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Anti-tumor response of some natural products

Ashwag Ahmed Abdel rahman Mohamed Nour *

Department of Biotechnology, Faculty of Agriculture (Abu-Naama) University of Sinnar. Sudan.

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Abstract

The role of natural products as asource for remedies has been recognized since ancient times. Many pharmaceutical agents have been discovered by screening natural products. This study will briefly summarize research on the study of antitumor effects of some plant natural products (Bee honey, Cumin extract, a combination of both at a rate of 1:1, Ginger extracts and Tepary beans Lectin). The crudes extract obtained by cold extraction were evaluated for antibacterial by using disc diffusion method and antitumor activity by using *Agrobacterium tumefaciens*strain SDB0012 (local isolate) as biological tool for potato disk bioassay technique. Results of Inhibition zone as antibacterial indicted that honey, cumin, their mixture, ginger extracts and lectin of Tepary bean have no anti-bacterial effects against the indigenous strain *A.tumefaceins* SDB0012. The Indigenous Strain of *A.tumefaceins* SDB0012facilitated use of the potato disc bioassay technique to study antitumor activity of tested natural products (bee honey, cumin extract, a combination of both at a rate of 1:1, Ginger extracts and Tepary bean Lectin). Screening for antitumor activity resulted in 40% 55% and 100% inhibition from the total surface of the potato disc due to application of honey, cumin oil and the mixture, respectively. lectin(Dark red kidney bean hemagglutinin) also have antitumor activity. While Ginger methanol extract have largest result as antitumor 95% compare with author extracts of ginger.

Keyword: Anti-tumor; Potato disk; Honey; Cumin oil; Ginger; Lectin

1. Introduction

Natural products being synonymous with secondary metabolite, and considerable structural diversity and these organic substances are of relatively small molecular weight (<3,000) . Such compounds tend to be in the correct chiral form to exhibit biological activity, and it has been postulated that, this facilitates species survival by repelling or attracting other organisms [1].

For over 40 years, natural products have played a very important role as established cancer chemotherapeutic agents, either crude or synthetically modified forms [2]. In turn, members of four classes of plant-derived compounds are used widely as antitumor agents, namely, the bisindole (vinca) alkaloids, the epipodophyllotoxins, the camptothecins, and the taxanes [2].

A total of 155 anti-cancer agents approved for use in Western medicine and Japan since the 1940s, 47% were classified as either natural products (14%), semi-.synthetic derivatives of natural products (28%), or otherwise derived from natural products (5%) [3].The clinically used anticancer agents of natural origin, as well as those compounds of this type in advanced clinical trial, are known to exhibit considerable structural diversity [2]. In addition, there are several examples of promising natural product-derived anti-neoplastic agents currently in advanced clinical development or recently approved, not only from microbes and plants, but also of marine origin [4]. Among the largest groups of taxonomically identified classes of organisms that may be studied as sources of new anticancer drugs are arthropods, higher plants, and marine invertebrates. In addition, natural product researchers have examined other taxonomic

*Corresponding author: Ashwag ahmed abdelrahman mohamednour

classes of organisms found all over the world, including algae, bacteria, fungi, and even terrestrial vertebrates. However, it must be pointed out that natural product drug discovery for anticancer agents requires special procedures involved with sample collection, inclusive of the development of "benefit-sharing" agreements with source countries, whether the samples are of marine or terrestrial origin [5]. Recent developments in anti-cancer technology allow isolation chemists working in a natural product laboratory to isolate only a few milligrams of a promising lead compound of novel structure [6],the application of which may also yield valuable information on mechanism of action [7].

1.1. Use of the biological assays to evaluate botanicals

Bioassays offer a special advantage in the standardization and quality control of heterogeneous botanical products. Such products can be "heterogeneous" due to presence of mixtures of bioactive components either from the same or from purposefully mixed botanical sources. The potato disc bioassay technique was developed as to aid drug discovery work with botanicals. This method was used over the past 15 years, and was apparently adaptable to the purpose of standardization or quality control for bioactive components in such heterogonous botanicals [8].Crown gall is a neoplastic disease of plants induced by specific strains of the gram negative bacterium, the *A. tumefaciens*. The bacteria contain a large Ti (tumour – inducing) plasmid which carries genetic information (T-DNA) that transforms plant cells into tumorous cells. The inhibition of crown gall tumours on disc of potato (*Solanum tuberosum* L.) tubers showed an apparent correlation with compounds and plant extracts known to be active (in vivo, murine leukaemia) anti tumour assay [9]. The indigenous strain of *A. tumefaciens* SDB0012 was effectively used to be applied on potato discs treated with plant extracts and natural products to assess their anti-tumour activity [10].

Objective

This review will briefly summarize research on the study of antitumor effects of some plant natural products (Bee honey, Cumin extract, a combination of both at a rate of 1:1, Ginger extracts and Tepary bean Lectin).

2. Material and method

The Potato Disc Bioassay was used to estimate antitumor anticancer activity of some natural products using the indigenous strain of *Agrobacterium tumefaciens*"SD.B0012". The Sub-Cultures of this bacterium were made into (NASA) Medium to prepare the original supplied slant of *Agrobacterium tumefaciens* strain SD.B0012. The bacterium culture was maintained throughout the study by routine sub-culturing under aseptic microbiological methods.

2.1. Plant collection and preparation

Bee Honey, Cumin Oil,Ginger (*Zingibe rofficinale Rosc*)and Red kidney beans (tepary)used in this study were collectedfrom local market of Wad Medani city, Sudan.

2.2. Extraction

- Cold extraction: A direct cold extraction procedure of finely ground material was developed for use in the phyto-medicine programme [11].
- Extraction of lectin : Red kidney beans (tepary) were ground to a powder in an electric mill and filtered through 80 mesh greet. The powder (50 g) was mixed with 0.15M NaCl (1:8,w/v) for 48 hours at 4 C0, and filtered through 80 mesh grid. The filtrate was centrifuged at 13000 rpm for 15 minutes, and supernat was fractionally precipitated with ammonium sulfate at 40%- 50%- 60%- 70% saturation, respectively. The four pellets were combined, dissolved in a minimal volume of water, and dialyzed against distilled water at ''4 0C''

2.3. Bioassay techniques

The crudes extract obtained by cold extraction were evaluated for antibacterial and antitumor activity as described below.

- Antibacterial activity assay: Biological activity of the crude and the purified fraction were tested by using disc diffusion method.
- Antitumor activity: Using *Agrobacterium tumefaciens* strain SDB0012 (local isolate) as biological tool for potato disk bioassay technique [12],and calculated as:

Inhibition% =(Average number tumor of sample ×100) \ Average number tumors of control.

3. Results and discussions

Inhibition zone of antibacterial : This test was conducted to study the level of antibacterial potency of honey and cumin oil on the growth of the bacterium expressed in the size of inhibition zone. the bacterium grew normal in filter paperwith bee honey, cumin oil and a mixture them at a rate of 1:1. Results indicted that honey, cumin and their mixture has no anti-bacterial effects against the indigenous strain SDB0012. this strain resisted application of honey despite its antimicrobial property as well as wound- healing activity.

Table 1 Antibacterial activity (inhibition) of tested some natural productsby disc diffusion method (The applied dose is 20 µl/disc)

Product	Inhibition of zone
Bee Honey	0.0%
Cumin Oil	0.0%
Mixture of Bee Honey and Cumin Oil (1:1)	0.0%
Ginger methanol extract	0.0%
Ginger hexane extract(oil)	0.0%
Ginger water extract	0.0%
Lectin suspension	0.0%

In general, the antimicrobial activity in most honey is due to the enzymatic production of hydrogen peroxide. Resistance of this strain to honey application might be due to production of catalyse which is known to detoxify hydrogen peroxide by catalyzing its decomposition to $O_2$and H_2O [13]. this result was in a line with [14]. who mentioned that most bacteria appear to express one more catalyses in response to peroxide stress and the different types of catalyses are regulated independently.

Table 2 *In- vitro* inhibition of tumor metastasis using some natural products

Product	Inhibition of tumor metastasis (%)*
Bee Honey	40%
Cumin Oil	55%
Mixture of Bee Honey and Cumin Oil (1:1)	100 %
Ginger methanol extract	95%
Ginger hexane extract(oil)	30%
Ginger water extract	20%

* Inhibition of tumour metastasis (in percentage) out of the total surface area of the potato disc.

Potato Disc Bioassay : The Indigenous Strain of *A.tumefaceins* SDB0012facilitated use of the potato disc bioassay to study antitumor activity of tested natural products (bee honey, cumin extract, a combination of both at a rate of 1:1, Ginger extracts and Tepary bean Lectin).

The importance of this technique for identification of natural products having antitumor and anticancer activity comes from the fact that antitumor results obtained in this technique were found to be highly correlated with results obtained on the same products in treating animals and human beings. in his evaluation of seventeen samples of purified compounds and various ethanol extracts from plant sources [15] concluded that results demonstrated definite correlation between the ability of these samples to inhibit the formation of crown gall tumors and their activity on the p388 leukemia system in mice.

Screening for antitumor activity resulted in 40% 55% and 100% inhibition from the total surface of the potato disc due to application of honey, cumin oil and the mixture, respectively (table 2). This result suggested the use of honey and

cumin oil (1:1) for inhibition of tumor growth and further elucidation of this mixture in Animal experimentation(in-vivo). Since results obtained from potato disc bioassay were considered 100% similar as if in-vivo treatment of human cancer [16]. While lectin(Dark red kidney bean hemagglutinin) also have antitumor activity (table 3) these result agreementwith [17] toward leukemia L1210 cells.

Table 3 Inhibition effect (%) of Tepary bean Lectin on the tumor formation, produced by *A. tumefaciens* on the potato disc

Crude Lectin Concentration (µl/disc)	**Days**			**Analysis**		
	7	**12**	**21**	**R^2**	**intercept**	**slope**
50	100	99	98	0.97	100.85	0.14
37.5	90	70	80	0.12	86.62	-0.50
25	60	40	50	0.12	56.62	-0.50
Control	0	0	0			
R^2	0.92	0.99	0.98			
Intercept	23.33	-18.83	4			
Slope	1.6	2.36	1.92			

4. Conclusion

This survey suggests that information gathered from compounds derived from tested plants, could be a suitable starting point for extensive drug discovery projects, especially for some of the most frequently mentioned diseases like cancer. In depth study can results in the development of human friendly anticancer drug from this source.

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