Abstract

The Chinese frog, Odorrana tormota generate s ultrasound naturally through vocal apparati . This ultrasou nd detectable by the female Anopheles gambiae antennae evoked evasive response due to neural stress and fear f or predation . The mated female A. gambiae are the Malaria vectors seeking blood meal from humans for egg nourishment through bites. Many Malaria preventive and control measures currently in use have had mini mal impact in Africa. Mosquitoes and malaria causing organisms have also developed resistance to chemicals in use. The use of EMR in mosquito repellency has been reported to be ineffective. Recent studies have shown that ultrasound of O. tormota evoked sig nificant evasive responses in the female A. gambiae, due to its pulsatile nature. In view of this , this study examines and analyses the 30 - 60 kHz frequency band of the re c orded sound of O. tormota reported to have the highest repellency to the female A. ga mbiae. In t his study , the 30 - 60 kHz frequency band was filtered from the recorded sound of O. tormotus , acoustic transmission parameters determined and analyse d using Avisoft - SASLab Pro version 5.1 software and Raven Pro. 1.4 . The activity and the behavio ural response of the female A. gambiae to the ultrasound in the optimal frequency range were also dtermined and analysed . A bioassay study involving 3 - 4 day old female A. gambiae exposed to the 35 kHz - 60 kHz frequency range of the sound of O. tormota was conducted and the rate of mosquito activity and behavioral response s noted. It was established the 35 - 60 kHz sound of O. tormotus was composed of 583 pulsate calls with call duration ranging from 0.003 s to 0.4167s. T he maximum and minimum mean peak am plititude s were 85.42 Pa and 102.15 Pa respectively; with most calls between 90 - 99 Pa. The signal power of the sound of O. tormotus varied between 40.5 dB and 73.0 dB , characterized by dips and peaks. The behavior al response of female A. gambiae to the u ltrasound was characterized by excitation and immobility due to the pulsate nature of the acoustic energy. These responses included weak movement, exhaustion, collapsing, unusual rest on the floor, antennae erection, low flights which was a manifestation o f stress on nervous system and fear for predation . There was sufficient evidence for significant relationship between acoustic energy with amplitude, bandwidth and frequency. The comparison between mean mosquito activity and acoustic energy using a paired samples T - test at 95% confidence was highly significant at p = 0.0000487, with a low positive correlant (r =0.156). The mean of the acoustic energy and mosquito activity in th is frequency range was 1.429 Pa 2 s and 59.333 respectively. The mosquito activities under the influence of 35 - 60 kHz sound differed significantly (p = 0.0032) from their activities under the control and were highly correlat ed (r = 0.773). The rate of mosqu ito activities under the 35 - 60 kHz sound of O. tormotus increased 4.617 times of the activities under the control experiment. The change in the rate of mosquito activities , attributed to nervous system besides fear of predation, was statistically significa nt at p = 0.013 and r = - 0.356. Also, the mean rate of mosquito activities under the influence of the 35 - 60 kHz sound of O. tormotus varied significantly with the peak amplitude, bandwidth and frequency. This study provide insight into the acoustic transmi ssion parameters of the sound of O. tormotus which affect the rate of activity and behavioural response in mosquitoes. The female A. gambiae, a Malaria vector can therefore be effectively be repelled using the 35 - 60 kHz sound of O. tormotus besides other c ontrol measures.