



*Ain Shams University
Faculty of Women for
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Zoology Department*

**Protective Role of Lycopene and Grape seed extract
against Formaldehyde –induced Pulmonary Damage in
Rats.**

Athesis

**Submitted in partial fulfillment of the requirements for the
degree of M.Sc. of Science in Zoology**

By

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قَالُوا سُبْحَانَكَ لَا عِلْمَ لَنَا إِلَّا مَا عَلَّمْتَنَا إِنَّكَ أَنْتَ

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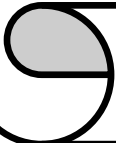


Dedication

*This thesis is dedicated to My husband
who have supported me all the way since
the beginning of my studies.*

*Also, this thesis is dedicated to my
parents who taught me that even the
largest task can be accomplished if it is
done one step at a time.*

*Finally, this thesis is dedicated to all
those who believe in the richness of
learning.*



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الدور الواقى لللا يكوبين ومستخلص بذور الغنب ضدالتدهور الرئوى المستحث بفعل الفورمالدهيد فى الجرذان

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شَكَرْتُكَ يَا رَبِّ

الحمد لله الذى هدانا لهذا وما كنا لنهتدى لولا أن هدانا الله

أتقدم بخالص الشكر والتقدير الى أساتذتى الذين قاموا بالإشراف على هذه الرسالة وهم :

أ.د / **سميحه محمد عبد الدايم** أستاذ علم وظائف الأعضاء – قسم علم الحيوان – كلية البنات للآداب والعلوم والتربية – جامعه عين شمس .

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كما أتقدم بخالص الشكر لزميلاتي وجميع العاملين بقسم الهرمونات – شعبة البحوث الطبية – المركز القومى للبحوث على معاونتهم ومساعدتهم لى طوال فترة البحث .

وأخيرا وليس بآخر أتقدم بكل الحب والعرفان لزوجى وأسرتى التى لطالما احاطتنى بالرعايه والحب والتشجيع .

ABSTRACT

Objective: The present study was constructed to investigate the protective role of lycopene (lyco.), grape seed extract (GES) either individually or in combination in ameliorating the oxidative damage, inflammatory and apoptotic insults on lung tissue induced by FA inhalation in experimental rat model. **Design:** This study was conducted on 90 adult albino rats divided into 9 groups : Gr. (1): healthy animals served as negative control group, Gr. (2): animals were exposed to 10 ppm FA (FA 10 ppm), Gr. (3): animal were exposed to 20 ppm FA (FA 20 ppm), Gr. (4): animals were orally administered with lycopene prior exposure to 10 ppm FA (FA 10 ppm + lyco.), Gr. (5): animals were orally administered with lycopene prior exposure to 20 ppm FA (FA 20 ppm + lyco.). Gr. (6): animals were orally administered with GSE prior exposure to 10 ppm FA (FA 10 ppm + GSE), Gr. (7): animals were orally administered with GSE prior exposure to 20 ppm FA (FA 20 ppm + GSE). Gr. (8): rats were orally administered with lycopene and GSE prior exposure to 10 ppm FA. Gr. (9): animals were orally administered with lycopene and GSE prior exposure to 20 ppm FA. At the end of experimental period, both blood and lung tissue samples were obtained for chemical analyses and histopathological investigation. Pro-oxidant markers: nitric oxide (NO), hydrogen peroxide (H₂O₂) and malondialdehyde (MDA), antioxidant enzymes: Superoxide dismutase (SOD), catalase (CAT) and glutathione peroxidase (GSH-PX), apoptotic markers: B cell lymphoma 2 (Bcl-2) and P⁵³ and protein were measured in rat lung homogenate. Serum inflammatory markers: Interleukin-6 (IL-6), IL-8 and IL-10 were determined. Additionally, Histopathological investigation of the lung tissue was carried out. **Results:** The present results demonstrated that inhalation of formaldehyde either 10 ppm or 20 ppm cause elevation of lung pro-oxidant markers (NO, H₂O₂ and MDA), pro-inflammatory (IL-6 and IL-8) and pro-apoptotic markers (p⁵³) levels. However, these induced depletion of lung antioxidant enzymes (SOD, CAT and GSH-PX), anti-inflammatory marker (IL-10) and anti-apoptotic marker (BCL-2) relative to the corresponding control value. Histopathological investigation of lung tissue of rats in groups challenged to formaldehyde 10 ppm and 20 ppm were also observed. On the other hand, the pre-treatment with lyco, GSE or a combined dose of lyco and GSE of exposed rats showed significant modulation in lung oxidant / antioxidant homeostasis in addition to marked suppression in inflammatory and apoptotic mediators. These results

were well documented by the histopathological finding of lung tissues of rats in the treated groups. **Conclusion:** The present study provided a clear evidence for the Protective role of the lycopene, grape seed extract or their combination in the regression of formaldehyde toxicity. This effect was achieved through the antioxidant, anti-inflammatory and anti-apoptotic effects of the selected treatment play a key role in their therapeutic potential.

Keywords: Rats, Formaldehyde, Lycopene, Grape seed extract, Oxidative stress, Inflammation, Apoptosis.

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