

Phenotypic and Genotypic Expression of Hyalomma Anatolicum Ticks Silenced for Ferritin Genes through RNA Interference Technology

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Abstract : Ticks are blood-sucking ectoparasite that causes a decrease in production and economic losses and affects mammals, reptiles, and birds. Hyalomma anatolicum is the main vector for CCHF transmission and Pakistan has faced several outbreaks of CCHF in the recent past. Ferritin (fer) is a highly conserved molecule that is ubiquitous in most tick tissues and responsible for iron metabolism and storage. It was hypothesized that the development of acaricidal resistance and residual effects of commercially used acaricides could be controlled by using alternative control methods, including RNA interference. The current study aimed to evaluate the fer silencing effects on tick feeding, average body weight, egg mass index, and mortality. Ticks, collected through the standard collection protocols were further subjected to RNA isolation using the Trizol method. Commercially available kit procedures were followed for cDNA and dsRNA synthesis. The soaking/Immersion method was used for dsRNA delivery. Our findings have shown a 27% reduction in body weight of fer silenced group and showed a significant association of fer and body weight. Silencing of fer had a significant effect on the engorgement percentage ($P=0.0007$), oviposition ($P=0.008$), egg mass ($P=0.004$) and hatching ($P=0.001$). The soaking method was used for dsRNA delivery and 15°C was found to be an optimum temperature for inducing gene silencing in ticks as at this temperature, maximum survivability after immersion was attained. This study along with previous studies, described that iron toxicity due to the silencing of fer could play an important role in the control of ticks and fer can be used as a potent candidate for vaccine development.

Keywords : ticks, iron, ferritin, engorgement, oviposition, immersion, RNA interference

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