

Mosquitoes and their perceived nuisance in Tripoli

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Abstract— Despite the high numbers of mosquitoes observed in some areas, little is known about the biting nuisance of mosquitoes in Libya. Tripoli municipality is a place notorious for nuisance mosquitoes perceived in year 2015, The objective was to assess the impact of mosquito nuisance on the residents of Tripoli municipality and to show results of mosquitoes collected during the nuisance outbreak. Two hundred people were randomly selected and asked if they had been bitten by mosquitos. If they said yes, they were asked to explain where and when they were attacked by mosquitos, as well as what precautions they took to avoid mosquito bites. The questionnaire was filled out by 160 participates. 65% of those reported being bitten by mosquitoes, with most bites occurring outdoors during the summer. Thirty-nine percent said most of the biting happened in the evenings and at night. 43 (27%) took protective measures against being bitten. Of those respondents who protected themselves against biting using repellents (44%), with the remainder changing their behavior to avoid mosquitoes, including closing or screening windows and windows or doors screen with (35%), (2%) respectively, wearing thicker clothes (4%) and spraying insecticide (21%).one person stayed inside (2.3%). Mosquitoes are a major issue for a large section of Tripoli's population, according to this study. Given the growing worry about the threat posed by potential and emerging viruses in Libya, health officials need to make major efforts to alert the public about the threats posed by mosquitoes in areas where they are common.

Keywords— Mosquito, nuisance, bite, Protective measures, Libya (Key words).

I. INTRODUCTION

Globally, current, and emerging diseases pose significant new threats to human health. Biting flies that are generalist feeders are responsible for many of these new diseases. Our ability to assess the risk posed by vector-borne diseases is hindered by a lack of knowledge about how often people are bitten and how they respond to the threat [1]. This is particularly common in Libya, where research on mosquito bites and other biting insects is difficult to come by.

Despite historical literature describing malaria in Libya [2],[3],[4],[5],[6],[7],[8],[9],[10],[11],[12],[13],[14], there has been no systematic effort to quantify the issue of mosquito bite. However, Libya has 38 mosquito species, all of which are known to feed on people; also, several species have biological preferences for flood plains, salt marshes, poorly drained ditches, old tires, and organic debris [15],[16]. Human activities influence their local environment and promote the growth of many pathogen-transmitting mosquito species, possibly mediating interactions among mosquito species, their hosts, pathogens, and predators, just as temperature and precipitation influence the abundance of single species or vector groups [17]. In addition to climate, human activities influence their local environment and promote the growth of many pathogen-transmitting mosquito species, and possibly mediating interactions among mosquito species,

their hosts, pathogens, and predators. To our knowledge there have been no mosquito nuisance surveys carried out throughout Libya by primary health care of local authorities, however, In 2015 biting nuisance outbreak was first perceived in Tripoli municipality ; Public complaints of mosquitoes are a rarity, unfortunately even when they do, there is a risk that the complaint is not recorded or taken seriously, however, depending on the vociferously of the complaints action was under taken by the National Centre for Diseases control (NCDC) Libya - Vector Borne Disease Department and primary health care of local authorities. Sites that were visited had reported mosquito problem by residents, mosquito survey was conducted and treated larval and adult sites with insecticide. The same biting outbreak was also noticed at Bani Walid municipality, since then biting outbreaks continued to be reported during months of September, October of 2016 and in November 2017 where the biting effect experienced was more aggressive. Despite the experience of mosquito nuisance, neither Tripoli nor other municipalities currently have any mosquito management programs in place, people are expected to protect themselves against mosquitoes [18] (unpublished report). Presented here are the results of a questionnaire survey to assess the impact of mosquito nuisance on the residents of Tripoli municipality and to show results of mosquitoes collected during the nuisance outbreak.

II. METHODOLOGY

In August 2019, 15 participants were asked to complete a pilot questionnaire, based on the results of the survey, a final questionnaire with closed questions was developed. Each respondent was asked whether they had been bitten by mosquitos. If they answered yes, they were asked to explain where and when they were bitten by mosquitos, as well as what precautions they took to avoid mosquito bites. Other questions were to try to answer publics question why mosquitoes bit more humans than others. A total of 160 had participated, who attended National center for disease control (NCDC), Tripoli - Libya clinic and other health care center in Tripoli.

III. RESULTS AND DISCUSSION

Mosquito survey was conducted using CDC UV Light trap, sampling was for two days, as well as citizens sent photos of insects that bite them. All samples were sent to parasitology and vector borne disease laboratory at the NCDC.

A total of 50 mosquitoes were collected 15 were *Culex pipiens* and 35 *Aedes caspius*. (Figure 1) Samples were confirmed by the help and support of Vincent Robert, Gilbert Le Goff (MIVEGEC unit, IRD-CNRS-Montpellier University). A total of 160 people agreed to be participating in filling the questionnaire, of these 48.75% were female (n=78) and 51.3% male (n=82). Seventy-six (48%) respondents complained of being bitten in their house and 58 %garden or both with 23 %. Thus 65% of the total sample considered there was a problem with biting insects. Most people complained of being bitten during the summer (87%), seventeen (11%) stated either spring, summer, and autumn or just autumn with (10%). Sixty-two (39%) respondents to have been bitten during evening and night or with (10%) reported biting only at evening and (50%) night, six people reported daytime mosquito biting. Twenty-eight of the respondents (18%) said they reacted badly to mosquito bites. 43 (27%) took protective measures against being bitten Table 1. Forty-four per cent of people using protective measures used only repellents. four people with 9% cover up with clothes, were as 15% of people close or screen windows and 7(16%) of people screen windows or doors screen, 1(2%) person reported to stay indoors and 9 (21%) people used Insecticide spray, respondent results have also shown that 40% of people exercise, ate food with strong flavors (such as garlic, pepper, and onions) once a day and have blood type A, were shown to be bitten more outside and (36%) with blood type O were bit outside, were as blood type B (16%) were bitten inside and (8%) blood type AB were bitten outside. Reactions to mosquito bites vary between individuals with (12.5%) had a median effect and (3%) of people had an aggressive effect



Figure 1: mosquito samples collected and the reactions to mosquito bites.

Table 1: Protective measures against mosquito bites (n= 160)

Method	% Of responses
Closing or screening windows	16
Repellents	44.2
Cover up with clothes	2.0
Window or door screens	16.3
Insecticide spray	21
Stay indoors	2.3

Discussion

Mosquitoes is thought to be a problem in Tripoli by at least 65% of those questioned. These findings may not be reflective of the population in Tripoli. However, the questionnaire provided insight into how mosquito bites are experienced as nuisance and how people protect themselves from mosquitos.

Mosquitoes bite people all year, but the summer is where they bite the hardest. Mosquitoes were so terrible in Tripoli that at least 58% of respondents said they couldn't relax in their gardens during the evenings because of them. The nuisance was caused mainly by floodwater mosquito *Aedes caspius*; it is commonly found in marshland, flood plains, salt marshes, poorly drained ditches, used tires and organic matter, Floodwater mosquitoes lay their eggs on soil in flood-prone areas, the eggs remain dormant and viable for several years, creating an egg bank, and the eggs hatch into larvae when the water temperature is warm enough in the

spring and summer [19]. This mosquito may have several generations in a season, increasing their numbers and stretching the nuisance cycle to cover the entire summer months. Several floodwater mosquitoes that have been recorded to cause extreme nuisance in Europe are capable of long-distance flight, with larval habitats in temporarily flooded wet meadows extending 11 kilometers or more [20]. As a result, the vast numbers of host-seeking females would influence humans in regions much greater than the larval environments. For residents and businesses located far from the temporarily flooded wetlands, the mosquito threat becomes a big issue. In addition, it was the main cause of nuisance on the Mediterranean Coast as well as *Culex pipiens* they bite through Autumn and summer; their abundance depends on temperature and precipitation [21].

Specific responses to mosquito bites differ. Most people experience only minor pain after being bitten by a mosquito. However, some people experience severe symptoms after just a few mosquito bites, including urticaria and erythema, asthma [22], and, in rare cases, anaphylaxis [22],[23]. Mosquito bites are so widespread in Tripoli that they are likely to cause allergic reactions in a significant number of people each year. Recent papers in the Tripoli social-media news, as well as complaints to the primary health care offices, have stressed the large number of mosquitoes in Tripoli and the inconvenience they inflict. Moreover 40% of people questioned; practiced exercise, ate food with strong flavors and the blood type A, have shown to have been bitten by mosquitoes outside, this could answer public's question on why mosquitoes bite more humans than others. However, more research is needed to understand the behavior of mosquito bite and their association with citizens in Libya. These findings suggest that people who report a mosquito problem go to great lengths to prevent getting bitten. Nineteen percent of people would lock their curtains at night, which made sleeping on hot summer nights very unpleasant, but it was thought to be superior to getting bitten. The use of a mosquito repellent was another method of protection. Others protected themselves by installing security screens in their homes and wearing in long-sleeved clothing at night. It's noteworthy to note that no one who was questioned has tried to eliminate mosquito breeding grounds. No one had enclosed a water butte or filled in a pond. water butts may develop significant amounts of *Culex pipiens* which feed on birds and mammals [24]. While this study focused on Tripoli, mosquitoes are likely to be a pest in other parts of Libya. Moreover, according to climate change projections, areas of Libya will see extreme weather very hot summers and milder winters and heavy rain [25] which will be more conducive to mosquito breeding.

IV. CONCLUSION AND FUTURE SCOPE

This survey shows that mosquito bites are a big annoyance in Tripoli and that further research is needed to assess how common the issue is in areas around wetlands in Libya. This is important for the overall well-being of the local

population as well as the prevention of mosquito-borne diseases.

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REFERENCES

- [1] X. Bonnefoy, H. Kampen & K. Sweeney, "Public health significance of urban pests", WHO Regional Office for Europe Publisher; Denmark, pp. 347 – 387, 2008.
- [2] G. Ragazzi, "La malaria a Touarga". Arch. Ital. Sci. Med. Colon, Vol.3, Issue. 14, pp. 264 – 276, 1933
- [3] E. Zavattari. "Prodromo della fauna Della Libia". Tipografia già cooperativa, Vol.2, Issue. 7, pp. 726 – 730, 1934.
- [4] A. ANON. "Bollettino delle malattie infettive verificate nei Mesi de Gennaio a dicembre" Bollettino Sanitario Della Tripolitania; Tripoli. Vol.2, Issue.1 Vol 2, pp. 1- 12, 1944 -1950
- [5] A. ANON, "Malaria in Libya". Health Torch, Vol. 2, Issue 2, pp. 1-9, 1957
- [6] J.W. Goodwin & A.B. Paltrinier. "Oasis malaria in Libya". Mimeographed technical document EM/ME 2/8. World Health Organization, Geneva. Vol. 4, Issue.3, pp. 6-11. 1959
- [7] J.W. Goodwin, "A list of the mosquitoes of Libya". Mosquito News, 21, pp. 106-109, 1961
- [8] A. Shalaby, "Survey of the mosquito fauna of Fezzan South-Western Libya". Bulletin of the Entomological Society of Egypt, Vol.5 Issue. 6, pp. 301-312, 1972.
- [9] W. Macdonald. "Anophelines of Libya and their control". Gariounis Med J, Vol. 2, Issue. 5, pp. 72-74, 1982
- [10] A. Gebreel. "Malaria in Libya: introduction and historical review". Gariounis Med. J, Vol.4, Issue.5, pp. 70-71, 1982
- [11] A. Gebreel, H. Gilles & J. Prescott. "Studies on the sero-epidemiology of endemic diseases in Libya", IV Malaria. Annals of Tropical Medicine & Parasitology, Vol.7, Issue.9, pp. 341-347. 1985
- [12] C. Ramsdale. "Anopheles mosquitoes and imported malaria in Libya". Mosquito Systematics, Vol.2 Issue. 2, pp. 34-40. 1990
- [13] S. Manguin, P. Carnevale, J. Mouchet, M. Coosemans, J. Julvez, D. Richard-Lenoble, J. Sircoulon, "Biodiversity of malaria in the world", John Libbey Eurotext Publisher; Paris, pp. 20- 40, 2008
- [14] H. Aqeelhal, H. Abuabaid, W. Saadawi, & B. Annajar. "Molecular characterization of mosquito in eastern Tripoli, Libya for species *Culex pipiens*, molestus and hybrids". International Journal of Mosquito Research Vol 6. Issue 6; pp. 26-30. 2019.
- [15] H. Aqeelhal, N. Shibani, B. Annajar. "Mosquito species composition at a selected area in eastern Tripoli, Libya". International Journal of Entomology Research, Vol.6, Issue.4, pp. 122-125. 2019.
- [16] D. Roiz, S. Ruiz, R. Sorigue & J. Figuerol. "Climatic effects on mosquito abundance in Mediterranean wetlands". Parasites & vectors, Vol.7, Issue.1, pp. 1-13. 2014.
- [17] H. Aqeelhal, "Mosquito nuisance Report: a public health issue posed by mosquitoes" (unpublished report). National Center for Diseases Control – Libya, pp. 1-10, 2016.
- [18] D. Becker, M. Petric, C. Zgomba, M. Boase, C. Madoon, A. Dahi, and A. Kaiser. "Mosquitoes and their Control", 2nd ed. Springer Verlag, Berlin/Heidelberg Publisher, Germany, pp. 54 -55, 2010.
- [19] S. Bogojevic, E. Merdic & T. Bogdanovic. "The flight distances of floodwater mosquitoes (*Aedes vexans*, *Ochlerotatus sticticus* and *Ochlerotatus caspius*) in Osijek, Eastern Croatia". Biologia, Vol. 66, Issue. 4, pp. 678-683, 2011.
- [20] E. Blomgreni, C. Hesson, L. Schafer & O. Lundstrom. "Pest occurrence of *Aedes rossicus* close to the Arctic Circle in northern Sweden". Journal of Vector Ecology, Vol.43, Issue.1, pp. 36-43, 2018.

- [21] S. Gupt, S.Jain, S.Chaudhry &K. Agrwal. "Role of insects as inhalant allergens in bronchial asthma with special reference to the clinical characteristics of patients". *Clinical and Experimental Allergy*, **Vol 2 Issue.2**, pp. 519–524.1990.
- [22] P. Galindo, E.Gomez, J.Borja, F.R. Garcia, M. Lombardero & D. Barber."Mosquito bite hypersensitivity". *Allergologia et Immunopathologia (Madrid)* **Vol.2, Issue. 6**, pp. 251–254,1998.
- [23] S. Hassoun, M. Drort &A.Sabbah. "Anaphylaxis caused by a mosquito: 2 case reports". *Allergie et Immunologie Paris*, **Vol.3, Issue. 1**, pp. 285–287.1999
- [24] N. Shahhosseini,J. Friedrich, H. Moosa-Kazemi, M. Sedaghat, H.Kayedi, H.Tannich, &R. Luhken . "Host-feeding patterns of Culex mosquitoes in Iran". *Parasites & vectors*, **Vol.11, Issue.1**, pp. 1-10,2018.
- [25] M. El-tatawi. "Climate change in Libya and desertification of Jifara Plain. Using Geographical Information System and Remote Sensing Techniques". (Unpublished Dissertation) Naturwissenschaften Fakultät Universität in Mainz, Germany, pp.20-38, 2005.

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