SCIENTIFIC ARTICLE

Genetic profiling of *HSP70* gene in local Iraqi goats

Perfil genético do gene *HSP70* em cabras iraquianas locais

Hassan Nima Habib[1], Wessam Monther Mohammed Saleh[2*] & Qutaiba Jassim Gheni[3]

[1] Biotechnology and Molecular Genetics, PhD, Department of Animal Production, College of Agriculture, University of Basrah, Basrah, Iraq
[2] Veterinarian, PhD, Department of Internal and Preventive Medicine, College of Veterinary, Medicine, University of Basrah, Basrah, Iraq
[3] Veternarian, PhD, Department of Animal Production, College of Agriculture, University of Basrah, Basrah, Iraq

BJVM
Brazilian Journal of Veterinary Medicine

p-ISSN 0100-2430
e-ISSN 2527-2179

Abstract

Animals display numerous physiological and behavioral responses that reduce the effects of heat stress. Moreover, genetic variance is strongly associated with responses to heat stress, including variants of heat shock proteins (HSPs) that are necessary for thermoregulation and stress resistance. Herein, we performed the molecular profiling of the HSP70 gene, and its polymorphism was demonstrated as a possible factor in the stress tolerance of local Iraqi goats. A number of different mutations were found owing to seven main polymorphisms. Results indicated the occurrence of silent and missense mutations in sequences obtained for Iraqi local goats. Genetic diversity was observed in the HSP70 gene of Iraqi local goats on the basis of phylogenetic-tree analysis as some mutations occurred once whereas others occurred multiple times. The polymorphisms LC616787, LC616788, and LC616791 were combined with the reference gene in the same branch, whereas polymorphisms (LC616785 and LC616786) and (LC616789 and LC616790) met in different branches, respectively. Moreover, all studied proteins had mismatches in their three-dimensional structures. Therefore, the presence of specific genetic differences within the HSP70 gene in Iraqi goats can increase the possibility of selecting animals more suitable to various levels of stress.

Keywords: HSP70 gene, goats, polymorphism, molecular analysis.

Resumo

Os animais apresentam uma série de respostas fisiológicas e comportamentais que reduzem os efeitos do estresse térmico. Além disso, a variância genética está fortemente associada às respostas ao estresse térmico, incluindo variantes de proteínas de choque térmico (HSPs) que também são necessárias para a termorregulação e resistência ao estresse. O perfil molecular do gene HSP70 foi realizado neste estudo e o polimorfismo desse gene foi demonstrado como um possível fator na tolerância ao estresse de caprinos iraquianos. Várias mutações diferentes foram encontradas devido a sete polimorfismos principais. Os resultados indicam a ocorrência de mutações silenciosas e sem sentido em sequências obtidas para caprinos iraquianos. A diversidade genética pode ser vista no gene HSP70 de cabras locais iraquianas com base na análise da árvore filogenética, já que algumas mutações ocorreram uma vez, enquanto outras ocorreram várias vezes. Os polimorfismos LC616787, LC616788 e LC616791 foram combinados com o gene de referência no mesmo ramo, enquanto os polimorfismos (LC616785 e LC616786) e (LC616789 e LC616790) se encontraram em diferentes ramos, respectivamente. O estudo também revelou que todas as proteínas estudadas tinham incompatibilidade sem suas estruturas tridimensionais. De acordo com nossas descobertas, a presença de diferenças genéticas específicas dentro do gene HSP70 em caprinos iraquianas aumentaria a possibilidade de seleção de animais mais adequados a vários níveis de estresse.

Palavras-chave: gene HSP70, caprinos, polimorfismo, análise molecular.

Introduction

Goats are important livestock making up a significant part of the agricultural economy in Iraq (Food and Agriculture Organization of the United Nations, 2018). Climate change, specifically the rise in temperature, has negatively affected the production of farm animals, especially goats (Hassan et al., 2018). This negative impact may develop further as global temperatures increase (Pachauri et al., 2014). In general, animals have many physiological and behavioral responses to withstand heat-stress conditions that result in reducing the impact of stress (Collier et al.,

How to cite: Habib, H. N., Saleh, W. M. M., & Gheni, Q. J. (2022). Genetic profiling of *HSP70* gene in local Iraqi goats. *Brazilian Journal of Veterinary Medicine*, *44*, e004121. https://doi.org/10.29374/2527-2179.bjvm004121

Received: October 12, 2021.
Accepted: September 18, 2022.

***Correspondence**
Wessam Monther Mohammed Saleh
Department of Internal and Preventive Medicine, College of Veterinary Medicine, University of Basrah
57 Baghdad Street
Basrah, Iraq
E-mail: Wessam.Mohammed@uobasrah.edu.iq; wessamgm@gmail.com