheles, ten Culex, two Aedes, two Mansonia and one Armigeres) in Myanmar. Mosquitoes are the single largest group of insects, which serve as intermediate hosts in the transmission of many important human diseases carry number of vector borne diseases, They are including malaria, dengue hemorrhage fever (DHF), yellow fever, filariasis, chikungunya and Japanese encephalitis (JE) (Wharton, 1951) [1], And now recently found Zika virus which cause the microcephaly in fetus (Kuno *et al*., 1998) [2]. Mosquitoes biting behavior is most important to eliminate and control the mosquitoes and vector borne diseases. Understanding biting distribution of potentially infectious (parous) mosquitoes at various hours of the night would be useful in establishing the likely impact of bed nets on malaria transmission. However, this behavior is likely to vary across ecological settings and among mosquito populations.

Therefore the present study focus the biting habit of mosquitoes. Biting or feeding preferences and host behavior have an important influence on the local epidemiology of vector borne diseases. For example, malaria prevalence may be less in communities where the principal malaria vector is not strictly anthropophilic and where cattle range between the villages and major breeding sites (8 Kelin *et al*., 1991) [3]. In some areas of Brazil, observations indicate that local populations of mosquito species are zoophilic, while in others they are anthropophilic (2 Deane 1988) [4]. It is now apparent that these differences are often species differences within species complexes (Deane 1988) [4]. Mosquito blood feeding behavior consists of several phases: the search for potential hosts, attraction to hosts, attacking, feeding, and resting. Of these phases, much attention has focused on attacking behavior of mosquitoes because of its practical importance. Little is known about outdoor biting behavior. Even the dynamic of indoor biting and infection risk of sleeping of household occupants. A recent study, Anopheline biting sites indicate that certain species have a preference for specific parts of the body. *Anopheles Gambia* Giles S.S. shows a preference for foot and angle areas (Jong and Knils 1995) [5].

Studied explore the colour preferred and biting behavior sides of cattle body in outdoor condition and demonstrated the strong preference for feeding on the cattle body. The works focused the attention on monthly variation in host colour preference biting behavior of Anopheline and Culicine mosquitoes from Takkyi Township Yangon Region as important vector, *Anopheles* and

Culex. The opportunities of this study was for behavioral targeting to reduce biting risk and vector borne infections.

Objects of the study

To record the species composition of mosquitoes in studied area
To determine the biting habit of *Anopheles* and *Culex* mosquitoes

Materials and methods

Study site

Monthly mosquitoes sample were collected in 10 cows from Taikkyi Township, Yangon Region.

Study period

The study was done from March to November 2018.
Sample collection method: Outdoor cattle bait mosquitoes collection was done using WHO sucking tube from 18:00 hours to 24hours for 3 days from March to November 2018. *Anopheles* and *Culex* mosquitoes were collected for 45 minutes in every hour on the specific parts of the White, Brown and Black cattle body. Hourly collected mosquitoes were placed in specific body parts labeled paper cups individually. Next day morning all collected mosquitoes were morphologically classified the species.

Species identification

The species identification of all collected mosquitoes according to the body parts were identified by Harrison BA. And Scanlon JE. (1975), Reid 1967 and Myo Paing 1990) [8]

Analysis

Monthly collected entomological data were analyzed by according to specific parts of three different coloured cattles by Microsoft excel software.

Results

Systematic position of studied species of Anopheles
Phylum: Arthropoda
Class: Insecta
Order: Diptera
Family: Culicidae
Genus: Anopheles
Species: 1. *An. annularis* (Vander Wulp, 1884)
2. *An. vagus* (Donitz, 1902)
3. *An. barbirostris* (Vander Wulp, 1884)
4. *An. aconitus*
5. *An. fluviatilis*
6. *An. philippinensis*

Table 1: Monthly collection of mosquitoes from different parts of cattle body

	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Total
Total Mosquito bites	1409.00	456.00	226.00	483.00	642.00	845.00	1798.00	1244.00	433.00	7536
Mean	469.67	152.00	75.33	161.00	214.00	281.67	599.33	414.67	144.33	2512
± SD	58.86	67.20	35.12	10.58	15.10	32.58	207.81	52.37	31.34	116.77

Table 1 shows that the highest number (n=1798) of mosquitoes were collected in September followed by n= 1409 in March and lowest was collected in n=226 in May.

Table 2: Biting behavior of mosquitoes against different coloured of cattles

Coloure of cattle's	Total collected	Percentage (%)
White	2566	34.05
Brown	2378	31.56
Black	2592	34.39
Total collected mosquitoes	7536	100.00
mean	2512	0
SD	116.77	0

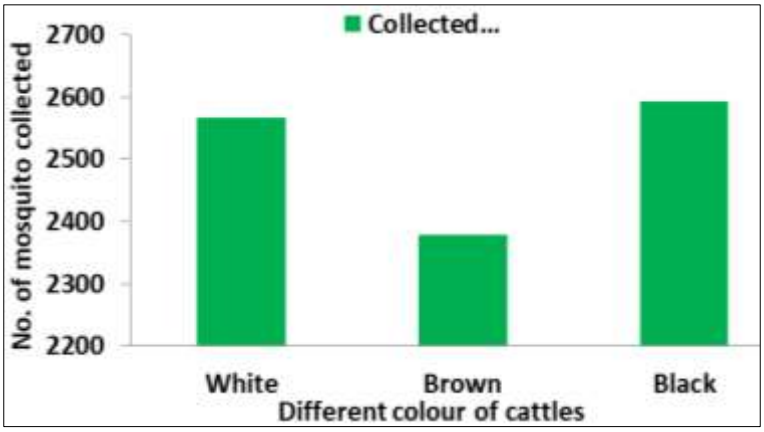

Fig 1

Table 2 and Fig 1. Shows that the biting preference of mosquitoes on different coloured of cattles was found that the highest number of mosquitoes were bitten 2592(34.39%) to black coloured cattle followed by 2566 (34.05%) bitten to white coloured cattle and lowest bitten was observed 2378(31.56%) to Brown coloured cattle.

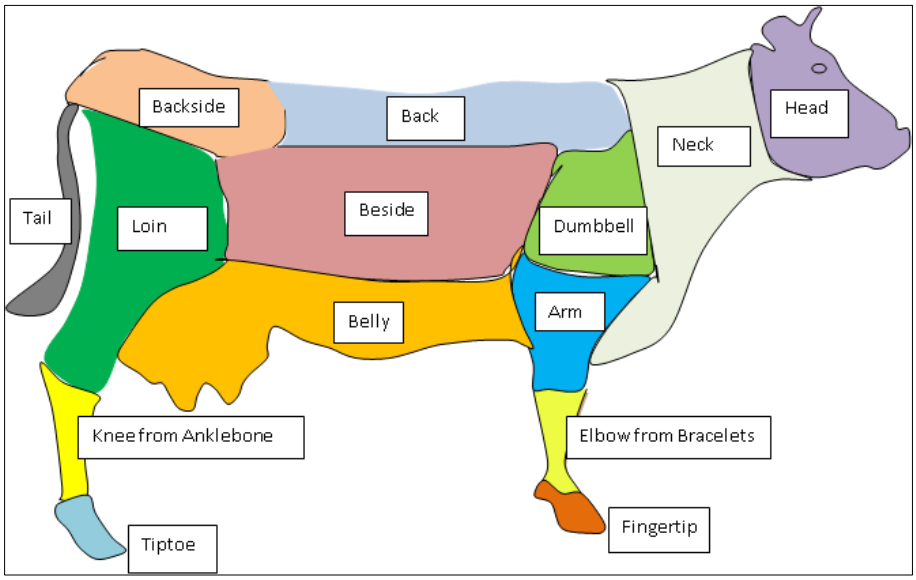

Fig 2: Body divided by specific parts of cattle body

Table 3: Biting preference of mosquitoes according to specific parts of cattles body

Specific parts of body	Different coloured of cattle's			Total collected	Percentage of bite
	White	Brown	Black		
Head	13	47	48	108	1.43
Neck	156	195	69	420	5.57
Dumbbell	165	160	68	393	5.21
Arm	73	94	125	292	3.87
Elbow from Bracelets	552	522	537	1611	21.38
Fingertip	343	159	362	864	11.46
Back	55	150	132	337	4.47
Belly	333	134	51	518	6.87
Beside	222	235	67	524	6.95
Backside	96	54	102	252	3.34
Loin	45	125	52	222	2.95
Knee from Anklebone	283	395	430	1108	14.70
Tiptoe	230	108	549	887	11.77
Total mosquito collected	2566	2378	2592	7536	100.00
Mean	197.38	182.92	199.38	579.69	
SD	±152.85	±135.20	±194.47	±426.69	

Table 3. Shows detail of biting preference of mosquitoes on specific parts of cattle body and found that the highest preference of mosquitoes body part was observed 1611 (21.38%) bite to Elbow from Bracelets and followed by 1108 (14.70%)bite on Knee from Anklebone and lowest was found on 108(1.43%) on Head. Although mosquitoes were found more preference to Fingertip 864(11.46%) and Tip toe 887(11.77%) than the other remaining parts of the cattle's body parts.

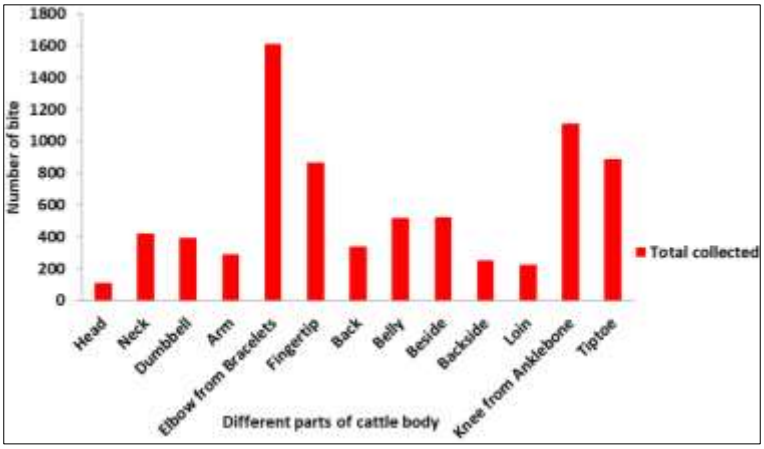

Fig 3: Biting behavior of mosquitoes on specific parts of the cattle body

Fig. 3 shows that the highest preference of biting was observe Elbow from Bracelets parts of cattle followed by Knee from Anklebone of body part and lowest biting part was head of the cattle. Fingertip and tiptoe of cattle were found high preference of mosquito biting.

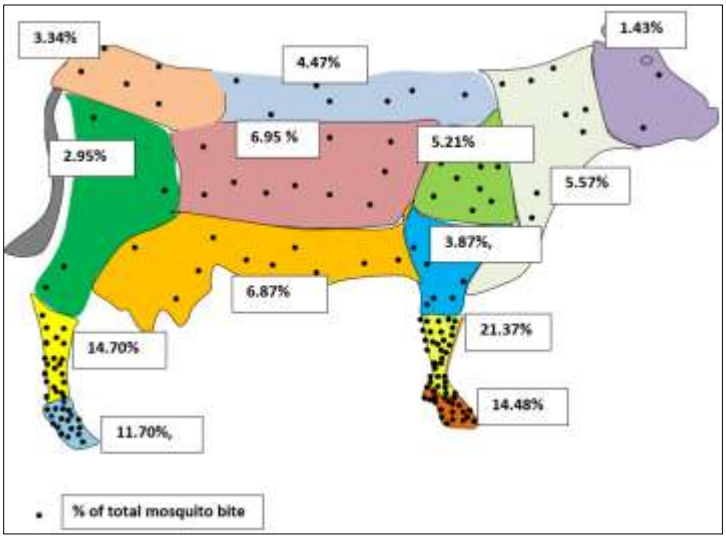

Fig 4

Fig 4. Shows that the biting behavior of mosquitoes on specific parts were found highest 21.37%bite on Elbow from Bracelets followed by 14.70 Knee from Anklebone, 14.48% fingertip, and 11.70% Tiptoe the lowest was found 1.43% on head part of cattle.

Table 4: Colour preference and biting behavior of mosquitoes on different specific part of cattles

Specific parts of body	Different coloured of cattle's					
	White		Brown		Black	
	Average collected	% of bite	Average collected	% of bite	Average collected	% of bite
Head	13	0.51	47	1.98	48	1.85
Neck	156	6.08	195	8.20	69	2.66
Dumbbell	165	6.43	160	6.73	68	2.62
Arm	73	2.84	94	3.95	125	4.82
Elbow from Bracelets	552	21.51	522	21.95	537	20.72
Fingertip	343	13.37	159	6.69	362	13.97
Back	55	2.14	150	6.31	132	5.09
Belly	333	12.98	134	5.63	51	1.97
Beside	222	8.65	235	9.88	67	2.58
Backside	96	3.74	54	2.27	102	3.94
Loin	45	1.75	125	5.26	52	2.01
Knee from Anklebone	283	11.03	395	16.61	430	16.59
Tiptoe	230	8.96	108	4.54	549	21.18

Total mosquito collected	2566	100.00	2378	100.00	2592	100.00
Mean	197.38		182.92		199.38	
SD	±152.85		±135.20		±194.47	

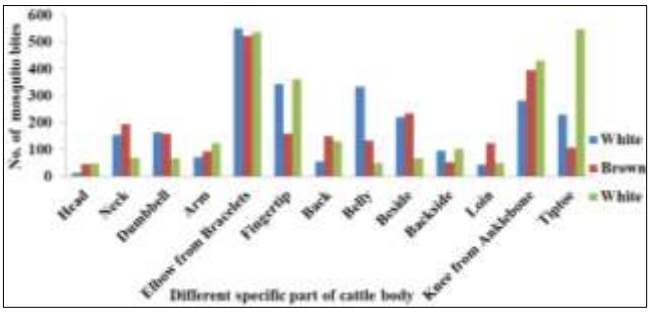

Fig 4: biting behabior of mosquitoes on specific parts of different coloured cattle bodys

Table4 and Fig.4. Shows that Colour preference and biting behavior of mosquitoes on specific part of different coloured cattles body. The result found that mosquitoes were most preference to black coloured cattle (n=2592) followed by white coloured cattle (n=2566) and lowest biting was found to Brown coloured cattle (n=2378). The biting behavior of mosquitoes on specific part of the Black coloured cattle body was found 549 bites to Tiptoe followed by 537 bites to Elbow from Bracelets the lowest was found 48 bites on head. Biting behavior of mosquitoes on different parts of White coloured cattle was found to be the highest 552 bite on Elbow from Bracelets followed by 343 bites on the Fingertip and lowest was found 13 bites on head. Biting behavior of mosquitoes on different parts of brown coloured cattle was found the highest biting on 522 bites on Elbow from Bracelets followed by 395 bites on Knee from Anklebone and lowest was observed 47 bites on head of the brown cattle.

When copared with each other the biting behavior of mosquitoes were observed highest on Elbow from Bracelets (n=1611 and followed by Knee from Anklebone (n=1108) of the all cattle body and the lowest bite was observed on head. Of this the highest biting on Elbow from Bracelets was found to be 552 bites to white followed by 537bites to Black and lowest was found 522 bites to Brown coloured cattle. Although biting on Knee from Anklebone was the second most preference area and found that the highest biting was observed 430 bites on black cattle followed by 395 bite to Brown and lowest bite was observed 283 bite on Knee from Anklebone area of white coloured Cattle. Although fingertip and tiptoe of cattle body were also found high biting parts of bodies. The highest biting on Tiptoe was found 362 bites to Black followed by343 bite to White and lowest was 159 bite to Brown coloured cattle and the highest biting behavior of mosquitoes on tiptoe was 549 bites to Black followed by 230 bites to White and lowest was observed 108 bites to Brown coloured cattle. More than 150 bites of mosquitoes on different parts of cattle body were found Neck, Dumbbell, beside and back parts of White and Brown coloured cattle. Although other parts of body were found less than 150 bites to all cattle. Same highest biting behavior of Anopheles mosquitoes on Knee from Tiptoe and Albow to fingertip parts of cattle body was observed in Loikaw (Mya *et al*., 2017 unpublished data).

Conclusion

In conclusion the biting behavior and coloure preference of mosquitoes on cattle are same as human study. The results presented in the current study was not a difference in the attractiveness of *Anopheles* mosquitoes and *Culex* mosquitoes on highest attractive parts of three different coloured Cattles. Conclusive evidence for the evolution of colour preference and biting behavioral has often been confounded by methodological issues. However, our preliminary study has demonstrated that biting behavioral of both mosquitoes could have a significant impact on the effectiveness of diseases control. As a result, we propose to improve understanding of both physiological and behavioral in disease vectors.

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