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Infrared spectra and anti mitotic potential of *Linum usitatissimum* L gel water extract

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Abstract

This study was conducted at Misurata City in Libya. Gel of linseed is primary a mixture of polysacharies which acid-catalyzed hydrolysis yield rhamonose fucose arabinose, xylose, glactose, galacturonic acide, and glucose. It used as an emulsifying agent for chocolate milk and functionally resembles arbic gum. In this study gel of linseed isolated from locally, Linseeds by hot water extract. Antimitotic action potential of extracted gel investigated using *Allium cepa* bioassay. Different concentration of gel (2.5%, 5%) were tested at different periods (2, 4, 6hours) on active growing root tip cells .Changes in the rate of cell division (mitotic index) was recorded. The result showed a significant decrease in mitotic index in treated cells in comparison with control. The result showed also that gel of linseed has more mitodepressant action than whole seed extract. IR of the extracted gel and whole seed extract were similar in band number and peaks. The data suggest that mitodepressnt effect of Linseed gel on rate of cell division may result of biologically active functional group of chemicals indicated by absorption spectra properties.

I. INTRODUCTION

Linseed *(Linum usitatissimum*L) from linaceae family is composed of multiple chemical constituents such as measurable concentrations of lignans and isoflavones [1],[2]. The out coat of linseed (flaxseed) contains plant gel (Mucilage) that composes of polysaccharide and characterized by rich gel (9-12%) compose of 3polysacrids [3].The polymeric carbohydrate composites about 8% of the seed weight [4], [5]. The presence of sucrose makes the plant gel important in food industry as fixative. The yield and purity of the gel vary with extract condition. The chemical and physiological properties of Linseed differ in different strain and species due to different factors such as the way of extract, cultivation, temperature and pH [5], [6]. Linseed gel has large water binding capacity due to the high concentration of OH group in monosaccharide also may due to protein contents of the gel [5]. Maximum yield can be obtained by hot water extract with high protein contamination [5], [22]. Chemicals and plant extracts genotoxicity were investigate using recommended *Allium cepa* plant bioassay by many researchers [7], [8], [9], [10], [11]. The aim of this study preformed to investigate Infrared properties of Linseed constituents in water extract and to determine genotoxcicity of linseed (*Linum usitatissimum*) whole seed and gel.

II. MATERIAL AND METHOD

Water-soluble gel extracted from local linseed by mixing the seed with boiling water for 1/2 hr with stirring before it filtrated and precipitated by 95% ethanol (4:3v/v). The tested concentrations were prepared from dried gel extract (0.5, 1 and 1.5 %)in distilled water. For whole seed water extract, a weight of 50g of air-dried linseed was soaked in 100 ml water at 60 ^{0}c.degree. The collected extract was filter and concentrate under reduced pressure (using Rotavap instrument). The stock solution was dilute to 2.5 and 5% [12].

A. Cytological studies

Allium bulbs were germinating in tap water at room temperature. When the roots reaches 3-5cm they treated with tested extract for 2, 4 and 6 hours for each concentration. Control roots were a kept in tap water without treatment. Untreated and treated root detached, fixed in Carnoy`s solution (3:1 ethanol to acetic acid) for 24 hours. Root tips were hydrolyzed with 1N HCL at 60 ^{0}c. Orcein stain in squash technique was carried out with

modification. Five temporarily slides were prepared for each treatment and concentration and the experiment repeated 3 times. A least 1000 cell per slide was examine under 40-x magnification. MI was determined by counting the number of mitotic cells among the total amount of scored cells per experiment [12].

B. Infrared spectra:

IR of dry gel and whole linseed extracts were measured by PerkinElmer in the range 4000 cm^{-1} to 550 cm^{-1} and the observed characteristic bands of IR spectra were listed.

III RESULT AND DISCUSSION

Medicinal plants have been used from generation to generation in the traditional system of medicine for treatment various types of diseases. There is a broad range of plant parts possessing a variety of pharmacological properties**.** Water extract of whole linseed extract showed no significant inhibitory effect on cell division of treated cells with low and high concentration for 2hours (Figure 1). By increase time of treatment, the potential of cell inhibitory effect enhanced significantly comparing to the control .This inhibitory action is concentration and time of treatment dependent. The MI of cells treated with high (5%) and low (2.5%) concentration were 5.63 and 8.28 respectively comparing to the experiment control (11.36). The anti mitotic potential of linseed gel on divided *Allium* root tips was also investigate. Data in figure2 showed that the extracted gel has more inhibitory effect on cell division. At 2-hour treatment, there was significant decrease in MI. This significant Mitodepressant effect was observe at all treated dose and treatment time comparing to the control (18.3). Maximum inhibitory level was recorde in cells treated with 1% concentration of gel extraction at 4 hours treatment. The decrease in cell division rate is evidence of linseed anti mitotic potential and genotoxicity that led to arrest the cell cycle progression in treated [11], [13], [14], [15].

Infrared (IR) is one of the methods used in diagnosing of active organic compounds to measure their purity through beam sites and peaks. The infrared spectra is absorbed by linseed gel and whole seed, where the vibration frequencies of the most important and active groups in the compound were identical to the IR of the standard linseed gel and whole seed. IR spectroscope (4000-550 cm^{-1}) of linseed gel extract (fig. 3) and whole seed extract (fig.4) were presented in Table1. Data in Table1 indicated the presence of many active functional groups of gel contents. These biologically active organic compounds can interact with DNA [23].The gel extract can bind to DNA molecules through several different [24]. This binding cause damage or change in genetic material (genotoxicity) in treated cells, which may lead to anti mitotic action of the [16], [17], [18]. However, inhibition of cell division in treated active cells with gel extract may due to linseed derived proteins [19] because of protein contamination in hot gel extract method [5]. There are pattern and mode similarity of IR in the gel and whole extracts (figure 3 and 4). This similarity indicates the presence of anti mitotic compounds in both extracts, although it more concentrated in gel material. The obtained result may conform Linseed anticancer activity cited in many studies [20], [21].

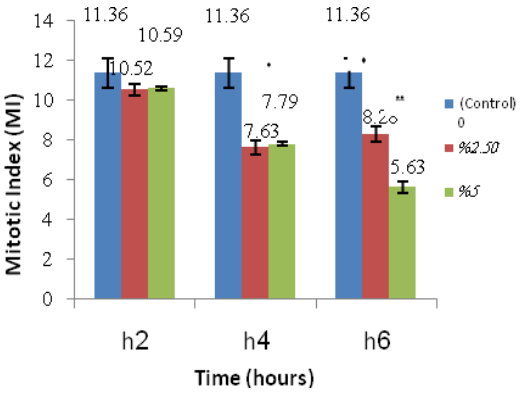

Figure1. Mitotic Index of *Allium cepa* root tip treated with whole linseed extract at different treatment time and concentration

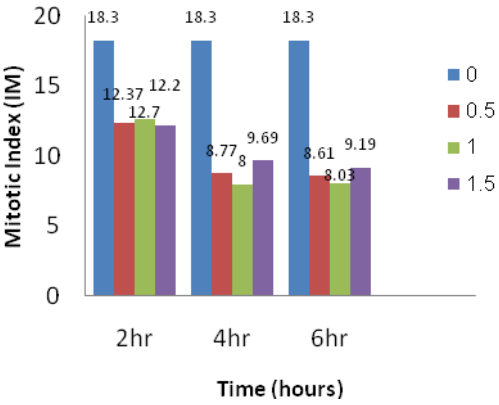

Figure. 2 *Cepa***.** Mitotic Index of *Allium* root tip Treated with gel extract at different treatment time and concentration

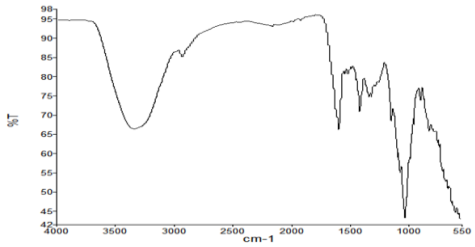

Figure. 3 IR spectrum of linseed gel extract

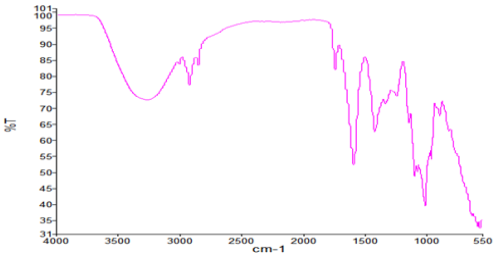

Figure.4 IR spectrum of whole linseed extract

Table 1: IR property of linseed gel and whole seed water extract

Band No.	*Band Frequency cm -1* *Gel*	*W.seed*	*Band Shape*	*Function Group*
1	*3346*	*3343*	*weak*	*O-H stretch*
2	*2930*	*2925*	*weak*	*C-H stretch*
3	*1597*	*1598*	*Sharpand strong*	*C=O stretch*
4	*1314*	*1312*	*Sharpand strong*	*C-N stretch*
5	*141 9*	*1412*	*Sharpand strong*	*C-N stretch*
6	*1035*	*1032*	*Sharpand strong*	*C-O-C bending*

The peak at 3346-3343 wave number cm-1 due to the O-H group of hydrogen bounded alcohols and phenols. additional beam peak at 2930-2925 wave number cm-1 due to the asymmetric stretching of C-H group of aromatic compound. It is indicated the presence of glycoside, tannin, flavonoid and saponin. The. The peak at 1597-1998 wave number cm-1 is due to C=O The peak at 1315.98 and 1314-1312 is due to C-N bonds showed Alkyl ketone, Amines, Amides. The strong band absorption at 1035-1032 cm–1 is attributed to C-O-C or phosphodiester stretching bands region. It is indicated the presence of glycogen, collagen and DNA [25].

IV. CONCLUSION

This study was initiated to identify the medicinal importance **of** *Linum usitatissimum* L, which is used as a traditional folk medicine by Libyans in ancient and current times. The results of the *Linum usitatissimum* L that gel of linseed has more mitodepressant action than whole seed extract. IR tests pointed to the existence of important chemical active groups, which also support the significance of *Linum usitatissimum* as a medicinal plant

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VI. REFERENCES

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