O30-05: KNOCKDOWN RESISTANCE MUTATIONS IN *Phlebotomus argentipes* FROM VILLAGES WITH AND WITHOUT INDOOR RESIDUAL SPRAYING IN BIHAR, INDIA

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Vector control by indoor residual spraying (IRS) is one of the main components of the visceral leishmaniasis (VL) elimination programme in India. DDT was used for IRS until 2015, then later replaced by the pyrethroid alpha-cypermethrin. DDT and alpha-cypermethrin both target the voltage gated sodium channel (*vgsc*) and high levels of resistance to DDT have been documented in the local sand fly vector, *Phlebotomus argentipes.* The aim was to compare the frequency of knockdown resistance (kdr) mutations in *vgsc*, particularly at codon 1014, observed in two sprayed and two unsprayed villages in Bihar state, India, which has the highest VL burden of the four endemic states. *Phlebotomus argentipes* were collected in 2019 in four villages in Bihar during a molecular xenomonitoring study: two VL endemic villages receiving IRS and two villages with no IRS. 350 females were used for sequence analysis of the IIS6 fragment of the *vgsc* gene and the frequency of mutations at codon 1014 was compared between sprayed and unsprayed villages. A high frequency of *kdr* mutations was found in the study. Mutations were identified at various positions within the IIS6 fragment, most frequently at codon 1014. Significant inter-village variation was observed. Sand flies from Dharampur, a non-sprayed village, had a significantly higher proportion of wild type alleles (55.8%) compared with the three other villages (8.5 – 14.3%). Both L1014S and L1014F mutations were observed, but the frequency of mutations where amino acid serine replaced leucine (L1014S) was the highest (48.5%). Significant differences in the frequencies of mutations observed between the villages may have

occurred as a result of selection pressure caused by previous exposure to insecticides. *Kdr* mutations L1014S and L1014F are associated with insecticide resistance in many vectors, including sand flies. While DDT resistance has been reported in Bihar, *P. argentipes* is still susceptible to pyrethroids. However, the presence of *kdr* in sand flies could present a threat to IRS used for VL control in endemic villages in India so the use of different insecticide classes, such as carbamates, organophosphates or neonicotinoids, may be explored for the purpose of insecticide resistance management. Further research on vector bionomics and insecticide resistance will be required to inform India's vector control strategies and ensure the VL elimination target is reached. This may include pairing of bioassay data to confirm the resistance phenotype of sand fly populations with genotypic data and transcription levels of metabolic enzymes that cause resistance to insecticides.

Keywords VISCERAL LEISHMANIASIS; VECTOR SURVEILLANCE; INSECTICIDE RESISTANCE; MOLECULAR XENOMONITORING

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