

عنوان المشروع باللغة العربية

- Title of the proposed project in Arabic

دراسة الفعالية المضادة للأكسدة والبكتيريا ونمو الخلايا السرطانية في مستخلص أوراق نبات التفاح السكري

Title of the proposed project in English

Antioxidant, Antibacterial, and Antiproliferative Activities of Sugar Apple (*Annona Squamosa* L.) Leaf Extracts

المشرف الرئيس - PI

ا. د. عبدالرحمن بن محمد السنيدي

التخصص الدقيق للمشرف

Specialty of PI - الرئيس

كيمياء البروتين ومضادات الأكسدة

المشرف المساعد - Co-PI

د. عبيد الغنوشي

المدة المتوقعة لإنجاز البحث

منذ الحصول على موافقة

عمادة الدراسات العليا

Expected time in month to finish - ((بالشهور

finish

ثمانية أشهر

Abstract of the proposal (No more than 200 words)

Cancer is the second leading cause of death all over the world. According to World health organization, more than 10 million new cases of cancer are diagnosed every year, and the statistical trends indicate that this number would double by 2020. The plant derived compounds have always been an important source of medicines for various diseases, and have received considerable attention in recent years due to their diverse pharmacological properties including cytotoxic and cancer chemopreventive effects. Most of the current anti-cancer drugs derived from plant sources, act through different pathways converging ultimately into activation of apoptosis in cancer cells leading to cell cytotoxicity. Plant-derived polyphenols receive considerable attention because of their potential antioxidant, antimicrobial and cytotoxic properties against different cancer cell lines. Keeping above in view, the present study aimed to investigate anti-proliferative and antioxidant status of the *Annona Squamosa* L. leaves extract on the breast cancer, MCF-7 cell line in vitro.

Free radicals or reactive oxygen species (ROS) are produced in vivo from various biochemical reactions and also from the respiratory chain as a result of occasional leakage. Free radicals have been implicated in the causation of several

diseases such as atherosclerosis, cancer, diabetes, etc. and compounds that can scavenge free radicals have great potential in ameliorating these disease processes. Antioxidants thus play an important role to protect the human body against damage by reactive oxygen species. Plants containing polyphenols have been reported to possess strong antioxidant properties. *Annona Squamosa* L., is a small group of edible fruits of genus *Annona* and family Annonaceae, commonly known as sugar apple or custard apple. Different parts of *A. squamosa* such as bark, root, seed, fruits, flowers and leaves are therapeutically helpful. The leaves of *Annona squamosa* are commonly used as spice and medicinal herb. The pharmacological effects of rosemary are the consequence of high antioxidant activity of its main chemical constituents, which include phenolic compounds, flavonoids and acetogenins. Breast cancer is the third most common cause of cancer deaths worldwide and is the most common form of cancer in women. The current treatment strategies involve chemotherapy, radiation therapy, hormones and surgery. Recently, the focus on finding chemotherapeutic agents have shifted towards natural products. Various plants and their bioactive compounds have been shown to have anti-carcinogenic and anti-proliferative effects towards breast cancer cells. To the best of our knowledge, the potential antibacterial, antioxidant and anti-proliferative of *Annona squamosa* leaves extracts has not been previously tested in vitro.

Hypothesis of the proposal

Specific objectives

The objectives of the present investigation is to evaluate the antioxidant, anti-proliferative and antibacterial potential and the activity of antioxidant enzymes, in addition to quantifying the polyphenols in the extracts, which might be responsible for biological activity.

Methodology & Major Techniques to be used

Dried *Annona squamosa* leaves, obtained from the local market will be ground in a domestic mixer. The plant powder will be extracted in methanol and evaporated using the rotary evaporator. The phenolic content of the extracts will be determined by the Folin-Ciocalteu assay method. Antioxidant activity will be determined by DPPH radical scavenging activity. Isolates of bacteria species which include Gram-positive and Gram-negative strains will be used to assay for antibacterial. MCF-7 human breast cancer cells were utilized for the anti-proliferation study. Cell viability will be tested using MTT assay. Antioxidant enzyme activities will be determined for catalase and superoxide dismutase.

Availability of Samples

Yes

Availability of Chemicals	Yes
Availability of Instruments	Yes
Ethical Approval	Not needed

Recent References

1. Lee CK, Kin H, Moon KH, Shun KH: Screening and isolation of antibiotic resistance inhibitors from herb materials resistance inhibition of volatile components of Korean aromatic herbs. *Arch Pharmacol Res* 1998, 21:62-66.
2. EL-CHAGHABY, G. A., AHMAD, A. F. & RAMIS, E. S. 2014. Evaluation of the antioxidant and antibacterial properties of various solvents extracts of *Annona squamosa* L. leaves. *Arabian Journal of Chemistry*, 7, 227-233.
3. GHALI, W., VAUDRY, D., JOUENNE, T. & MARZOUKI, M. 2014. Extracts from medicinal plants inhibit cancer cell proliferation, induce apoptosis in ovary, lung and neuronal cancer cell lines. *cancer metab*, 2, 21.
4. Cos P, Vlietinck AJ, Berghe DV, Maes L: Anti-infective potential of natural products: How to develop a stronger in vitro 'proof-of-concept. *J Ethnopharmacol* 2006, 106:290-302.
5. Monroe S, Polk R: Antimicrobial use and bacterial resistanc. *Curr Opin Microbiol* 2000, 3:496-501.
6. Yang J, Paulino R, Janke-Stedronsky S, Abawi F: Free radical scavenging activity and total phenols of noni (*Morinda citrifolia* L.) juice and powder in processing and storage. *Food Chem* 2007, 102:302-308.
7. Barreira JCM, Ferreira ICFR, Oliveira MBPP, Pereira JA: Antioxidant activities of the extracts from chestnut flower, leaf, skins and fruit. *Food Chem* 2008, 107:1106-1113.
8. Glorieux C, Dejeans N, Sid B, Beck R, Calderon PB, Verrax J: Catalase overexpression in mammary cancer cells leads to a less aggressive phenotype and an altered response to chemotherapy. *Biochem Pharmacol* 2011, 82:1384–1390.
9. Rathee JS, Patro BS, Mula S, Gamre S, Chattopadhyay S: Antioxidant Activity of Piper betel Leaf Extract and Its Constituents. *J Agric Food Chem* 2006, 54:9046– 9054.
10. Siddhuraju P, Becker K: The antioxidant and free radical scavenging activities of processed cowpea (*Vigna unguiculata* (L.) Walp.) seed extracts. *Food Chem* 2007, 101:10–19.
12. Gilani AH, Atta Ur R: Trends in ethnopharmacology. *J Ethnopharmacol* 2005, 100:43–49.
13. Li WY, Chan SW, Guo DJ, Yu PHF: Correlation Between Antioxidative Power and Anticancer Activity in Herbs from Traditional Chinese Medicine Formulae with Anticancer Therapeutic Effect. *Pharm Biol* 2007, 45:541–546.