BIONOMICS AND ABUNDANCE OF *ANOPHELES* MOSQUITOES IN BIHSUD DISTRICT, NANGARHAR AFGHANISTAN

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Abstract: A scientific Survey for the collection of Anopheles Mosquitoes at district Bihsud was carried out from August 2017 to July 2018. This survey includes the sampling of adult mesquites, and identified a total of 6 species in three targeted villages i.e. Malik Bella, Belandghar and Daman. Adult mosquitoes were collected pyrethrum spray methods from Man-Biting rooms. *Anopheles* Mosquitoes collection comprised by the species were *A. hyrcanus (15.67%)* as the most abundant mosquito species followed by *A. pulcherimus (15.28%), A. fluviatilis (14.80%), A. stephensi (14.68%), A. superpictus (14.63%,),A. culicifacies (13.53%),* and *A. subpictus (11.38%),* of the total collection.

During the study most of the species built up their population. The highest density was observed during the month of October 2017. During winter months the population density fined very low. A total of 3294 *Anopheles* species were collected at village Daman. *A hyrcanus* was (511, 15.51%) found to be the most abundant species then other species of *Anopheles* genus. While *A. culicifacies* was (429, 13.02%) comparatively least abundant species. A total of 3388 *Anopheles* species were collected in a survey at village Malik Bella. *A.hyrcanus* was (549, 16, 20%) found to be the most abundant species while *A. subpictus* was (390, 11.91) observed to be in a comparatively low abundance. A total of 3493 individuals belonging to various *Anopheles* species were collected in a survey at village Belandghar. *A. fluviatilis* was (530, 11.30%) found to be the most abundant species while *A. subpictus* was (402, 15.17%) the least abundant species.
Keywords: Mosquitoes, Vector. *A.hyrcanus, subpictus. A. fluviatilis, A. culicifacies, A. stephensi*

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1. Introduction

Mosquitoes have global distribution; they found trough out the hot and temperate region {2}. Mosquitoes extend their range northwards into the Arctic Circle Mosquitoes are small slander formed insect, the average length ranges from 3-6mm. the minimum range of body size is of about 2 mm while the utmost limit can be 19 mm {3}. Mosquitoes belong to Order Dipteral, which are having two pairs of wings {5}. Both sexes' male and female mosquitoes can be simply divided by examination of antenna {5} both sexes' male and female mosquitoes have different feeding behaviour {5}. Males and non-reproductive females fed by on nectar and plant juice {10}. The female of some species that normally feed on blood or sometimes enable of ovarian maturation without blood feeding {7}. The speed for the digestion of the blood meals rely on the climate and a lot of tropical species takes only two and three days but in colder temperature region it can take up to 14 days {12}. Mosquitoes belonging to family *culicidae*, which is a family almost 3 and 5 hundred species in the sub order *nematocera* Categorized the *culicidae* having 3 subfamilies i.e. *culicinaea* with thirty genus {10}, *Anophelinaea* with three genera and *toxorhynchtinae* with 1 genera {5}. The sub family *Anophelenaea* is ecologically the most common family which has medically most significant genera Anopheles, a variety of species which are malaria factor {11},

The genus *Anopheles* contain five hundred twenty-two species worldwide {16} of which seventy-five are the vectors of malaria below normal condition but twenty-eight species are of major importance amid them {5}{6}. Besides malaria Mosquitoes as number one public enemy inflict human diseases like Dengue fever, Dengue haemorrhagic fever, Filarial fever, Chikungunya, Japanese encephalitis, Rift valley fever virus, Wuchereria Bancroft and West Nile virus {6} {15} {5} {17}.

According to WHO calculation, there are at minimum 6 malaria vectors in Afghanistan, these are *An. Superpictus, An. Culicifacies, An. Hyrcanus, An. Pulcherrimus, An. Fluviatilis and An. Stephensi* {1}. In Afghanistan there are 24 *Anopheles* species {18}, of which only two species, *A. Culicifacies* and *A.*

*Stephensi*have been reported as confirmed malaria vectors {8}. The role of *A. Fluvitialis*, *A. Pulcherrimus*, *A. Maculates*, *A. Stephensi* and *A. Superpictius* is very essential and must be considered {16}. This research conducted to determine the species composition of *Anopheles* mosquitoes in district Bihsud, which will provide a base and make foundation for further studies. It also includes the analysis and identification of the *Anopheles* mosquito species in this part of the country.

2. Significanceofthe Study

This research conducted to determine the bionomics of Anopheles mosquitoes in district Bihsud, which will provide a base and make foundation for further studies data collected Anopheles mosquitoes which helps in estimating the position and status of malaria in district Bihsud and identification of the Anopheles mosquito species in this part of the country. This whole information will provide a guideline and a kind of first-hand information for several malaria direct program and policy applied in this district.

3. Reviewof Related Studies

This study was carried out to explore the bionomics and abundance of *Anopheles* mosquitoes in the different parts of the District Bihsud, Nanganar Province. Geographically position of this district through GIS are; Latitude is 34 27' 13'' degrees and longitude is 70 27' 23'' degrees. According to the 2010 expected survey, total population of the district is about 130,000 people. The climate of district Bihsud is very {19}. There are 3 spells of rainy season in the 12 months. The spring rainfall in the months of March and April and the other months in which the highest rainfall is in August. But overall the winter rainfall exceeds the summer rainfall {20}. Three targeted village's Malik Bella, Belandghar and Daman were selected as focal points for the collection of *Anopheles* mosquitoes in district Bihsud. The selection as well as to fulfil the ecological requirements for such study recommended, the houses selected in each village contained permanent ground water breeding sites, adjacent agricultural fields and vegetation for outdoor resting mosquitoes, cattle sheds and houses suitable for indoor resting collection.

4. Objectivesofthe Study

- To study the species composition and seasonal variation of Anopheles species in the Bihsud District.
- Toanalyze the malaria data collected by district hospital in the study area.

5. Hypothesesofthe Study

- The spring rainfall in the months of March and April Anopheles species highest this Manson.
- Anopheles species highest in water breeding sites and adjacent agricultural fields.

6. Populationand Sample

. A total of three sites of collections, 3294 *Anopheles* species were collected at village Daman. 3388 *Anopheles* species were collected from the village of Malik Bella and 3493 *Anopheles* species were collected in a survey at village Belandghar.

6.1. Statistical Techniques Used in the Present Study

Data will be analysed using Microsoft Excel. Diagram and tables will be used for the contrast and analysis.

6.2. Data Analysis and Interpretation

Table.1. Abundance of Anopheles mosquitoes at village Daman, district Bihsud from August 2017 to July 2018.

Species	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	TOTAL	%TAGE
A.Stepensi	44	50	41	40	43	30	18	34	40	51	51	14	487	14.37%
A.hycrans	54	47	45	30	48	20	2	46	53	53	63	57	549	16.20%
A.culicifacies	49	46	48	34	19	18	15	37	47	47	47	43	450	13.28%
A.superoictus	52	43	82	22	30	25	21	30	65	38	38	45	514	13.87%
A.fluviatilis	48	51	61	46	31	25	30	47	27	45	45	62	528	15.58%
A.pulchermus	34	51	61	28	41	17	29	40	39	42	42	45	470	13.87%
A.subpictus	39	29	61	22	21	15	21	30	38	39	39	38	390	11.91%

Interpretation of table-1.

Relative abundance of *Anopheles* mosquitoes at village Daman. A total of 3294 *Anopheles* species were observed in this survey. *A. hyrcanus* was found to be the most abundant species (611, 15.51%). However no drastic difference was observed in the species number among different species and the percentage was almost same for all seven species (Table. 1, Fig. 1).

Figure.1 Species wise distribution of Anopheles mosquito species at village Daman, district Bihsud. Species wise distribution of Anopheles mosquito species at village Daman, district Bihsud.
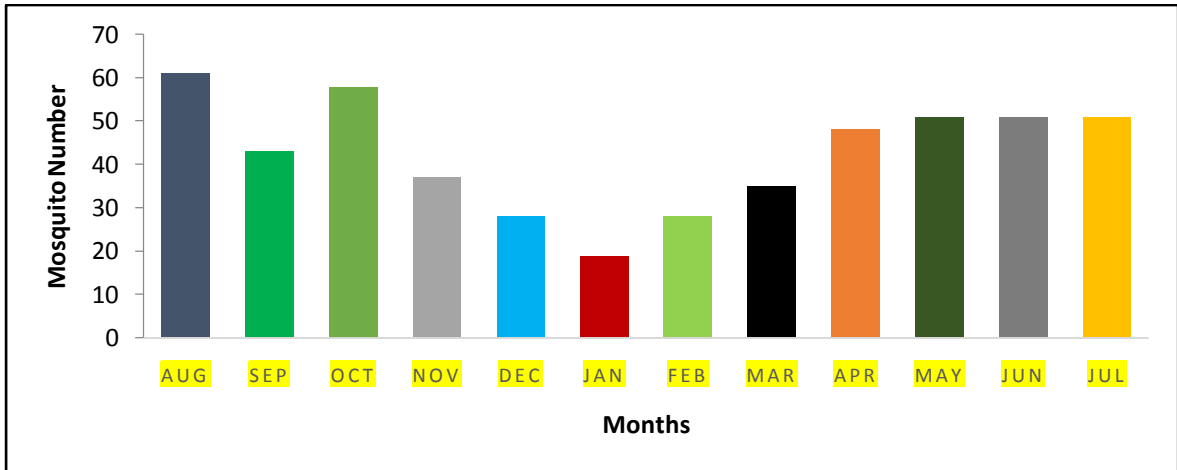

Table.2. Abundance of Anopheles mosquito at village Malik Bella, district Bihsud from August 2017to July 2018

Species	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	TOTAL	%TAGE
A.Stepensi	51	51	67	34	34	26	16	20	31	51	75	45	501	14.34%
A.hycrans	61	47	49	32	39	44	27	44	49	49	49	44	534	15.28%
A.culicifacies	47	49	49	34	43	38	22	35	48	38	48	47	498	14.25%
A.superoictus	50	51	63	26	55	18	34	31	41	42	55	46	512	14.65%
A.fluviatilis	39	51	63	30	27	25	16	48	36	65	65	65	530	15.17%
A.pulchermus	47	50	54	45	53	23	29	21	39	52	52	52	516	14.77%
A.subpictus	27	36	66	44	21	26	32	32	32	32	32	22	402	11.50%

Interpretation of table-2.

Relative abundance of *Anopheles* mosquitoes at village Malik Bella. A.*hyrcanus* was found comparatively to be the most abundant species (549, 16. 20%) while A. suspects was to be relatively less abundant species (390, 11.91). (Table 2, Fig. 2).

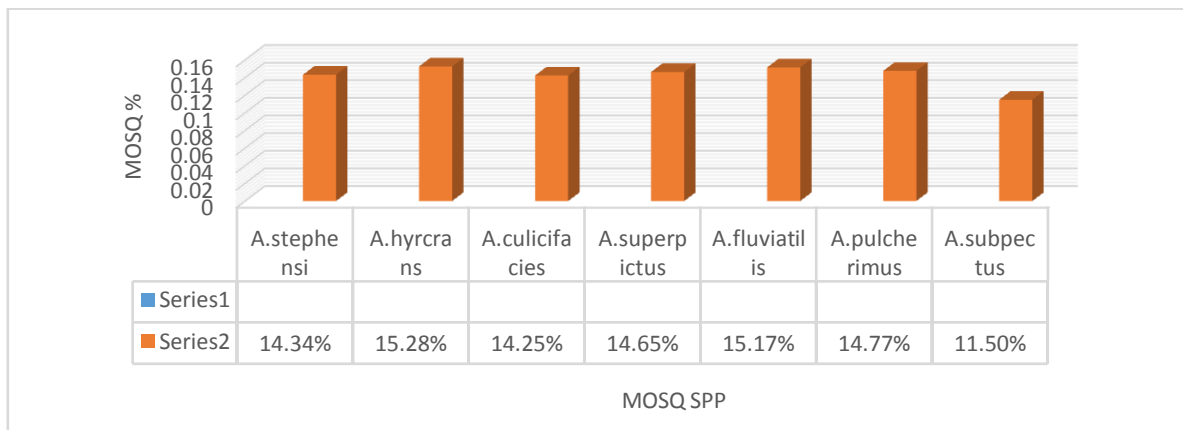**Figure.2.** Species wise distribution of Anopheles mosquitos at village MalikBella, district Bihsud.

Table.3. Abundance of Anopheles mosquito at village Belandghar, district Bihsud from August 2017 to July 2018.

Species	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	TOTAL	%TAGE
A.Stepensi	51	51	67	34	34	26	16	20	31	51	75	45	501	14.34%
A.hycrans	61	47	49	32	39	44	27	44	49	49	49	44	534	15.28%
A.culicifacies	47	49	49	34	43	38	22	35	48	38	48	47	498	14.25%
A.superoictus	50	51	63	26	55	18	34	31	41	42	55	46	512	14.65%
A.fluviatilis	39	51	63	30	27	25	16	48	36	65	65	65	530	15.17%
A.pulchermus	47	50	54	45	53	23	29	21	39	52	52	52	516	14.77%
A.subpictus	27	36	66	44	21	26	32	32	32	32	32	22	402	11.50%

Interpretation of table-3.

Relative abundance of *Anopheles* mosquitoes at village Belandghar.A. *fluviatilis* was found to be the most abundant species i.e. (530,) while A.*subpictus* was to be the least abundant species (402) as shown in (Table.3, Fig.3).

Figure.3. Species wise distribution of Anopheles mosquitos at village Belandghar, district Bihsud
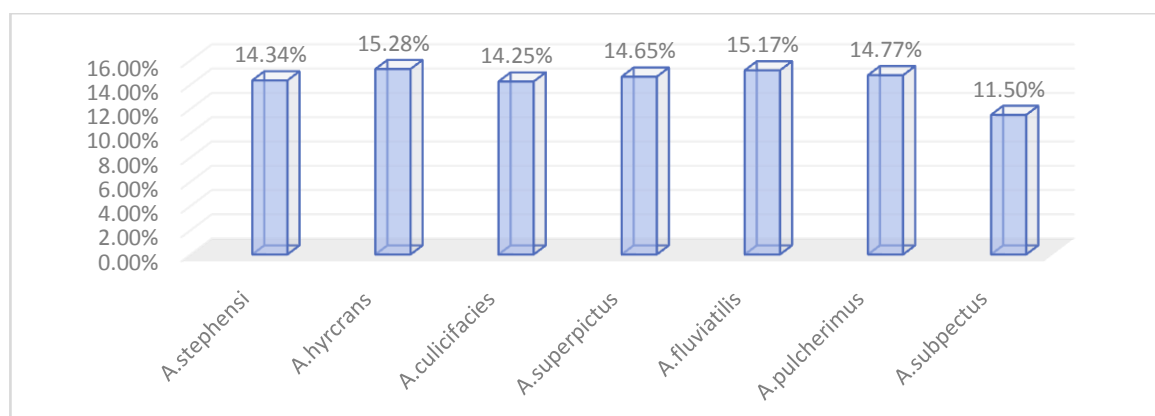
7. Recommendations

- Rice fields and connected ditches, ponds, pools will assist in understanding connection amid landscape mechanism and mosquito density.

- Amid landscape mechanism concern in foreseeing the variation malaria vector, try to keep up mosquitoes trapping net for the voidance of malaria.

- Number of fed, unfed, gravid and non-gravid mosquitoes were not recorded, that's scientific study useful for identifying of other species.

8. Conclusion

This study performed at three villages (Belandghar, Daman and Malik Bella)during August 2017 to July 2018.When rice, maize and tobacco were cultured on most area of these villages. Rice fields and connectedditches, ponds, pools (perennial and temporary), This will assist in understanding connection amid landscapemechanism and mosquito density, which is a main concern in foreseeing the control of land-cover variation on malaria vectorhappening and in determining control strategies for the future. There were some limitations to this s study due to which not a thorough survey could be done to find out the maximum species diversity in the district Bihsud. the land cover and irrigation canals were not analysed. Also the number of fed, unfed, gravid and non-gravid mosquitoes were not recorded. If the study area and parameters are extended than the data could be more useful for designing research and control strategies.

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