



شبكة المعلومات الجامعية
التوثيق الإلكتروني والميكروفيلم

بسم الله الرحمن الرحيم



MONA MAGHRABY



شبكة المعلومات الجامعية
التوثيق الإلكتروني والميكروفيلم



شبكة المعلومات الجامعية التوثيق الإلكتروني والميكروفيلم



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التوثيق الإلكتروني والميكروفيلم

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

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MONA MAGHRABY



Evaluation of the immunomodulatory effect of exopolysaccharides isolated from Lactic acid bacteria against hepatocarcinogenesis in rats

A Thesis
Submitted to Faculty of Science, Ain Shams University
In Fulfillment of Ph.D degree of Science in Biochemistry

By

Ola Mohamed Sayed Khedr
M.Sc. in Biochemistry and Chemistry (2017)

**Faculty of Science
Ain Shams University**

2021



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2021**

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

وَمَا تَوْفِيقِي إِلَّا بِاللَّهِ عَلَيْهِ
تَوَكَّلْتُ وَإِلَيْهِ أُنِيبُ



Approval Sheet

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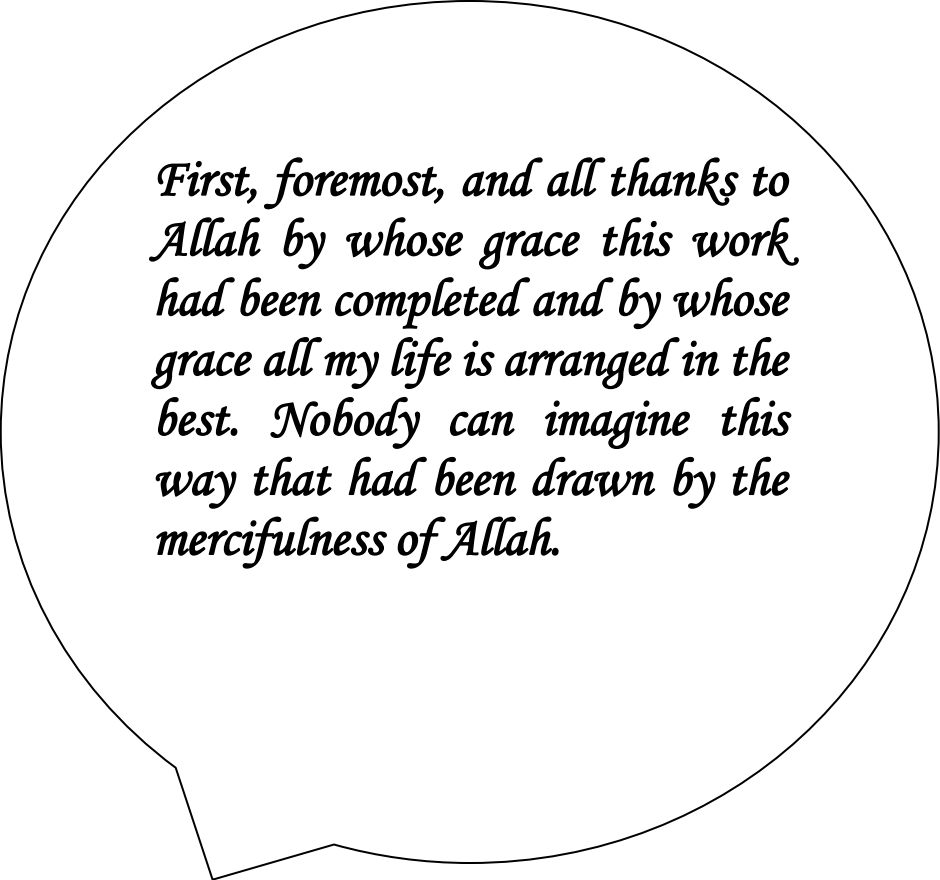
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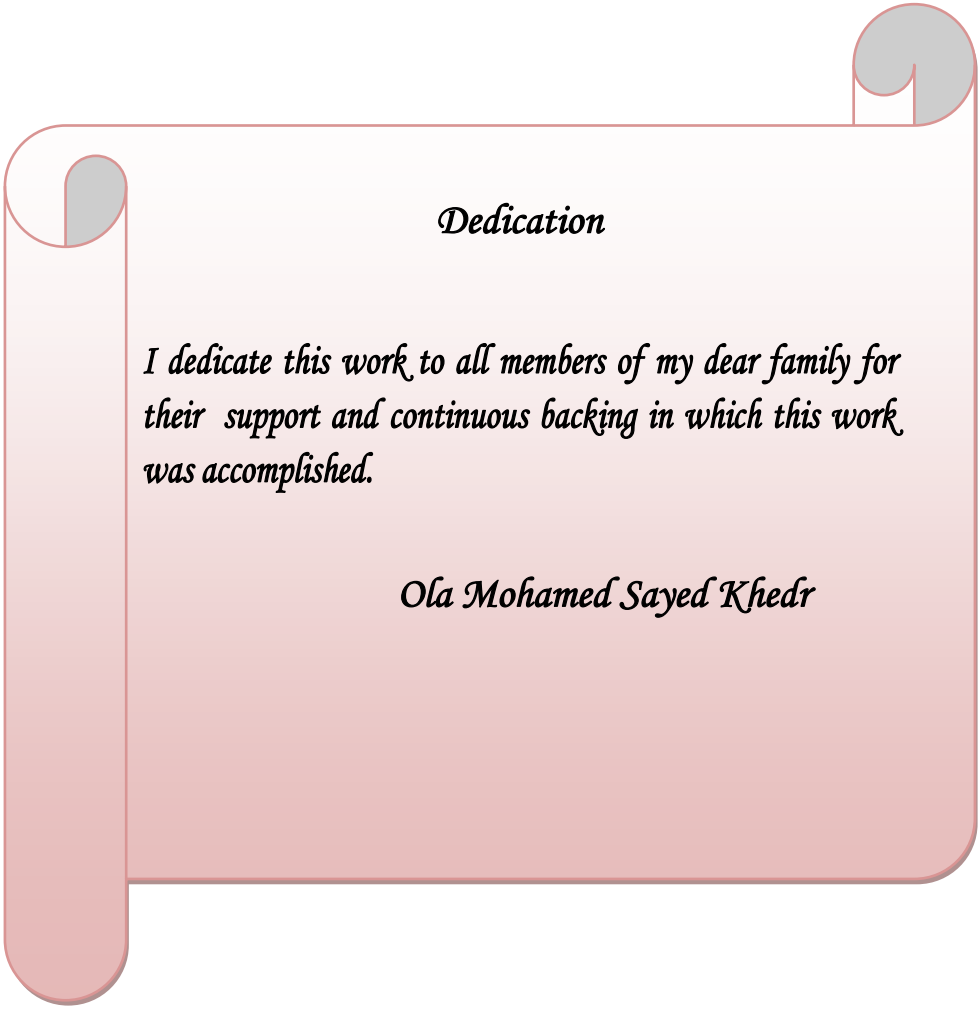


First, foremost, and all thanks to Allah by whose grace this work had been completed and by whose grace all my life is arranged in the best. Nobody can imagine this way that had been drawn by the mercifulness of Allah.

Declaration

I declare that this thesis has been composed by me and it has not been submitted for a degree at this or any other university.

Ola Mohamed Sayed Khedr



Dedication

I dedicate this work to all members of my dear family for their support and continuous backing in which this work was accomplished.

Ola Mohamed Sayed Khedr



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ABSTRACT

Probiotics have been suggested as safe and cost-effective approach to prevent or treat HCC. Some of the exopolysaccharides (EPSs) produced by lactic acid bacteria confer health benefits such as immunomodulatory, antitumor, antibio film and antioxidant activities. The present study was therefore aimed to investigate the immunomodulatory effect of *Lactobacillus acidophilus* ATCC 4356 EPSs against diethyl nitrosamine (DEN) induced HCC in male rats' model. The bacterial exopolysaccharides were extracted, purified and identified. Extracted EPSs were characterized by using Fourier transforms infrared spectroscopy (FTIR) which showed different stretches of bonds at different peaks. Hepatocellular carcinoma was induced by daily oral administration DEN (20 mg/kg b.w.) for eight constitutive weeks. EPSs were orally administered daily (100 mg /kg b.w.) for eight constitutive weeks. The results revealed that, DEN induced a significant increase in serum ALT and γ -GT activities as well as MDA, IL-17, TGF- β 1, signal transducer and activator of transcription-3 protein (STAT3), mitogen activated protein kinase p38 (p38MAPK) levels in the liver tissue. The gene expression of liver toll like receptor 2 (TLR-2) gene was also increased. While, there was a significant decrease in reduced glutathione, IL-10 contents in the liver tissue and serum total proteins level compared to normal control. However, prevention and treatment with EPSs ameliorated most of the investigated parameters. The histopathological observations of liver tissues were in agreement with restored biochemical results, revealed that liver tissues with DEN treatment showed significant inflammatory cells infiltration in portal area, while the liver tissues which exposed to EPSs preventive and treatment groups showed significant improvement upon hepatocytes. In conclusion, it can be concluded that *Lactobacillus acidophilus* ATCC 4356 EPSs are efficacious control against HCC throughout the modulation of key signaling growth factors associated with inflammation via antioxidant mediated antiinflammatory and immunomodulatory activities. Prevention effect of EPSs gave best results than treatment effect of EPSs on HCC.