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Effect of Thyroxine on Mosquito Larvae during Winter Months in Dengue Prone Regions of India

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I wish to submit this as a short letter to the editor in support of a publication entitled "Pathogenic parameters derived from activated platelets in dengue patients" by Tsai et al. [1] published in the Journal of Tropical Medicine and Surgery. Blood thyroxine has been correlated with mosquito borne illness like yellow fever in humans [2] and with *Plasmodium* in mice models [3] and in Dengue infections [1] where in, it has been shown that blood thyroxine levels have been increased in dengue patients. Further computational biology and proteomics research indicates thyroid hormone receptor TRIP11 has interaction with dengue virus [3]. Hence the relation between dengue infection and thyroxine is undeniable.

Coming to the vector, it is known that mosquitoes require blood meal for laying eggs and it is also known that the vertebrate hormone T3 is known to mimic insect juvenile hormone structure and function in *Locusta migratoria* and *Rhodnius prolixus* [4]. But the effect of human blood thyroxine levels on mosquito egg laying and the effect of thyroxine on mosquito larval molting is not correlated and nor studied by many. Further in a country like India, a single mosquito might have access to blood meals from humans and animals while living in close proximity and different animals have different thyroxine levels and I have observed that mosquitoes breed in public toilets located near bus stations in Indian towns like Madanapalle (13.5500°N, 78.5000°E) where dengue outbreaks are known (http://www.thehindu.com/todayspaper/tp-national/tp-andhrapradesh/villages-in-grip-of-viral fevers/article5271080.ece). It is known that human urine has thyroxine [5] as well as many other metabolites. Hence the exposure of mosquito larva to thyroxine is quiet possible in water bodies contaminated with human/animal urine. To find out the effect of human blood thyroxine on mosquito larva, 60 mosquitoes that bit me overnight was collected from my abode located in karnal, India (29.6900° N, 76.9800° E). The mosquitoes collected were not genus specific but this area is known for dengue outbreaks with one case near my proximity- http://www.hindustantimes.com/india-news/with-61-dengue-cases-reported-karnal-cmo-seeks-people-support/article1-1127559.aspx). All the mosquitoes should have had the same level of thyroxine in the blood meal as they had was only from one source within a short time span within overnight. The mosquitoes were introduced in containers having water with room temperature ranging from 12 to 18 degrees as in the month of November. The hatched mosquito larvae were split up into three sets with approximately 100 larvae per liter of water retained in a two liter container. In one container, 200 microgram of thyroxine (pharmaceutical grade) was introduced and in the other there was no thyroxine. The third container had introduced organic debris from aquarium feed. It was observed that after a week there was 95% survival of larvae in the container with thyroxine and there was 0% survival in the container without thyroxine. The container with organic debris showed 40% survival. Hence I would like to suggest that thyroxine might possibly influence mosquito larvae in winter months. Thus water bodies if contaminated with mammalian urine which is known to have thyroxine could exert influence on mosquito larva. Although I agree that this is not an in depth study but submitted as a letter to the editor to create interest in the scientific community for thyroxine based vector control research, I wish to indicate the possibility that dengue virus possibly manipulates thyroxine levels in human blood as shown in the article [6] probably to have some positive influence on mosquito propagation especially in winter months and this observation or data might be useful for drug discovery or mosquito control.

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