Cairo University

Faculty of Veterinary Medicine

Pathological and Immunohistochemical Studies on the Protective Effect of Spirulina Platensis Against Reproductive Arsenic Toxicity in Rats

A thesis submitted by

Khaled Said Ahmed Hassan

B.V.Sc (2002), Faculty of Veterinary Medicine
Tripoli University
M.V.Sc (2012), Faculty of Veterinary Medicine
Cairo University

For the Degree of PhD
Pathology (General, Special and Postmortem)

Under Supervision of

Prof. Dr. Kawkab Abd El Aziz Ahmed

Prof. of Pathology
Faculty of Veterinary Medicine
Cairo University

Dr. Reda Mohammed Sayed

Assistant Prof. of Pathology
Faculty of Veterinary Medicine
Cairo University.

Dr. Hanaa Ali El Halawany

Chief Researcher of Reproductive Pathology
Animal Reproduction Research Institute

2019

Cairo University
Faculty of Veterinary Medicine
Department of Pathology

Supervision Sheet

Prof. Dr. Kawkab Abd El Aziz Ahmed
Professor of Pathology,
Faculty of Veterinary Medicine
Cairo University

Dr. Reda Mohammed Sayed
Assistant Professor of Pathology
Faculty of Veterinary Medicine
Cairo University

Dr. Hanaa Ali El Halawany
Chief Researcher of Reproductive Pathology
Animal Reproduction Research Institute

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Faculty of Veterinary Medicine
Department of Pathology

Name: **Khaled Said Ahmed Hassan**
Date of birth: 16/03/1978
Nationality: Egyptian
Degree: Ph.D. of Vet. Med. Sciences
Specialization: Pathology (General, Special and Postmortem)
Title: Pathological and Immunohistochemical Studies on the Protective Effect of Spirulina Platensis Against Reproductive Arsenic Toxicity in Rats

Supervisors:
Prof. Dr. Kawkab Abd El_Aziz Ahmed Professor of Pathology, Faculty of Veterinary Medicine, Cairo University

Dr. Reda Mohammed Sayed Assistant Professor of Pathology, Faculty of Veterinary Medicine, Cairo University

Dr. Hanaa Ali El Halawany Chief Researcher of Reproductive Pathology Animal Reproduction Research Institute

Abstract

Arsenic (As) is currently one of the most important environmental global contaminants and toxicants, particularly in the developing countries. The aim of this study was to investigate the effect of arsenic (As) on the male and female reproductive organs, liver, kidneys, lungs, heart and brain and to assess the effect of *Spirulina platensis* (Sp) as an ameliorating agent in the arsenic-induced toxicity and exploring its pathway in protection. 120 male and female albino rats were divided into four equal groups, 30 rats in each group (15 males and 15 females): Control group and three treatment groups that daily received As, Sp and Sp+As respectively, Ten rats (5 males and 5 females) from each group were euthanized monthly during the experimental period (3 months). Results showed that the body weight in male and female rats was significantly reduced in As-treated groups compared to the control one, while the co-treatment with Sp significantly recovered the body weight in comparison with As-treated

groups. Arsenic significantly increased serum aspartate aminotransferase (AST), alanine aminotransferase (ALT), creatinine, malondialdehyde (MDA) and significantly reduced serum glutathione (GSH) activities, testosterone and estradiol in comparison with the control groups. Sp co-treatment significantly recovered AST, ALT, GSH, testosterone and estradiol levels and significantly reduced MDA in comparison to As-treated groups. Histopathologically, testes, uterus, ovaries, liver, kidneys, lungs, heart and brain of As-treated groups showed various degenerative and inflammatory changes which were relieved with the Sp co-treatment. Immunohistochemistry revealed increased apoptosis and explore the role of Nrf2 in the arsenic-induced toxicity. In conclusion, As-induced toxicity in rats could be ameliorated by *Spirulina platensis* co-administration, this with the expression of nrf2 and pro-apoptotic caspase 3 which indicating that *Spirulina platensis* is combating the generated oxidative stress in As-induced toxicity in albino rats.

Key words: Arsenic, *Spirulina platensis*, Pathology, Immunohistochemistry, Rats.

Dedication

To souls of my father and mother,

to my wife and my sons Maryam, Sama & Malek

for their constant support and unconditional love.

I love you all dearly.

Acknowledgment

Foremost, all thanks to the most merciful ALLAH who gave me all the graces to accomplish this work then I would like to express my sincere gratitude to my supervisor Prof. ***Kawkab Abd El-Aziz Ahmed*** *for the continuous support of my Ph.D. study and related research, for her patience, motivation, and immense knowledge. Her guidance helped me in all the time of research and writing of this thesis. I could not have imagined having a better advisor and mentor for my Ph.D. study.*

Besides my advisor, I would like to thank the rest of my thesis supervisors: Dr. ***Reda Mohammed Sayed*** *for her insightful comments, assistance and encouragement, but also for the hard question which incented me to widen my research from various perspectives. And Dr.* ***Hanaa Ali El Halawany*** *for her guidance, assistance and sharing of information and researches, her continuous encouragement was always incentive for me. Their role in my thesis cannot be forgotten.*

My sincere thanks also go to the Department of Pathology at the veterinary faculty and My Department of Reproductive Pathology at my institute which gave access to the laboratory and research facilities. Without their precious support it would not be possible to conduct this research.

I am grateful to Department of Immunity at my institute for their help and assistance.

Last but not least, I would like to express my deepest gratitude to my family. This dissertation would not have been possible without their warm love, continued patience, and endless support.

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