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Insecticide susceptibility of wild-caught sand fly populations collected from certain districts of Aegean Region, Turkey

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Sand fly-borne diseases like visceral, cutaneous leishmaniasis and phlebovirus infections are seen endemically in Turkey. The control programs are mainly based on treatment of the cases and insecticide spraying. However, no study was performed about the susceptibility/resistance in phlebotomine sand flies against pyrethroids in Turkey. For this reason, in our study, we aimed to evaluate the pyrethroid group insecticide susceptibility/resistance in phlebotomines using WHO standard protocols.

The Standard WHO testing procedure "Tube Test" has applied for pyrethroid susceptibility by using 0.05% deltamethrin and 0.75% permethrin impregnated papers. The tests were repeated 5 times including control ones. The sand fly specimens were collected from several localities of Mugla province where insecticides regularly applied and one village of Aydin province where no insecticide application. Following the standards of WHO testing procedures, all specimens were dissected, mounted and identified according to the standard species key charts of the Mediterranean Region. A total of 230 and 246 sand fly specimens collected from Mugla and Aydin provinces were used as 15-20 specimens in each tube, respectively.

The 90% and 93.3% susceptibility was detected among the sand fly specimens collected in Mugla against deltamethrin and permethrin after 24 hours of exposure, respectively. Because of the mortality rates are below the 5%, no correction was made with the Abbotts formula. The insecticide resistance was detected in these specimens according to WHO standards.

The 99% and 100% susceptibility was detected among sand fly specimens collected in Aydin against deltamethrin and permethrin after 24 hours of exposure, respectively. Because of the mortality rates were found as 15%, the correction was made using Abbotts formula according to WHO standards. No insecticide resistance was detected in these specimens.

Sand fly fauna of the study areas and species spectrum used in the study were as follows; in Mugla province, we found three (64% *P. tobbi*, 30% *P. papatasi*, 5% *P. neglectus/syriacus*) and one (1% *S. minuta*) species belonging to *Phlebotomus* and *Sergentomyia* genera while four (79% *P. tobbi*, 9% *P. neglectus/syriacus*, 6% *P. papatasi*, 2% *P. alexandri*) and two (2% *S. minuta*, 2% *S. dentata*) species belonging to *Phlebotomus* and *Sergentomyia* genera were found in Aydin province, respectively.

In conclusion, the resistance against deltamethrin and permethrin were detected in the areas where insecticide applications have been applied for long time while no resistance were found in the insecticide free area. We also showed the presence of vector sand fly species for *L. infantum* in the study areas. These results clearly pointed out the more attention are needed by the authorities involved in control programs for sand fly-borne diseases.