



شبكة المعلومات الجامعية
التوثيق الإلكتروني والميكروفيلم

بسم الله الرحمن الرحيم



HANAA ALY



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شبكة المعلومات الجامعية التوثيق الإلكتروني والميكروفيلم



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**ASSESSMENT OF POTENTIAL GENOTOXIC EFFECTS OF SOME
COMMONLY USED FLAVORS THROUGH GENETIC AND
MOLECULAR SHORT-TERM ASSAYS**

By

MOHAMED RAAFAT ABU-ELMAATI SALAMA

B.Sc. Agric. Sci. (T.M.A.P.E.S), Ain Shams University, 2014

A Thesis Submitted in Partial Fulfillment

Of

The Requirement for the Degree of

MASTER OF PHILOSOPHY

in

Agricultural Sciences

(Genetics)

Department of Genetics

Faculty of Agriculture

Ain Shams University

2021

Approval Sheet

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ABSTRACT

This study was carried out at the Molecular and Cytogenetic Genetics Laboratories of the Department of Genetics, Faculty of Agriculture, Ain Shams University, Egypt, and The National Research Center, Giza, Egypt, during the period from 2016 to 2021.

Since the mid-1950s, the volatile structure of butter oil and butter were researched, and an exhaustive list of elements has been collected. Diacetyl is an aromatic popular synthetic fragrance that gives food a buttery taste used in ice cream, snacks and potting with butter, strawberry, caramel, or cheese flavor. The chromosomal aberrations and micronuclei are commonly used biomarkers of chromosomal damage, genome stability, and cancer risk assessment. In vivo trials are still important to assess the genetic toxicology of chemical products such as industrial chemicals, pharmaceuticals, and food additives. This study aimed at assessing the potential genotoxic effect of diacetyl and butter flavors on swiss albino mice using alterations in liver function enzymes, micronucleus (MN), and chromosomal aberrations (CA) assays. The results showed that exposure of swiss albino mice males to diacetyl and butter flavors induced (CA) and (MN) in a statistically highly significant manner compared to the control. Meanwhile, the biochemical analysis revealed that these substances caused an exceptional rise in liver function enzymes (AST, ALT, and ALP) activity in serum of treated experimental animals. The effect of these flavors on cell viability of the normal human liver cell line THLE2 was tested using MTT assay. were carried out. The real-time-PCR and western blotting techniques were used to measure the mRNA levels of p53, Bcl 2, Caspase 3, and RIP1, genes that play key roles in the cell cycle, apoptosis, and necrosis, and their protein expression levels in the liver of diacetyl and butter flavors-treated male mice. The diacetyl and butter flavors treatment resulted in the up-regulation of p53, Caspase 3, and RIP1 and the down regulation of Bcl-2 as well as their protein products suggesting the activation of apoptotic and necrotic pathways. Finally, comet assay showed significant DNA damage in liver cells of diacetyl and butter flavors-treated mice indicating its potential genotoxic effect. In

conclusion, both tested compounds have increased the chromosomal aberration, micronucleus test, and serum levels of liver function enzymes and occurred DNA damage in liver cells and both tested compounds have decreased the cell line viability and apoptotic and necrosis events indicating their high potential of being cytotoxic and genotoxic materials.

Keywords: Diacetyl; Butter flavors; micronuclei; chromosomal aberrations; liver function enzymes, comet assay, THLE2, western blots, real time-PCR.

ACKNOWLEDGEMENT

First and above all, I praise Allah, the almighty for providing me this opportunity and granting me the capability to successfully proceed with this thesis to appears in its current form.

I would like to express my deep gratitude and sincere appreciation to the soul of **Prof. Dr. Abdel-Fattah A. Awad**, Prof. of Genetics, Faculty of Agriculture, Ain Shams University for continuous supervision, kind encouragement, precious advice during the progress of thesis work.

I would like to express my sincere gratitude to my supervisor **Prof. Dr. Khalid Ibn-Elwaled Fahmy** Prof. of Genetics, Faculty of Agriculture, Ain Shams University for the continuous support of my M.Sc. study and research, for suggesting the problem, his patience, motivation, and immense knowledge. His guidance helped me in all the time of research and his help in writing and reviewing this thesis. Words are not enough to express how grateful I am to him.

I am grateful to my supervisor warmly **Prof. Dr. Naglaa Mohammed Ebeed** Prof. of Genetics, Faculty of Agriculture, Ain Shams University, whose encouragement and supervision, and support from the initial to the final levels enabled me to develop an understanding of the introduction and gave me moral support needed to complete the thesis.

The author is greatly indebted to **Dr. Neima Koutb Al-Senasy**, Faculty of Agriculture, Ain Shams University for suggesting the problem, sincere support, effective, valuable help, encouragement, and her help in preparing the manuscript.

Sincere thanks and appreciation to **prof. Dr. Amr Farouk**, Prof. of the National Research Center for his excellent advice, gave me the needed support to complete the thesis.

I also want to express my deepest gratitude to **Dr. Wesam Basal**. Lecturer of Zoology Department, Faculty of Science, Cairo Univ. for his excellent guidance, caring, patience.

Thanks, to **Dr. Mona Abd El Gawad**, Prof. of National Gene Bank for her excellent advice, who gave me the support needed to complete this work.

I am particularly grateful for the assistance is given to **Dr. Marwa Mahmoud El-Attar** who without their persistent help this thesis, would not have been possibly finished.

Thanks, should be extended to Genetics Department members, especially for her excellent advice, who gave me the support needed to complete the thesis.

Great thanks and sincere gratitude to the soul of my father for his support for me in all the fields in life, my mother for her continuous encouragement and praying for me, brother, sisters, and my friends **Hadeer Yousry Mohammed, Shaima Ahmed Shebl, and Shams Ahmed Hussein** for their encouragement and continuous support.

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