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Phytochemical Tests for Mullein Herb

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Submission Date:

May 23, 2021

Abstract

The importance of plants is well known to us. Plant kingdom is a treasure house of potential drugs and in the recent years there has been an increasing awareness about the importance of medicinal plants. Drugs from the plants are easily available, less expensive, safe, and efficient and rarely have side effects.

Verbascum Thapsus L. is an important species of the genus and and of Scrophul ariaceae, it is a famous herb that is found all over Europe, in temperate Asia, in North America and is well-reputed due to its medicinal properties. This medicinal herb contains various chemical constituents like saponins, proteins, phenylethanoid glycosides, flavonoids, vitamin C and minerals. It is famous in various communities worldwide for the treatment of various disorders of both humans and animals aliments. A number of pharmacological activities such as anti-inflammatory, antioxidant, anticancer, antimicrobial, antiviral, anti-hepatotoxic and anti-hyper lipidemic activity have been ascribed to this plant. The plant is used to treat tuberculosis also, earache and bronchitis.

Plants have been the basis of medicinal treatment since prehistoric times, and herbal medicine or herbal medicine is still widely practiced today. Modern medicine makes use of many compounds derived from plants as an essential raw material in the pharmaceutical industry. These plants were used in folk medicine, as mullein flowers were used to treat sore throat, cough, and colds. Other uses include asthma, diarrhea and colic.

The objectives of the project were to introduce people to the importance of the plant and its medicinal uses and a phytochemical screening of the methanolic and ethanolic extracts was performed.

Qualitative analysis of ethanolic and methanolic mullein extracts were performed, for the presence of phytochemical components such as alkaloids, tannins, flavonoids, carbohydrates, phenols and saponins. The results are in harmony with literature.The presence of these phytochemicals prove that the mullein plant is a medicinal plant. This conclusion is supported with a lot of scientific research.

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Chapter One: Introduction

1.1Background

Since the time people traded a group of herbs for the purpose of treatment and the benefit in healing them, this is mainly due to the fact that the population believes that herbal medicines, compared to traditional medicines, do not have harmful effects.

Medicinal plants, also called medicinal herbs, have been discovered and used in traditional medicine practices since prehistoric times. Plants create hundreds of chemical compounds for functions including defense against insects, fungi, disease and herbivorous mammals.

Verbascum is the largest genus of the family Scrophulariaceae, with about 2500 species (Tatli and Akdemir, 2006). Verbascum Thapsus L. is an important species of this genus and is found wild on stony ground, in wasteland, woodland, clearings and roadsides (Speranza et al., 2010). The use of Verbascum thapsus increasing the medicines not only globally but in developing countries also in advanced countries (Turker & Camper, 2002) where the United States like dried leaves and flowers, capsules, alcoholic extracts and the flower oil of this plant can easily be found in health stores (Turker & Gurel, 2005) .Verbascum is known by a variety of names in various regions of the world, great mullein, and blanket mullein.

It is a popular herb found throughout Europe, in temperate Asia, in North America, and well-reputed because of its medicinal properties. This herb includes numerous chemical components, including saponins, glycosides of iridoids and phenylethanoids, flavonoids, vitamin C, and minerals. It is known for the care of various human and animal food disorders in diverse cultures worldwide.

The variety of chemical is found in mullein, mainly glycosides, flavonoids, polysaccharides, saponins and terpenoids, mullein contains high total poly unsaturated fatty acid (PUFA) contents with linoleic acid (18:2n-6) as the primary fatty acid (Klimek, 1996). Mullein contains existence of different phytochemical ingredients such as mucilage, carotenoids (Sotoodeh, 2016) as well as provide glycosides, phenyl etanoid (Armatu, 2011), and ascorbic acid terpenoids (Riaz, Zia-Ul-Haq, & Jaafar, 2013).

Mullein contains ingredients such as provides, Phenylethanoid Glycosides, monoterpene glycosides, neolignan glycosides, flavonoids, steroids, spermine alkaloids, phenolic acids, and fatty acids (Tatli and Akdemir, 2004).

We have traced the presence of mullein in Palestine, particularly in Salfit, Tulkarm, Qalqilya governorate and west of Nablus, we have discovered the existence of mullein. This plant is characterized on the side of the roads by its growth.

Figure 1: Mullein Plant

1.2 Project statement

Recently, most people have resorted to treating their ailments with medicinal herbs rather than chemically manufactured drugs. They find the cure in using medicinal natural herbs, herbal medicines may offer some real benefits.

The aim of the project was to study the presence of chemicals in Mullein plant. Phytochemical qualitative tests were performed to improve the presence of different chemical families. We mean the presence of alkaloids, saponins, polyphenols, and flavonoids and so on.

1.3 Objective

The goal is to conduct qualitative phytochemical tests on the mullein flower and to prove the presence of active substances that contribute to the treatment of diseases such as cancer and respiratory diseases.This have been done by preparation of mullein extracts obtained from leaves and flowers of the herb. Investigation the presence of phytochemicals such as alkaloids,

saponins, polyphenols, and flavonoids and others is the final present objective to this work. These extracts have a strong healing effect on the respiratory and pulmonary system. It is important to introduce people to this unknown flower in Palestinian folk medicine.

1.4 Significance of the work

The decoction of the Palestinian Mullein plant is used directly to heal many respiratory system problems.

This medicinal herb contains various chemical constituents like saponins, iridoid and phenylethanoid glycosides, flavonoids, vitamin C and minerals.

Mullein has many aesthetic and therapeutic properties, as Mullein oil is extracted from the flower or leaves of the plant. The oil is used as a remedy for earaches, eczema, and some other skin conditions. And also contains compounds and elements that act as antioxidants and anti-inflammatory and antimicrobial.

Many products can be produced from this flower such as oil, syrup, ointment and medicine pills. This study will provide properties of mullein flower and its healing effect by made Phytochemicals tests.

1.5 Organization of the Report

This report consists of six main chapters; Chapter One introduces the Mullein herb and clarifies the problems that will tend to be solved and the main constraints and standards in this study. Chapter two shows the previous researches and studies published on this subject and included a literature review of the topics related to Mullein herb, general information about it, and medicinal values. Chapter three includes experimental work. Chapter four shows the results. Chapter five is discussion. Chapter six is conclusion.

1.6 Constraints and Standards

The spread of the Coronavirus has limited our ability to work in laboratories or even face-to-face meetings. So it is not possible to do all the experiments that are previously planned.

The lack of chemicals needed to continue phytochemical tests is another limitation in this project.

Chapter Two: Literature review

2.1 Mullein General Uses

Flower extract in hot water is used as dye to turn hair a golden color (Grieve, 1981; Huxley, 1992) that can be changed to green dye on acidification or alkalization on to brown. Leaves are used in the insulation shoes to keep the feet warm (Grieve, 1981). Also mullein was used as a useful fish poison (Haughton, 1978). The stems are used as torches, tinder and wicks for candles (DeBray, 1978; Grieve, 1981; Rhs, 1988).

Mullein has been around for thousands of years. Mullein oil is extracted from the flower or leaves of the plant. The oil is used as a remedy for earaches, eczema, and some other skin conditions. It's available as tinctures, teas, capsules, and elixirs. Leaves were smoked to attempt to treat lung ailments. Oil from the flowers was used against earaches, frostbite and eczema.

Leaves are used to draw out splinters (Grieve, 1981). The flowers in olive oil are used as earache drops having strong bactericidal properties (Bown, 1995; Chevallier, 1996). An infusion of the plant is taken internally in the treatment of a wide range of chest and abdominal complaints including productive cough and diarrhea (Bown, 1995; Chevallier, 1996; Murad et al., 2011). It is used as a tobacco substitute (Wilhelm, 1974) and rheumatic problems (Haughton, 1978).

The flowers and leaves are analgesic, anti-inflammatory, antiseptic, spasmolytic, astringent, diuretic, emollient, expectorant and vulnerary (DeBray, 1978; Grieve, 1981; Chiej, 1984; Hussain et al., 2007). Ointments prepared from leaves are used for the leaves is a good healer of wounds and is also applied to ulcers, tumors and piles.

Figure 2: Mullein oil

2.2 Mullein medical uses

Mullein is a plant used to make medicine. Some people take mullein by mouth for breathing conditions such as cough or asthma, pneumonia, colds, and sore throat.

An infusion or tea of the plant is taken internally in the treatment of a wide range of chest and abdominal complaints including productive cough and diarrhea (Bown, 1995; Chevallier, 1996; Murad et al., 2011). It is used as a tobacco substitute (Wilhelm, 1974) and rheumatic problems (Haughton, 1978).

Mullein is used for cough, whooping cough, tuberculosis, bronchitis, hoarseness, pneumonia, earaches, colds, chills, flu, swine flu, fever, allergies, tonsillitis, and sore throat. Other uses include asthma, diarrhea, colic, gastrointestinal bleeding, migraines, joint pain, and gout.

Figure 3: Mullein extract for Respiratory health.

2.3 Extraction

Extraction is the first crucial step in preparation of plant formulations. Modern methods of extraction are effective in advancing the development of traditional herbal remedies. The development of modern sample-preparation techniques with significant advantages over conventional methods for the extraction and analysis of medicinal plants is likely to play an important role in the overall effort of ensuring availability of high-quality herbal products to consumers worldwide (Gupta & Kothari, 2012).

Sample preparation is importance to the development of analytical methods for the analysis of constituents present in the botanical and herbal preparations.

A typical extraction process may contain following steps (Handa et al., 2008):

1. Collection and authentication of plant material & drying.
2. Size reduction.
3. Extraction.
4. Filtration.
5. Concentration.
6. Drying & reconstitution Quality of an extract is influenced by several factors such as, plant parts used as starting material, solvent used for extraction, extraction procedure, and plant material: solvent ratio etc. Extraction techniques separate the soluble plant metabolites through selective use of solvents.

The properties of the extraction solvent, the particle size of the raw materials, the solvent-to-solid ration, the extraction temperature and the extraction duration will affect the extraction efficiency.

The selection of the solvent is crucial for solvent extraction. Selectivity, solubility, low toxicity, minimal safety concerns and little impact on the environment , avalibilty and cost should be considered in selection of solvents (Paggiola, Sherwood , & Jin, 2016).Based on the law of similarity and intermiscibility (like dissolves like), solvents with a polarity value near to the polarity of the solute are likely to perform better and vice versa. Alcohols (EtOH and MeOH) are universal solvents in solvent extraction for phytochemical investigation (Zhang, Lin, & Ye, 2018).

2.4 Anti-oxidant

Free-radicals containing oxygen and nitrogen species are responsible for various chronic diseases like Parkinson's and Alzheimer's diseases, atherosclerosis, aging, and cancer in biological systems. Various constituents present in plants like phenolic compounds, vitamin C, vitamin E, carotenoids and certain minerals, such as zinc and selenium are capable of neutralizing the effects of free radicals (Riaz, Zia-Ul-Haq, & Jaafar, 2013).

Antioxidants are compounds that inhibit oxidation. Oxidation is a chemical reaction that can produce free radicals, thereby leading to chain reactions that may damage the cells of organisms.

They are sometimes called "free-radical scavengers." Antioxidants such as thiols or ascorbic acid terminate these chain reactions.The sources of antioxidants can be natural or artificial. Certain plant-based foods are thought to be rich in antioxidants. Plant-based antioxidants are a kind of phytonutrient, or plant-based nutrient. The body also produces some antioxidants, known as endogenous antioxidants. Antioxidants that come from outside the body are called exogenous.

There are thought to be hundreds and possibly thousands of substances that can act as antioxidants. Each has its own role and can interact with others to help the body work effectively.

"Antioxidant" is not really the name of a substance, but rather it describes what a range of substances can do.

Examples of antioxidants that come from outside the body include: vitamin A, vitamin C, vitamin E, beta-carotene, lycopene, lutein, selenium, manganese, zeaxanthin.

Flavonoids, flavones, catechins, polyphenols, and phytoestrogens are all types of antioxidants and phytonutrients, and they are all found in plant-based foods (Prior and Schaich, 2005).

2.5 Chemical composition in mullein

Verbascum thapsus has been used as an analgesic, anti-inflammatory, antiseptic, spasmolytic, astringent, diuretic, emollient, expectorant piles.

Based on the literature survey, many of these isolated compounds or different extracts of V. thapsus possess a wide range of biological activity including but not limited to, antioxidant,

wound-healing, antimicrobial, antiviral, anticancer, cytotoxic, antihyperlipidemic, anti germination, hepatoprotective and nephroprotective activity.

Mullein contains Iridoid glycosides, Phenylethanoid glycosides, terpenoids, Flavonoids and carotenoids, Saponins, Carbohydrates, Minerals, Lipids (Klimek, 1996).

Mullein contain phytochemical ingredients such as mucilage, carotenoids (Sotoodeh, 2016) as well as iroide glycosides, phenyl etanoid (Armatu, 2011), and ascorbic acid terpenoids (Riaz, Zia-Ul-Haq, & Jaafar, 2013).

2.6 Chemical relations of compounds and biological effect

Phytochemical comes from phyto, which is Greek for plant, the term refers to chemicals made by plants. This medicinal herb contains various chemical constituents like saponins, iridoid and phenylethanoid glycosides, flavonoids, vitamin C and minerals (Kanzaki, 1998). We would like to introduce shortly all of these chemical constituents:

Saponins organic chemicals that have a foamy quality when agitated in water. Isolated from medicinal plants is a naturally occurring bioorganic molecule with high molecular weight and its aglycone (water non-soluble part) nucleus having 27 to 30 carbon atoms besides one or two sugar moieties (water soluble part) containing at least 6 or 12 carbon atoms respectively.

Saponins are an important phyto-constituent ascribed to various biological actions like antimicrobial, antileishmanial, antiplasmodial, antimalarial, antitumoral and antiviral activities. Various antimicrobial, antiviral and antitumoral activities of Mullein may be due to these constituents.

They are used in soaps, medicinals, fire extinguishers, speciously as dietary supplements, for synthesis of steroids. Some examples of these chemicals are: (Wang, 1998).

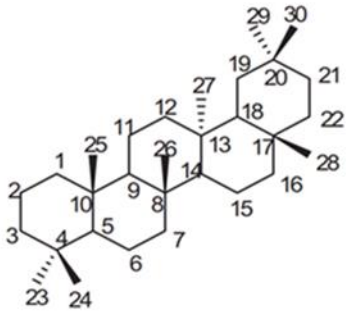


Figure 4: Triterpines

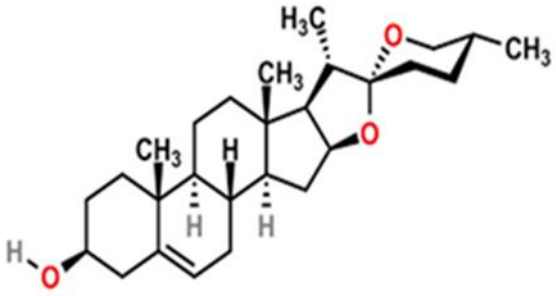


Figure 5: Steroid glycoside

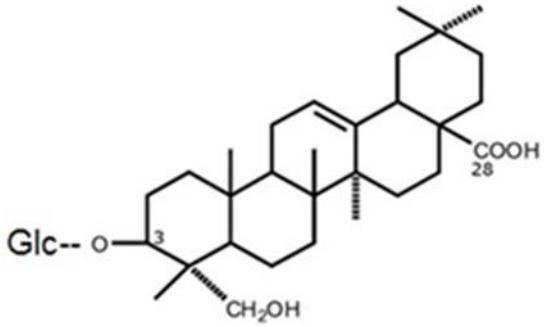


Figure 6: triterpenoid saponin

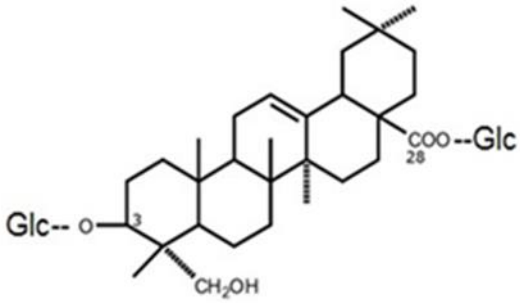
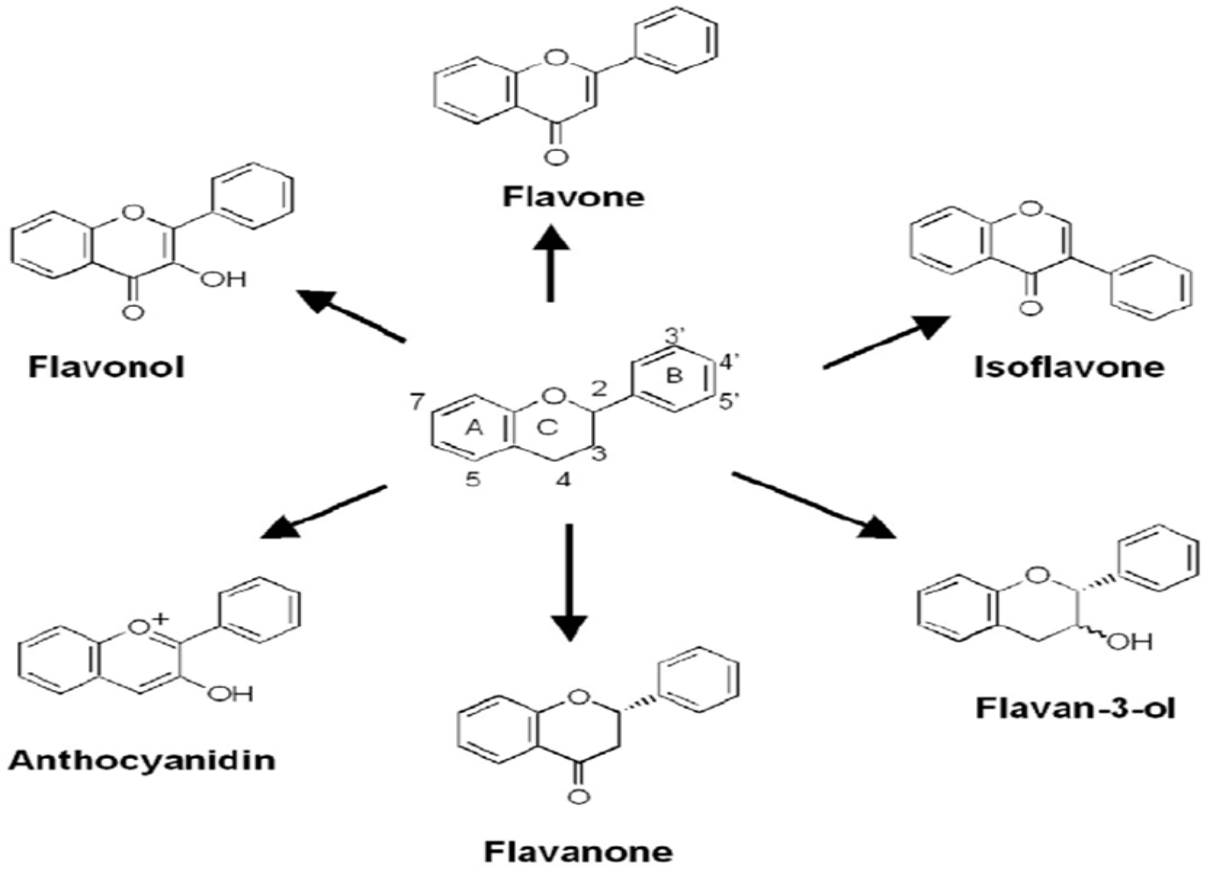


Figure 7: triterpenoid saponin

Flavonoids Flavonoids are part of the polyphenol class of phytonutrients. They are associated with skin protection, brain function, blood sugar and blood pressure regulation, in addition to antioxidant and anti-inflammatory activity (Asgary, 2016).

Flavonoids are getting fame due to their antioxidative and anticancer activities besides their role in managing oxidative stress in biological systems due to their ability to act as free radical scavengers.



Alkaloids are cyclic compounds containing nitrogen atoms in their structure. Due the presence of nitrogen they have basic or alkali effect. They have a wide range of pharmacological activities including antimalarial (e.g. quinine), antiasthma (e.g. ephedrine), anticancer (e.g. homoharringtonine), cholinomimetic (e.g. galantamine), vasodilatory (e.g. vincamine), antiarrhythmic (e.g. quinidine), analgesic (e.g. morphine), antibacterial. Some examples of these chemicals are quinolone, pyridine, Indole, Tropane, isoquinoline (Turker & Gurel, 2005).

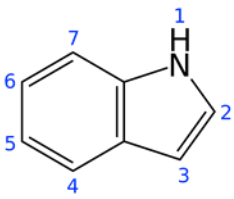


Figure 8: Indole

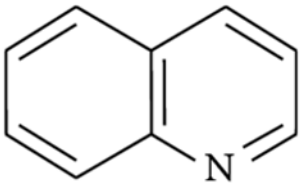


Figure 9: quinolone

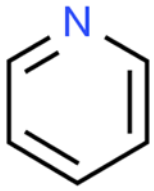


Figure 10: pyridine

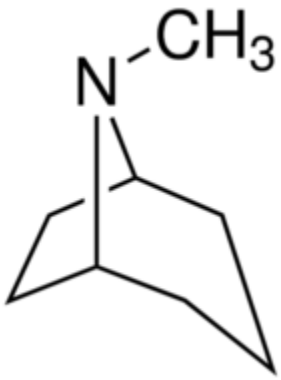


Figure 11: Tropane

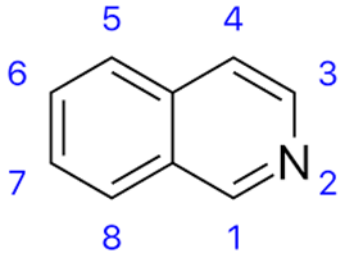


Figure 12: isoquinoline

Tannins are a class of astringent, polyphenolic biomolecules that bind to and precipitate proteins and various other organic compounds including amino acids and alkaloids. The term tannin refers to the use of oak and other bark in tanning animal hides into leather. Tannins have been reported to possess strong antioxidant and antimicrobial properties as well as anticarcinogenic and antimutagenic potential (Amarowicz, 2007).

2.7 Toxicity

In two model systems, in vitro in BEAS 2B epithelial bronchial cells and in vivo in zebrafish embryos, a research was conducted to investigate the possible toxic and antioxidant effects of V.thapsus water extracts. In both model systems, the findings obtained showed that V.thapsus flower water extract showed high acute toxicity and no antioxidative effects (Dr gićević, 2019) There are no data on genotoxicity, carcinogenicity, reproductive, and developmental mullein flower (European Medical Agency 2009).

There are no data on genotoxicity, carcinogenicity, and Reproductive, and developmental mullein flower (European Medical Agency 2009).

There are many diseases and health problems that need to be treated, a major part of people resorts to the use of chemically synthesized medicines. To most of their problems, they find the answer in using medicinal natural herbs.

Chapter three: Experimental Work

3.1 Extraction

The mullein leaves and flowers were extracted with ethanol and methanol to use the extract solution in phytochemical tests.

3.1.1 Pre-experiment preparation

The sample was prepared as follows steps:

- **For mullein leaves**

1. Mullein leaves raw material were collected and dried with continuous reciprocating to avoid rotting of raw material.
2. Grinded the mullein leaves by using milling machine in the laboratory of operating units in the Faculty of Engineering / Chemical Engineering Department.

- **For mullein flowers**

1. Mullein flowers raw material was collected and dried with continuous reciprocating to avoid rotting of raw material.
2. Grinded the mullein flowers by using milling machine in the laboratory of operating units in the Faculty of Engineering / Chemical Engineering Department.

3.1.2 Ethanol and methanol extraction

- **Ethanol extraction**

- **For mullein leaves**

1. 20 grams of grinded mullein leaves was put in conical flask (500 ml).
2. The 80% ethanol/ water solution was added to the conical flask and covered to avoid Ethanol evaporation.
3. The conical flask was put in shaking water bath to mix the solution for 2 hour at 40°C and 100 rpm.
4. The extract was gotten after filtration of the solution in Erlenmeyer flask.

- **For mullein flowers**

1. 20 grams of grinded mullein leaves was put in conical flask (500 ml).
2. The 80% ethanol/water solution was added to the conical flask and covered to avoid Ethanol evaporation.

3. The conical flask was put in shaking water bath to mix the solution for 2 hour at 40°C and 100 rpm.
4. The extract was gotten after filtration of the solution in Erlenmeyer flask.

- **Methanol extraction**

➢ **For mullein leaves**

1. 10 grams of grinded mullein leaves was put in conical flask (250 ml).
2. The methanol was added to the conical flask and covered to avoid methanol evaporation.
3. The conical flask was put in shaking water bath to mix the solution for one hour at 40°C and 100 rpm.
4. The extract was gotten after filtration of the solution in Erlenmeyer flask.

➢ **For mullein flowers**

1. 10 grams of grinded mullein flowers was put in conical flask (250 ml).
2. The methanol was added to the conical flask and covered to avoid Methanol evaporation.
3. The conical flask was put in shaking water bath to mix the solution for one hour at 40°C and 100 rpm.
4. The extract was gotten after filtration of the solution in Erlenmeyer flask.

3.2 Phytochemical analysis

The ethanolic, methanolic herb extract were tested for the presence of phytochemicals as follow:

❖ **Alkaloids**

Mayer's and Wagner's reagents were used to detect of alkaloids (Making Laboratory Reagents for General Use).

➢ First we prepared the reagents.

- **Mayer's reagent**

Mixture of mercuric chloride (1.36 g) and of potassium iodide (5.00 g) in water (100 ml)

- **Wagner's reagent**

0.5 gm iodine is dissolve in 2.5 gm of potassium iodide add 30 ml of water to produce solution.

- Then we made the Alkaloids test

1. 2 mL of mullein (flowers & leaves) extract were taken.
2. added 1% HCl
3. put the solution into two different test tubes
    a. First test tube 2-3 drops of wagner's reagent are added.
    b. Second test tube 2-3 drops of mayer's reagent are added.

✓ Mullein extracts contain alkaloid compounds if the test produces a brown, red or orange red precipitate (Wagner's reagent), and white or yellowish precipitate (Mayer reagent).

Note: in the case of testing leave extract that has strong green color, about 3ml of hexane is added and diluted HCl solution is added to get rid of chlorophyll.

❖ **Saponins test**

1. 2 mL of mullein extract.
2. Shaken until homogeneous.

✓ Mullein extracts contain saponin compounds if the test result produces as table foam

❖ **Tannins test:**

1. 2 mL of plant extract
2. Added with 2-3 drops of 1% $FeCl_3$ then placed into a test tube.

✓ Mullein extract contain tannin compounds if the test result produces blue or blackish green color.

❖ **Flavonoids test:**

1. 2 ml of mullein extract.
2. Treated with sodium hydroxide (NaOH).

✓ Mullein extracts contain flavonoid compounds if the test result produces ared precipitation

❖ **Proteins test:**

1. 2 ml of mullein extract.

2. Treated with nitric acid (HNO_3).

✓ Mullein extracts contain protein compounds if the test result produces yellow color.

❖ **Phenols test:**

1 2 mL of plant extract

2 Added with 2-3 drops of 1% $FeCl_3$ then placed into a test tube.

✓ Mullein extract contain phenol compounds if the test result produces blue or blackish green color.

❖ **Cardiac Glycosides test:**

1 2 mL of plant extract

2 2 ml of glacial acetic acid.

3 Add few drops of sulphuric acid (H_2SO_4) and $FeCl_3$.

✓ Mullein extract contain Cardiac Glycosides compounds if the test result produces brown ring.

❖ **Terpenoids test:**

1 1 mL of plant extract

2 2 ml of chloroform.

3 Add few drops of sulphuric acid (H_2SO_4) .

✓ Mullein extract contain Terpenoids compounds if the test result produces reddish brown color

Chapter four: Results

4.1 Result of phytochemicals screening for mullein herb (leaves and flowers)

Phytochemicals tests are carried out on ethanol and methanol extract of both leaves and flowers solution of mullein herb plant. The tests are oriented towards qualitative analysis to investigate the presence of flavonoids, alkaloids, tannin, antioxidants and phenolic compounds. The presence of these compounds is strong indication that the mullein herb has medicinal effectiveness and the potential to protect from disease.

Table (1) shows the phytochemical screening tests for Mullein leaves and flowers

Table 1: phytochemical screening tests for Mullein leaves and flowers

Component	Detector	Indicator
Alkaloids	Mayer's reagent	white or yellowish precipitate
	Wagner's reagent	red or orange red precipitate
Tannins	Ferric chloride($FeCl_3$)	Blue or blackish green color.
Terpenoids	chloroform, sulphuric acid(H_2SO_4)	reddish brown
Flavonoids	Sodium hydroxide (NaOH)	red precipitation
Cardiac Glycosides	Benedict's regent	Reddish brown precipitate
Phenols	Ferric chloride ($FeCl_3$)	Blue or blackish green color.
Saponins	Shaken until homogeneous	stable foam
Proteins	nitric acid (HNO_3)	Yellow color formation

As a result of the experimental work (phytochemical tests) on mullien herb (flowers and leaves) showed that it presence alkoloids, flavonoids, proteins, Cardiac Glycosides, tannins, Phenols and Terpenoids in mullein flower but it not presence saponins.

And presence alkoloids, flavonoids, proteins, Cardiac Glycosides, tannins, Phenols, saponins and Terpenoids in mullein leaves. But the flavonoids and terpenoids in leaves more than in flowers based on the observation.

Table 2: Result of phytochemical tests for mullein herb (leaves and flowers)

phytochemical tests	methanolic mullein leaves extract	ethanolic mullein leaves extract	methanolic mullein flowers extract	ethanolic mullein flowers extract
Alkaloid	+++	+++	+++	+++
Flavonoids	+++	+++	++	++
Saponins	++	++	+	+
Phenol	+++	+++	+++	+++
Terpenoids	+++	+++	++	++
Tannins	++	++	++	++
Cardiac glycosides	+++	+++	+++	+++
Proteins	+++	+++	+++	+++

Table 3: The result of the phytochemical tests on the leaves of mullein methanolic and ethanolic extracts (Ullah, et al., 2018)

phytochemical tests	methanolic mullein leaves extract	ethanolic mullein leaves extract
Alkaloid	+++	+++
Flavonoids	+	++
Carbohydrate	+++	+++
Phlobatannins	+++	+++
Glycosides	+	+
Saponins	+	+
Phenol	+++	+
Terpenoids	+	+
Tannins	+	++
Cardiac glycosides	+++	+++
Proteins	+++	++

Key: +++: present highest level, ++ showed moderate level, + showed low level

In these results +++ indicate that the hight level of phytochemicals, the ++ indicated that the moderate level of phytochemicals' are present and the + indicated that low level of phytochemicals (Ullah, et al., 2018).

Chapter five: Discussion

In the present research work the phytchemical tests on the mullein herb (flowers and leaves) was carried out.

First we collected the mullein leaves and flowers and dried it then grinded, to extract the grinded mullein flowers and leaves

Selection of solvent for mullein extract preparation depends on the type of phytoconstituents we are willing to separate. In such a case, there are several criteria we followed it on choosing the solvent such as the Non-toxicity, avalibilty and low cost and we chose ethanal and methanol as a solvent same the Literature survey.

And finally use the ethanolic/methanolic mullein extracts in phytochemical tests such as tannins, saponins, alkoloids, etc.

The results showed that alkaloids,flavonoids, saponins, phenols,terpenoids, tannins , protiens and cardiac glycosides was found in methanolic and ethanolic extracts for mullein leaves, while alkaloids,flavonoids, phenols,terpenoids, tannins , protiens and cardiac glycosides were found in the methanolic and ethanolic extracts for mullein flowers and saponins not found in flowers.

Noticed that, the results of the experiment match the results of the literature, As shown in the table.

Table 4: Comparison of literature and our experiments on the mullein herb

Component(Literature result on mullein leaves)	Component(Experimental results on mullein leaves)	Component(Experimental results on mullein flowers)
Alkaloids	Alkaloids	Alkaloids
Tannins	Tannins	Tannins
terpenoids	terpenoids	terpenoids
Flavonoids	Flavonoids	Flavonoids
cardiac glycosides	cardiac glycosides	cardiac glycosides
Phenols	Phenols	Phenols
Saponins	Saponins	-
Proteins	Proteins	Proteins

Flavonoids are potent water soluble antioxidants and free radical scavengers, which prevent oxidant cell damage has strong anticancer activity Flavonoids in intestinal tract lower the risk of heart disease. As antioxidants, flavonoids from these plants provide anti-inflammatory activity.

The mullein leaves extracts were also revealed to contain saponins which are known to produce inhibitory effect on inflammation, Saponins have the property of precipitating and coagulating red blood cells, Some of the characteristics of saponins include formation of foams in aqueous solutions, hemolytic activity, cholesterol , the saponins are used in hypercholesterolemia, hyperglycemia, antioxidant, anticancer, anti as inflammatory activity and weight loss, Saponins act as antimicrobial activity.

Alkaloids have the analgesic, antispasmodic and antibacterial properties.Alkaloids has been used as both antibacterial and antidiabetic properties and useful for such activities.

Phenols and phenolic compounds have been extensively used in disinfections and remain the standard with which other bacterisides are compared.

Phytotherapatically tannin containing plants are used to tract diarrhea, inflammations of mouth and throat and slightly injured skins.

Chapter six: Conclusion

Our goal was to conduct phytochemical tests on the mullein plant after identifying it by reading scientific papers to know the components of the plant and its general and medical uses, as well as to identify some of the studies that were carried out on the mullein plant.

The medicinal values of this unknown plant in Palestine were collected to provide a therapeutic alternative to cover respiratory and pulmonary diseases.

This was accomplished by examining the chemical components in the leaves and flower of the mullein.

Through studies, many benefits of mullein have been identified and their therapeutic effects on human health have been identified, helping mullein treat respiratory and pulmonary diseases such as cold, bronchitis and others.

Some tests were conducted and selected according to the availability of materials in the university laboratory, the availability of safety, and according to the epidemiological situation (the spread of the Corona virus) and the political situation we faced, the things that limited the continuation of our work inside the laboratory.

The steps of conducting phytochemical tests were followed according to books and scientific papers.

Results were obtained proving that mullein is a medicinal plant with its flowers and leaves because it contains a high level of chemicals such as: alkalis, tannins, flavonoids, phenols, saponins, cardiac glycosides, proteins and terpenoids.

Chapter seven: Recommendations

- This project should be continued to study antioxidant test such as DPPH.
- Any possible to Make any medical products from this herb

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Appendices

Figure 13: mullein flowers extract

Figure 14: mullein leaves extract

Figure 15: shaking water bath

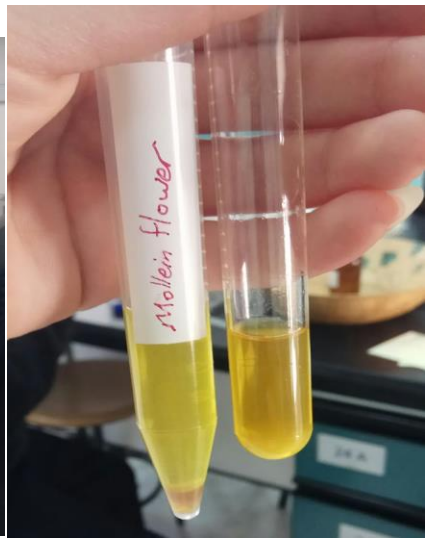

Figure 16: ethanolic mullein flowers extract with mayers reagent

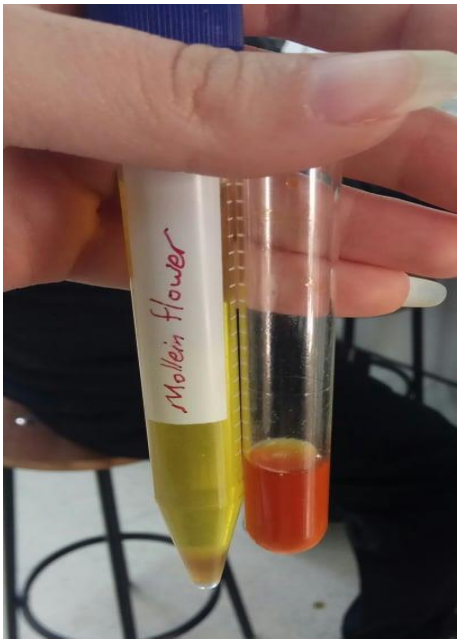

Figure 17: ethanolic mullein flowers extract with wagners reagent

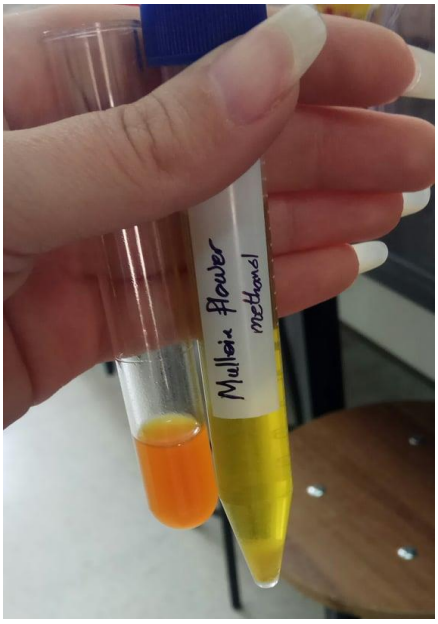

Figure 18: methanolic mullein flowers extract with wagners reagent

Figure 19: ethanolic mullein leaves extract with wagner's reagent

Figure 20: ethanolic mullein leaves extract (tannins test)

Figure 21: ethanolic mullein leaves extract (protiens test)

Figure 22: ethanolic mullein leaves extract (Flavonoids test)

Figure 23: ethanolic mullein leaves extract (Cardiac Glycosides test)

Figure 24: ethanolic mullein flowers extract (tannins test)

Figure 25: ethanolic mullein flowers extract (Cardiac Glycosides test)

Figure 26: ethanolic mullein flowers extract (flavonoids test)

Figure 27: ethanolic mullein flowers extract (saponins test)