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Lebanese *Anacyclus nigellifolus* Boiss: Chemical composition and Biological Properties

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Rational Healthy Food & Herbal Contributing to Sustainable Development Goals Conference

Nowadays, attention is being focused on the investigation of the efficacy of plant in the traditional medicine.

In recent years, consumers have become more concerned about the processed food they eat mainly after the usage of **Synthetic preservatives** that may lead to negative health consequences.

Besides, the use of synthetic compounds has significant drawbacks, such as increasing cost, handling hazards, concerns about residues on food, and threat to human environment.

Therefore, there has been increasing interest to replace synthetic preservatives with **natural, effective, and non-toxic compounds** (extracts and essential oils).

The World Health Organization (WHO) estimates that 80 % of the populations of some Asian and African countries presently use herbal medicine for some aspect of primary health care.

At least 7000 medical compounds in the modern pharmacopoeia are derived from plants.

The study of medicinal plants aimed to:

1. Provide the pharmaceutical industry from natural product as precursors for preparing drugs.
2. Produce the medicine containing the **active ingredients** and which will be available **at low price**.
3. Ensure the **safety of human body's** using plants extracts due to the absence of most of side effects of organic drugs.
4. Evaluate the content of medicinal plants in active materials.
5. Find and search for the best methods of extraction of active substances.

Lebanon is distinguished by a great wealth of plant species especially with medicinal properties.

In fact, 2607 wild species of which 92 are endemics can be found in only 10452 km^2.

Anacyclus nigellifolius Boiss belongs to the Asteraceae family. It was used in the treatment of neuralgic and rheumatic affection of the head, face and teeth.

Family: *Asteraceae or Compositae*

Genus: *Anacyclus*

Arabic name: قنيطسه

English name: Nigella –leaved anacylus

Objectives

- Extract and Purify some active ingredients from the dried leaves of ***Anacyclus nigellifolius*** grown in Lebanon.
- Investigate the *in vitro* antioxidant activity of these ingredients using the DPPH assay.
- Evaluate the antiproliferative activity on different cancer cell lines using the MTT assay.
- Determine the antibacterial activity on different bacterial strains.
- Estimate the antibiofilm activity on *E.coli* biofilm.

RESULTS

The TPC estimated using the gallic acid standard curve is 42 mg/g of dry powder.

The TFC estimated using the Rutin standard curve is 18 mg/g of dry powder.

Results

Phytochemical screening of *A. nigllifolius*

Active compound	Result
Polyphenol	+++
Flavonoid	+++
Saponin	++
Alkaloid	++
Tannin	+
Terpenoid	++
Glycoside	++

Results

Percentage of active contents

Total saponin	5.1 ± 0.015
Total alkaloid	3.6 ± 0.006
Total ash	6.5 ± 0.017
Total lipids	7.5 ± 0.011
Total proteins	1.23 ± 0.016
Total tannins	2.66 ± 0.07
Humidity	70.61 ± 0.018

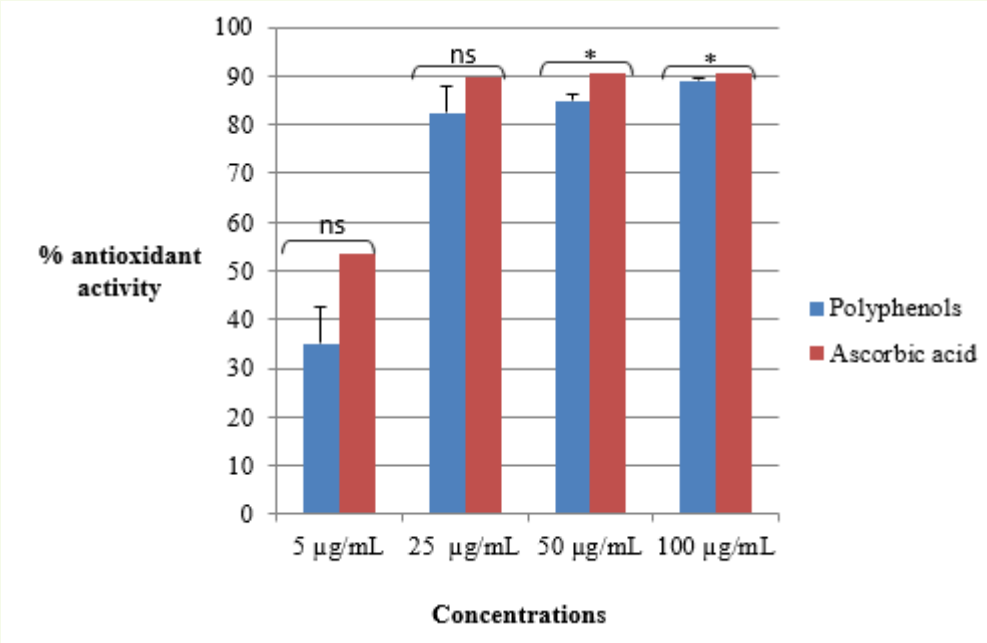
Results

The heavy metals found in *A. nigllifolius* (µg /g dry weight) using the Atomic Absorption technique

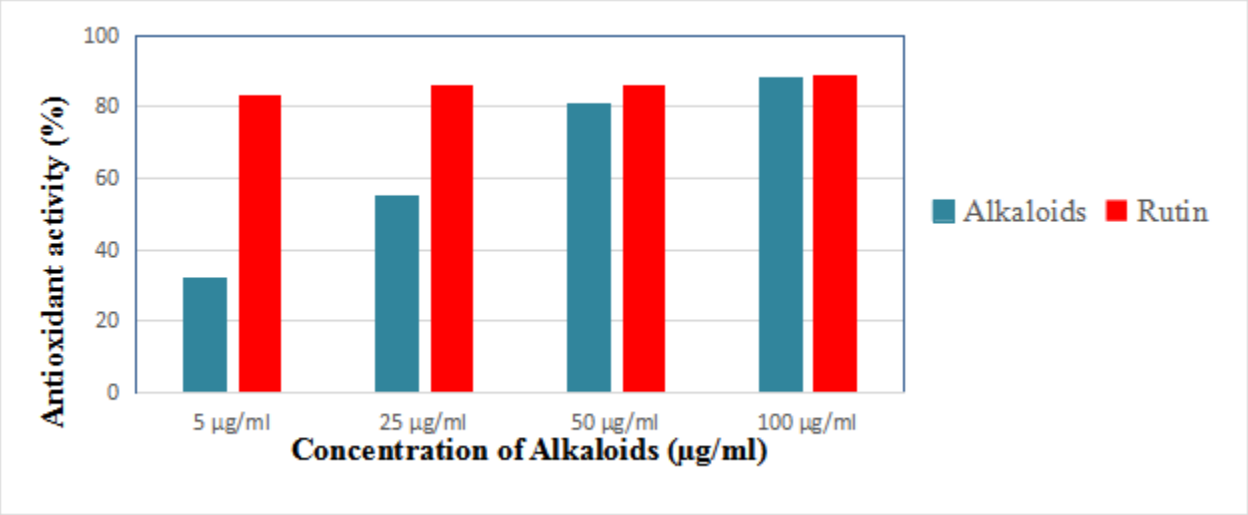
Fe	4 ± 0.0003
Mn	34 ± 0.0002
Zn	20 ± 0.0002
Cu	5.3 ± 0.0001

RESULTS (Antioxidant activity of Polyphenols)

The IC50 was 16 µg/mL



RESULTS (Antioxidant activity of Alkaloids)



The IC50 for alkaloids was 22 µg/mL

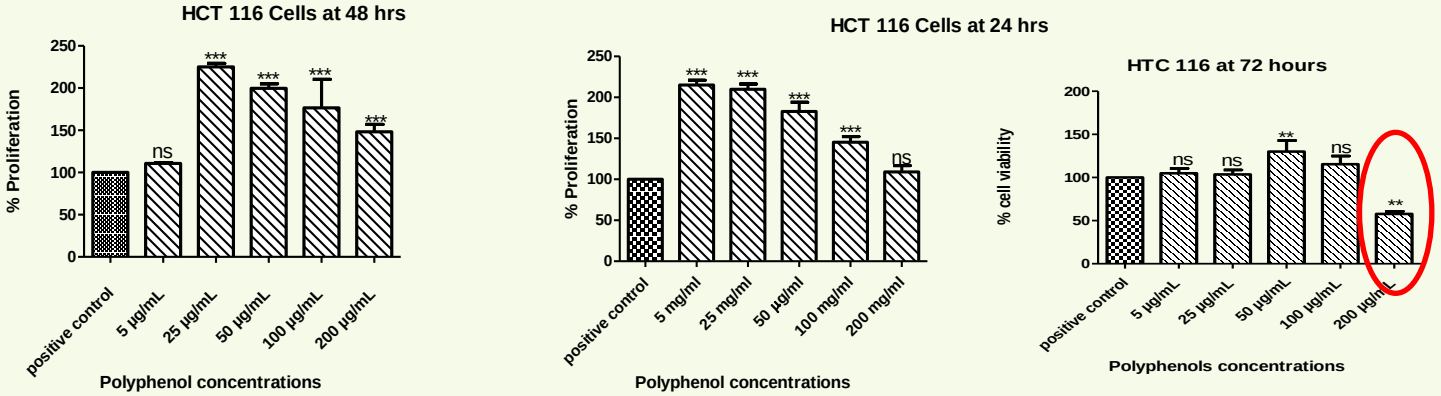
RESULTS

Antibacterial activity

Plant extract	MIC (mg/mL)		MBC (mg/mL)	
	S. epidermidis	***E. coli***	***S. epidermidis***	***E. coli***
Polyphenols	1.125	1.125	2.25	2.25
Alkaloids	1.75	1.75	> 3.5	> 3.5

RESULTS

Antiproliferative Activity of Polyphenols

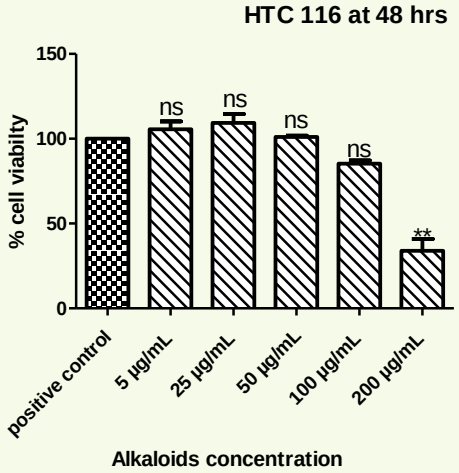


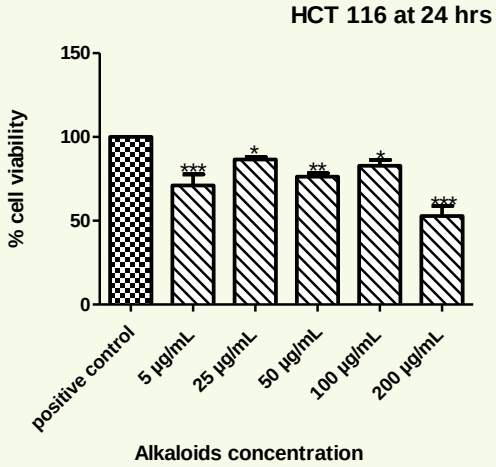
No antiproliferative activity was observed on HCT-116 cell lines after 24 & 48 hours of treatment.

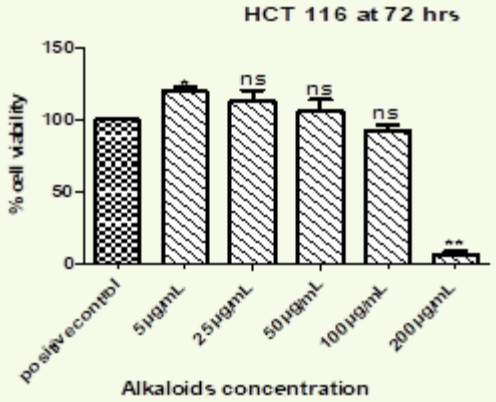
However, 42% of tumor cells died at 200 µg/ml after 72 hours.

RESULTS

Antiproliferative Activity of Alkaloids



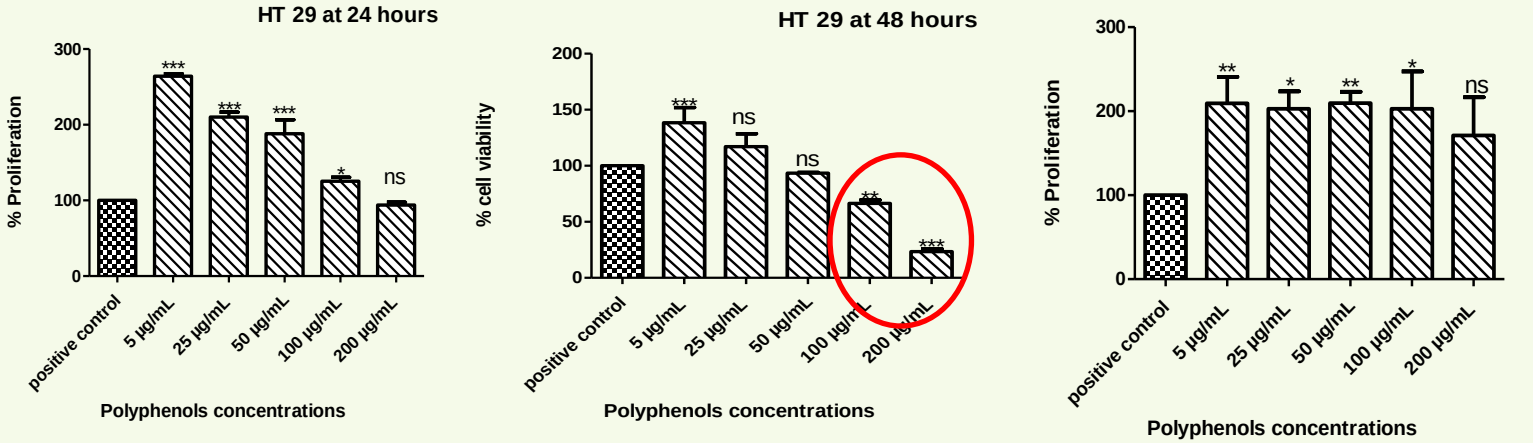




After 24 hours, the % inhibition increased to **47.3%** at 200 µg/mL.
After 48 hours, the inhibition was **65.97%** at 200 µg/mL.
After 72 hours, it was recorded that the effect increased with the increased dose from 7.7% to **93.74%** at doses 100µg/mL and 200µg/mL respectively.

RESULTS

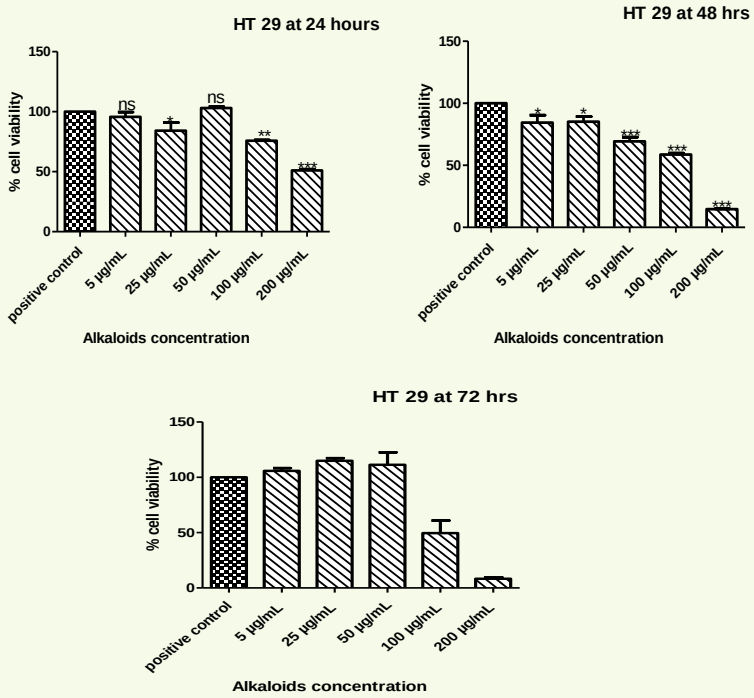
Antiproliferative Activity of Polyphenols



After 48 hours there was an increase in the cytotoxicity for all concentrations except for 5 & 25µg/mL that showed proliferation of HCT 116 cells.

RESULTS

Antiproliferative Activity of Alkaloids



After 24 hours there was high inhibitory effect (48.957%) at the highest dose (200µg/mL). However, this % decreased with the decrease of the used dose to be 24.16 at 100 µg/mL before to be totally absent at 50µg/mL

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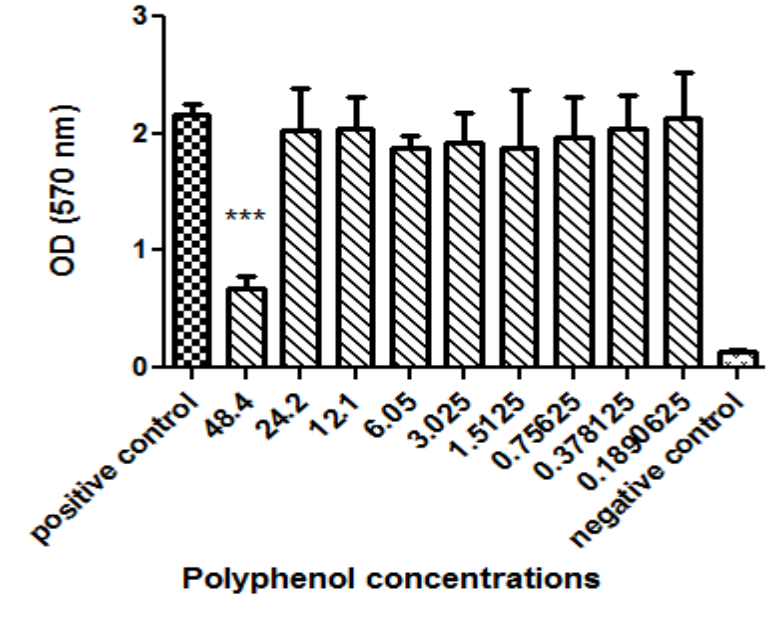
After 48 hours, the % inhibition was also the best at 200µg/mL (**85.34%**). Then it was decreased to 38.67% and 30.62% at 100 and 50 µg/mL respectively. It reaches 14.81% at dose 25 µg/mL. Then it increases slightly to reach 15.47% at 5 µg/mL.

After 72 hours, the inhibitory effect was the highest (**96**%) at 200µg/mL. Lower inhibitory effect (56%) is observed at 100µg/mL.

RESULTS

Antibiofilm activity of Polyphenols



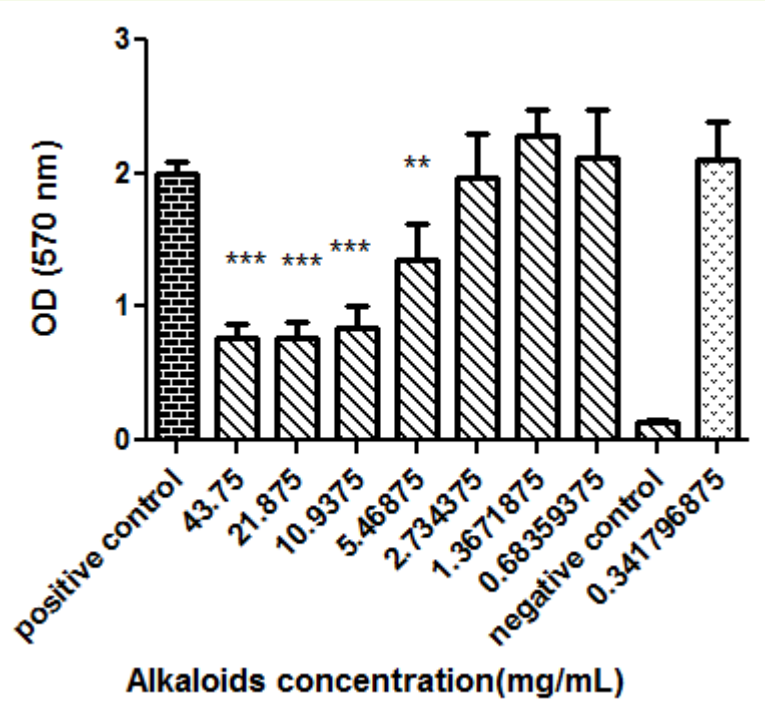
A. nigellifolius extracts variously modified biofilm formation of *E. coli*.

A significant ($p < 0.01$) decrease in biofilm formation was observed when *E. coli* grown in the presence of the polyphenols.

Polyphenols exhibit 74.3% of biofilm prevention with MPBC equal to 48.4 mg/mL.

RESULTS

Antibiofilm activity of Alkaloids



A significant ($p < 0.01$) decrease in biofilm formation was observed when *E.coli* grown in the presence of the extracted alkaloids.

Alkaloid extract prevented 74.4%, 63%, 34 %, and 20% at concentrations 43.7 mg/mL, 21.8 mg/mL, 10.9 mg/mL, and 5.4 mg/mL respectively with a MBPC value of 43.7 mg/mL.

CONCLUSION

The data showed that polyphenols and their biologically active compounds might be potential sources of new antioxidants.

Also, our obtained results demonstrated that *A. nigellifolius* has an antiproliferative effect on the viability of HCT-116 and HT-29 cells as well as antibacterial activities on planktonic and biofilm living *E. coli* and *S. epidermedis.*

Thank You