Insulin is described as a sensor of nutritional status and a potent hormonal regulator of sugar and lipid metabolism in vertebrate organisms. In *Rhodnius prolixus*, a hematophagous insect vector of Chagas’ Disease, insulin must be involved in intracellular lipid metabolism in fed insects, regulating the synthesis of diacylglycerol, triacylglycerol and phospholipids in intestine and the production of triacylglycerol stores in fat body and ovaries. Using bioinformatics tools, we identified in *R. prolixus* genome the presence of several genes involved in insulin pathway: three insulin-like peptides (*RpILP1-3*), two insulin receptors (*RpIR1* and *2*), an insulin receptor substrate (*RpIRS*), a protein kinase B (*RpAkt*) and a Forkhead-box protein O (*RpFOXO*). All identified sequences exhibit high similarity levels in comparison to their mammalian counterparts. qPCR analysis showed that both insulin receptor genes are expressed in all the investigated organs. In addition, *RpIR2* exhibits the highest expression level in ovaries, suggesting a possible relationship between insulin and the reproductive cycle in this insect. To further investigate the physiological role of this hormone in *R. prolixus*, we performed the knockdown of each insulin receptor form by RNAi. Silencing of *RpIR1* and 2 results in a remarkable decreasing of triacylglycerol storage in fat body after feeding. Moreover, the knockdown of *RpIR2* isoform prevents ovary development and egg production by these insects. These results point to a central role of insulin in lipid synthesis and insect reproduction. Furthermore, insulin receptor isoforms appears to have specific functions in different organs of *R. prolixus*.

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