شبكة المعلومات الجامعية

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بسم الله الرحمن الرحيم

HANAA ALY

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HANAA ALY

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

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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**.**

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CONTENTS

LIST OF TABLES

No. **Page**