Our Heritage

ISSN: 0474-9030

Vol-68-Issue-1-January-2020

Studies on Phytochemical and Antibacterial Activity of Ethanolic Extracts of *Allium Cepa* L., *Mentha Arensis* L., and *Mirabilis Jalapa* L.

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Abstract

In ethanomedical practices the traditional healers use *Allium cepa* L., *Menthaarvensis* L., and *Mirabilis jalapa* L., in the treatment of various ailments. Scientific parameters are used to identify the true plant material and to ensure its quality. The powder of three plants have shown the presence of tannin, flavanoid, anthocyanin, glucosides, phenol, carbohydrates, saponin, alkaloids are predominantly present in which tannin, flavanoids and anthocyanin are of medicinal importance.

Keywords: *Allium cepa* L., *Menthaarvensis* L., and *Mirabilis jalapa* L., Phytochemical, tannin, flavanoid, anthocyanin, medicinal plants.

Introduction

Plants are used as food, flavour and medicine (Nitto *et al*., 2002). Over centuries and decades our ancestors relied on the herbal products as therapeutic agents, which can be traced back to at least 5,000 years (Rajendran, 2009). Medicinal plants represent a rich source of phytochemical agents. According to World Health Organisation about 80% of the world population depends upon the natural products for their health due to minimal side effects and cost effective properties (Jagtap*et al*., 2009). In the recent years there has been a global increase to screen the

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biological activities on plants. Plants are well known to produce certain biological molecules which react with other organisms in the environment (Harborne and Bander, 1995). So we have selected *Allium cepa* L., *Menthaarvensis* L., and *Mirabilis jalapa* L., (Fig. 1,2, and 3) for our work. *Allium cepa* L., commonly known as onion belonging to the family Amaryllidaceae as great medicinal use. It contains flavonoid called quercitin (Slimedad, 2007) that reduce swelling (inflammation), lung tightness and cholesterol and sugar levels at the blood. Menthaarvensis belonging to family Lamiacea. It contains antioxidants and anti-inflammatory agent called rosmaric acid (Joergen, 1998). It also helps in curing digestive roblems. Mirabilis jalapa L., belonging to the family Onagracee, it contains fatty acid (Calder, 2010), which helps to decrease inflammation related to various parts of body. It is also used for skin disorders and bone weakness. Thus, these plants were taken with the objective to study the anti-hepalotoxic potential of ethanolic extract of the plant.

Figure 1: *Allium cepa*L.

Figure 2: *Menthaarvensis*L.

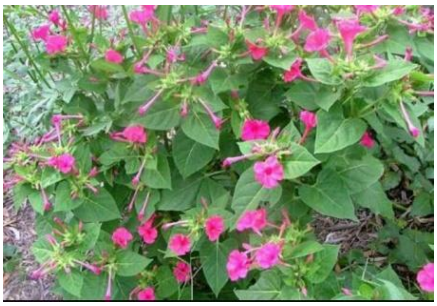

Figure 3: *Mirabilis jalapa*L.

Materials and methodology

Allium cepa L., *Menthaarvensis* L., and *Mirabilis jalapa* L., were selected for

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investigation. The dry bulbs, leaves and flower of the above mentioned species are taken to prepare extraction.

Preparation of plant extract

Extraction using crude plant material

The collected plant sample was refluxed in running tap water for 1-2 hours and shade dried at room temperature for 15-20 days and coarsely powdered with electric blender. Each 20g powder of bulb, leaves and flower were soaked separately in 200ml of ethanol in conical flasks and kept in shaker for 24 hours. After this, the extract was filtered and collected into pre weighed glass vials. The process was repeated for 3 times with the same material but using fresh sovent. The extracts were used for tests to determine phytochemical by diluting them. The extracts were stored at 4^{o}C. This crude drug was used for tests to determine the phytochemicals present in the plants.

Antibacterial activity

The ethanol extracts of *Allium cepa* L., *Menthaarvensis* L., and *Mirabilis jalapa* L., were evaluated for antibacterial activity using agar well diffusion method. Nutrient agar medium was prepared and poured into the petri dishes. Then it was inoculated with a swab of 24 hours bacterial culture and spread throughout the medium uniformly with a sterile swab. Using a sterile micropipette wells were made in the agar medium. The aqueous solution of *Allium cepa* L., *Menthaarvensis* L., and *Mirabilis jalapa* L., were introduced serially in the quantities of 25ul, 50ul, 75ul, 100ul respectively into the wells and all the plates were incubated at 37^{o}C for 24hours. Sensitivity of the organism was determined by measuring the diameter and thickness of the zone of inhibition. The zones of inhibition were measured in cm.

Results

Phytochemical tests were performed with all the three plants by using ethanolic solvent and the results were noted (Table 1, Fig. 4,5,6)

Table 1.Phytochemcial analysis of crude extract of *Allium cepa* L., *Menthaarvensis* L., and *Mirabilis jalapa*L.,

S. No.	Phytochemicals	*Allium cepa*	*Menthaarvensis*	*Mirabilis jalapa*
1	Tannin	+	+	+

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2	**S**aponin	+	+	+
3	Flavanoid	+	+	+
4	Anthocyanin and Betacyanin	+	+	+
5	Quinone	+	+	+
6	Glycoside	-	-	-
7	Glucoside	+	+	+
8	Acid	+	+	+
9	Steroid	+	+	+
10	Coumarin	-	+	+
11	Phenol	+	+	+
12	Terpenoid	-	-	+
13	Triterpenoid	-	-	+
14	Carbohydrate	+	+	+

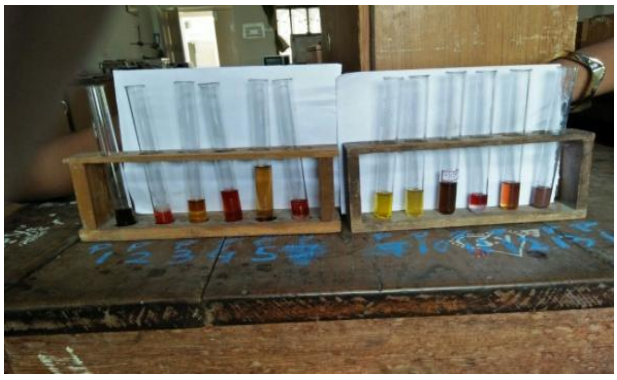

Figure 4.Phytochemical test results in crude extract of *Allium cepa*, showing the specific colouration.

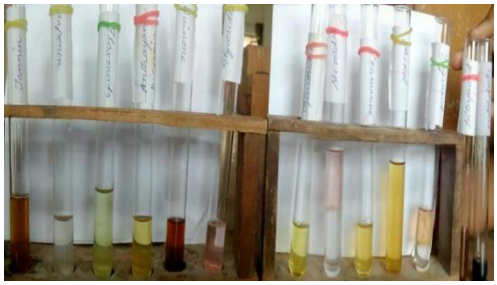

Figure 5.Phytochemical tests showing results of crude extract of *Menthaarvensis*

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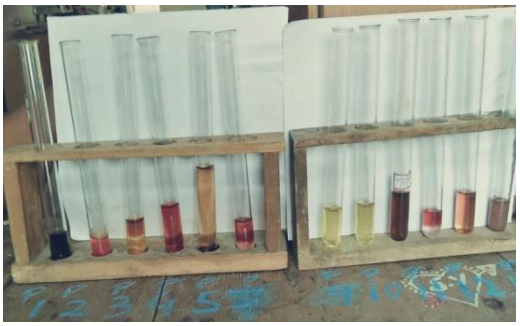

Figure 6.Phytochemical tests showing results of crude extracts of *Mirabilis jalapa*L.

Antibacterial studies

The antibacterial activity of crude extract of *Allium cepa* L., *Menthaarvensis* L., and *Mirabilis jalapa* L., was studied against different bacteria including *Micrococcus luteus* (gram positive), *Staphylococcus epidermidis* (gram positive), *Yersinia entrocolitica* (gram negative), *Enterobacteraerogenes* (gram negative). The extracts were screened for their antibacterial activity using*invitro* well diffusion method at concentrations ranging from 25µl to 100µl. Inhibitory zones was formed. Maximum inhibitory concentration was tested using broth dilution method at concentrations of extracts ranging from 25µl to 100µl of *Allium cepa* L.,(Table 2), *Menthaarvensis* L.,(Table 3), *Mirabilis jalapa*L., (Table 4). Significant antibacterial activity was absorbed and zones were formed in extract of *Allium cepa* L.,(Fig.7), *Menthaarvensis* L.,(Fig.8), *Mirabilis jalapa* L.,(Fig.9) respectively.

Table 2.Antibacterial activity in Ethanolic solution of *Allium cepa*L.,

Bacteria	**Zone of inhibition**			
	250µg/mL	**500 µg/mL**	**750 µg/mL**	**1000 µg/mL**
Micrococcus luteus	**11mm**	**13mm**	**15mm**	**20mm**
Staphylococcus epidermidis	**9mm**	**11mm**	**17mm**	**21mm**
Yersinia entrocolitica	**13mm**	**14mm**	**15mm**	**23mm**
Enterobacteraerogenes	**9mm**	**11mm**	**13mm**	**18mm**

Table 3.Antibacterial activity in Ethanolic solution of *Menthaarvensis*L.

Bacteria	**Zone of inhibition**			
	250 µg/mL	**500 µg/mL**	**750 µg/mL**	**1000 µg/mL**

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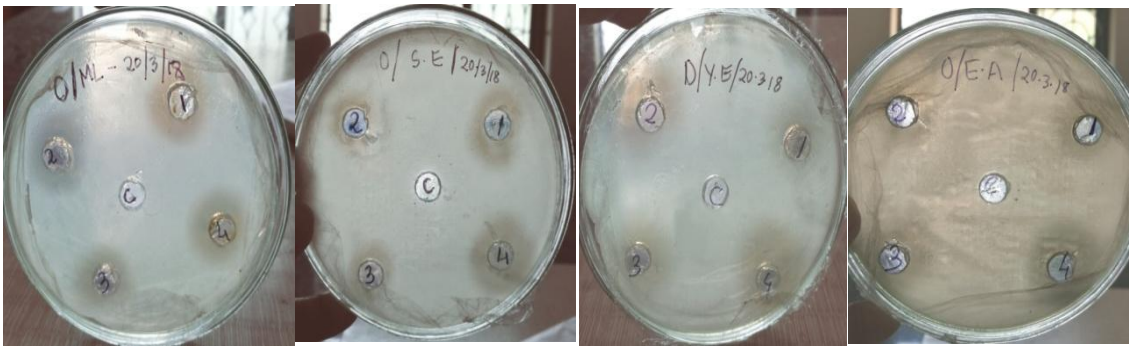
Micrococcus luteus	**12mm**	**16mm**	**18mm**	**21mm**
Staphylococcus epidermidis	**14mm**	**15mm**	**18mm**	**23mm**
Yersinia entrocolitica	**12mm**	**13mm**	**15mm**	**20mm**
Enterobacteraerogenes	**10mm**	**11mm**	**14mm**	**19mm**

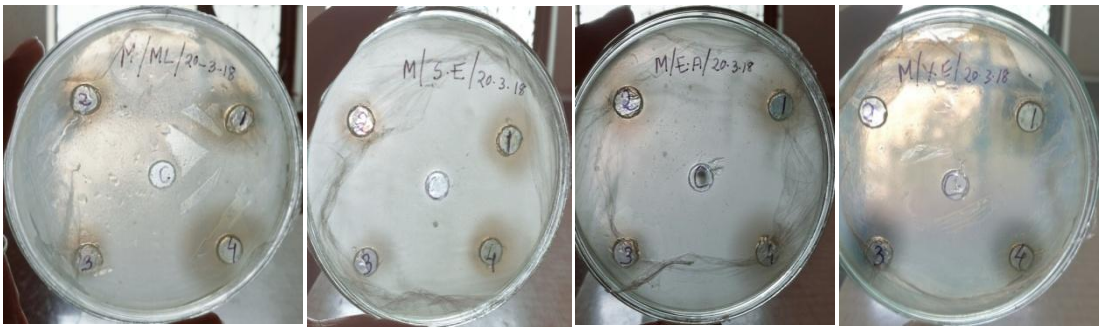
Table.4.Antibacterial activity in Ethanolic solution of *Mirabilis jalapa*L.,

Bacteria	**Zone of inhibition**			
	250 µg/mL	**500 µg/mL**	**750 µg/mL**	**1000 µg/mL**
Micrococcus luteus	**11mm**	**14mm**	**15mm**	**20mm**
Staphylococcus epidermidis	**8mm**	**10mm**	**13mm**	**18mm**
Yersinia entrocolitica	**10mm**	**12mm**	**14mm**	**23mm**
Enterobacteraerogenes	**9mm**	**14mm**	**16mm**	**21mm**



Micrococcus luteusStaphylococcus epidermisYersinia entrocoliticaEnterobacter aerogenes

Figure 7.Antibacterial activity of *Allium cepa*L., using crude extract.



Micrococcus luteusStaphylococcus epidermidis, Yersinia entrocolitica, Enterobacter aerogenes

Figure 8.Antibacterial activity of *Mentha arvensis* L., using crude extract.

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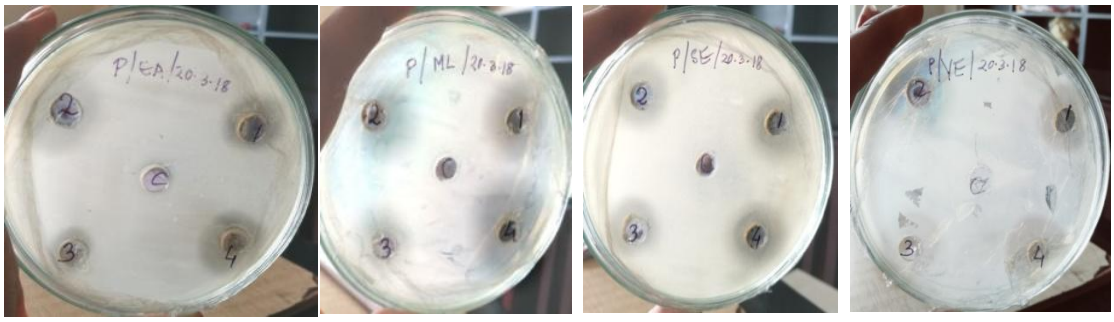

Micrococcus luteus Staphylococcus epidermidis, Yersinia entrocolitica Enterobacter aerogenes

Figure 9.Antibacterial activity of *Mirabilis jalapa* L., using crude extract.

Discussion

The power of three plants have shown the presence of tannin, flavanoid, anthocynin, Glucoside, phenol, carbohydrate, saponin, alkaloids are predominantly presence which tannin, flavanoid and anthocynin are of medicinal importance

Conclusion

The *Allium cepa* L., *Menthaarvensis* L., and *Mirabilis jalapa*L., ethanolicextacts of bulbs, leaves and flowers had common bioactive substances like tannin, flavanoid, anthocyanin, saponinetc that have anti inflammatory properties of the plants The three selected plants also resisted bacteria like *M. luteus, S.epidermidis, Y.enthrocolitica* and *E.aerogenes* to a particular extent .The combination of these herbs will be studied further and the findings of the present research will be taken forward for the development of natural anti inflammatory and antimicrobial drugs which will treat diseases related to mesenteric swelling

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