ETHNO-MEDICINAL APPRAISAL AND ANTIMICROBIAL PROPERTIES OF SOME SELECTED PLANTS OF TEHSIL SHAHPUR, DISTRICT SARGODHA

Rashida Sultana[1], Zara Jabeen[2], Summiya Kanwal[3], Faiza Mushtaq[4], Mahpara Zulqadar[5], Saima Faiz[6], Iram Shehzadi[7], Rana Muhammad Zubair[8*]

Abstract

The present research work was done to explore the data related to some important medicinal plants of Tehsil Shahpur, District Sargodha. A number of field trips were carried out to collect the ethnomedicinal information of the selected plants by using open ended questionnaires and informal interviews. The research work was conducted April 2023 to October 2023. According to the information provided by the respondents, leaves of the selected plants are mostly used by local peoples to cure a number of ailments and health issues followed by stem. Mostly the plant parts are used in the form of decoction and infusion. After the surveys it was revealed that young people (male and females) traditional knowledge is not properly transferred from old people to younger generation. Less data was gathered from young peoples as compared to older peoples. That's why most of the people of modern era are unaware of the medicinal importance of the selected plants. After the research work it was concluded that awareness among the people of Shahpur about the use and conservation of plants is necessary.

Key Words: *Camellia sinensis, Ocimum tenuiflorum, Mentha piperita,* Ethnobotanical survey, Health disorders

[1]Department of Botany, Nusrat Jahan College, Department of Botany, University of Lahore
[2]Department of Biochemistry, Riphah International University, Faisalabad Campus, Faisalabad
[3,8*]Department of Botany, University of Sargodha
[4,5,6,7]Department of Botany, University of Lahore, Sargodha Campus, Sargodha

***Corresponding Author:** Rana Muhammad Zubair
*Department of Botany, University of Sargodha. Email: zubairzill12@gmail.com

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Introduction

Right from the start of life, man is dependent on plants for various purposes. Plants and plant products are used for various purposes like food, timber, clothing, paper production and especially for medicines. Certain plant parts are recommended for prevention and treatment of number of ailments (Chah et al. 2006). Regional people use variety of ways to use different kind of vegetation for beneficial purposes especially medicinal (Adnan et al. 2014). As a result of different studies performed by Teklehaymanot and Giday (2007), it was concluded that almost all parts of medicinal plant are used for the formation of a number of medicines. Nyamanga et al. (2008) reported that a large number of people in underdeveloped countries still use herbs by using cultural ways for production of medicines and drugs. Sarwat et al. (2012) highlighted the problem of people of underdeveloped countries that their financial condition is not too good so most of the people use traditional ways for treatment of diseases and ailments. According to the local peoples these medicines are very much effective, easily available and have very little or no side effects. Plants and plant products have a key role in synthesizing new drugs (Verpoorte et al. 2006). Currently, in pharmaceutical industry 25% drugs are totally obtained from plant sources and a number of synthetic drugs are prepared by using chemicals and compounds extracted from different plants (Cordell and Colvard 2006). Due to these reports, in modern times the role of medicinal plants in traditional health system has diverted the mind of researchers towards the field of ethno medicines.

In Pakistan, a large number of plants are being used to cure certain diseases. The knowledge of use of plant for medicinal purposes is not properly documented and urban community has poor information about the use of plant species to cure different diseases (Shinwari and Khan 2008). However local communities of different areas in Pakistan have years old information about the medicinal uses of important plant species of their respective area. The indigenous knowledge related to medicinal uses of plants has been shifted from one generation to the next (Shinwari 2010). These plants and plant parts are used to cure almost every kind of disease from headache to cut and wounds (Bhardwaj and Gakhar 2005). Many important plant species are harvested commercially to extract different types of ingredients which are further used in the production of medicines. Different medicinal systems like Unani, homeopathy and Ayurvedic are mostly dependent on medicinal characteristics of these plants but in the current time precious information of indigenous knowledge is at risk of being lost due to the unawareness of local communities (Meena et al. 2009).

Among 6000 species of higher plants, nearly 12 % are used for medicinal purposes in Pakistan (Shinwari 2011). According to a survey conducted by Forest Institute Survey of Pakistan, more than 200 species are traded all over Pakistan. Karkii et al. (1999) documented that about 90 % of the 2000 medicinal and aromatic plant species that exist in Pakistan are imported. Keeping in view the ethnomedicinal importance, Sargodha District is considered as one of the least researched city of the province Punjab, Pakistan. Very little data is available related to medicinal importance, phytochemical estimation and ecological role of plant species. According to latest ethno botanical information of District Sargodha 100 species belonging to 39 families were reported to have their role for medicinal purposes (Shah et al. 2015). So there is need to collect and conserve the data related to important plant species of the area. For this purpose local people, specially aged and herbal specialist (Traditional healers) can play a important role. In present era traditional knowledge related to medicinal importance of plants is useful in conserving cultural tradition and biodiversity as well as it can upgrade community healthcare and pharmaceutical industry in future (Pea 2001). The present study, therefore, documents the traditional knowledge of Tehsil (Shahpur) of District Sargodha on medicinal uses of commonly cultivated three plant species.

Materials and Methods

Description of Study Area

Our study areas were sectioned into different localities of Tehsil Shahpur, District Sargodha. Most of the people in these areas depend on agriculture, agroforestry. The study was conducted from April to October, 2108. Shahpur is located at a distance of 222 kilometer in northwest of Lahore. It has links with M2 motorway at various points. District Jhang is situated in the east of Shahpur while Chashma Barrage and Mianwali lies in the west of Shahpur and Dera Ismail Khan is found at the distance of 182 km southwest from the city. Shahpur is well kmown for historical building like Kazi Mohammad Chishti Masjid. The River Jhelum flows on the western and northern sides while Chenab River stretches on the eastern side of

the city. The city is found at 190 meters above the sea level.

From different areas of Shahpur 15 boys, 15 girls (1st age group), 15 men, 15 women (2nd age group), and 30 old aged people (15 men and 15 women) were interviewed individually. Plant specimens were identified by local experts and previous published data (Shafi et al. 2001). The informants were Urdu and Punjabi speaking. The informants were different questions by using a structured and open ended questionnaire having the following questions.

1. Do you know the important medicinal plants of Tehsil Shapur? (Yes or No)
2. If you know then please name them.
3. For what purposes these medicinal plants are used (medicine, food, fodder)?
4. In which form do you use the plants (Decoction, Infusion, Powder)?
5. In which condition different parts of plants can be used (fresh, dry, fresh and dry)?
6. Do you use whole plant or specific parts of plants for curing diseases (leaves, stem, root)?
7. Which type of diseases can be cured by using these plants?
8. Have you any experience of collecting plant for medicinal purposes?
9. Do you use to collect all types of plant or specific type of plants?

Specific questions related to the selected plants (*Camellia sinensis, Ocimum tenuiflorum, Mentha piperita*) for present article were also asked by the informants. Data related to traditional uses of plants and identification of plants in different areas was done by showing already collected specimens to older peoples.

Antimicrobial Study:
The concentrates of leaves of selected plants (Tulsi, *Camellia sinensis* and Mentha) were individually tested against a group of microorganisms comprising of four bacterial and fungal strains.

3.2.1.1 *Fungal Strains:*
1) Fusarium solani
2) Aspergillus niger
3) Rhizopus nigrican
4) Aspergillus parasiticus

3.2.1.2 *Bacterial Strains:*
1) Pasteurella multocida (Gram negative)
2) Staphylococcus aureus (Gram positive)
3) Bacillus substillus
4) Escherichia coli

3.2.1.3 *Preparation of Reagents*:
Supplement Agar (2.8%)
Supplement agar (2.8%) was prepared by autoclaving at 121°C for 15 minutes and was utilized for bacterial medium.

Sabouraud Dextrose Agar (6.5%)
Sabouraud Dextrose Agar (6.5%) was utilized as asay for fungal species. It was prepared by using distilled water by autoclaving at 121 °C for 15 minutes.

Nutrient Broth (1.3%)
Fixed quantity of (1.3%) nutrient broth was utilized for above mentioned species of fungi by using distileed water by autoclaving at 121°C for 15 minutes.

Potato Dextrose Agar (3.9%)
Potato Dextrose Agar (3.9%) was utilized in distilled water by autoclaving at 121°C for 15 minutes to culture bacterial species.

3.2.1.4 *Antifungal Examine:*
A well-known method, Disc diffusion was used to assess the antifungal activity of different parts of selected plants (Tulsi, Green Tea and Mentha). Sabourad Dextrose Agar medium was utilized to separate the uncontaminated cultures of contagious microorganisms that were disinfected in hot air boilers at 180 °C for 5 hours. For the fine and perfect growth of fungal, incubator was used and temperature was set at 28°C for 2-3 days.

3.2.1.5 *Antifungal Test by Disc Diffusin Method:*
Growth medium was shifted to sterilized petri plated. Small paper discs were placed on the growth medium containing the extracts (20 mg/ml) of different parts of the selected plants (Tulsi, Green Tea and Mentha). After shifting the discs, petri plates were incubated at 28°C for 2 days for growth development of selected microbes. Growth free zones were found around the plates because of the antifungal action of extracts of different parts of (root, stem and leaves) Tulsi, Green Tea and Mentha.

3.2.1.6 *Antibacterial Assay:*
Pure cultures of selected bacterial species were placed on nutrient agar medium in the petri plates. Nutrient broth (13 g/ml) was poured in distilled water, shaked well and then was autoclaved at 121°C. Pure cultures of selected bacterial species were placed on nutrient agar medium in the petri. The inoculants were then kept at 4°C.

3.2.1.7 *Antibacterial examine by Disc Diffusion Method:*

Antibacterial activity of different parts (Root, stem and leaves) of selected plants (Tulsi, Green Tea and Mentha) was assessed by utilizing disc diffusion method. Nutrient agar (14 g/500 ml) was shaked well after pouring it in the distilled water. The nutrient agar medium was cleaned and autoclaved for 15 minutes at 121°C. In the next step inoculums (50 µl/50 ml) were added to the medium and poured in Petri plates. After this small paper discs were laid smooth on nutrient medium containing the arrangement of (100 µg/ml) of trial extracts of different parts of selected plants. For fine growth, petri plates having growth medium were then incubated for 24 hours at 37°C. The extracts of different parts of selected plants (Tulsi, Green Tea and Mentha) hindered the growth of bacterial species and growth free zones were confirmed to the plates where the arrangement of the extracts of selected parts of Tulsi, Green Tea and Mentha were set. Zone of inhibition were estimated in millimeters by utilizing scale.

Least inhibitory focus (MIC) of concentrates:

The results of MIC were acquired through Microwell plate reader.

Results

Ethno Medicinal Information Collected From informants of age ranging from 25-40 Years

Ethnobotanical data related to the selected plants of the present study is given in Table 01. Data given in table 01 was collected from the people of age ranging from 25-40 years. It is clear from the data given in Table 01 that locally *Camellia sinensis* is known by the name of *Sabz chaye*. In English it is called Green Tea. Almost all parts are used for medicinal purposes. Leaves are given special importance to cure a number of diseases such as to lower the cholesterol level, to boost the immune system. It is also useful in reducing the chances of heart attack.

Second plant that was preferred by local people was *O. tenuiflorum.* Local name as well as English name of of *O. tenuiflorum* is *Tulsi*. The informants highlighted the medicinal importance of leaves of *O. tenuiflorum*. However a few people also suggested that its stem and root also bear medicinal properties. It is mostly taken in the form of decoction and infusion. According to the informants this plant can be used to cure respiratory problems, sore throat, cold and fever.

Informants also preferred *Mentha piperita* for curing a number of diseases. Locally *M. piperita* is known by the name of *Podina and in* English language it is called as Mint. In case of *M. piperita*, highlighted the importance of leaves for solving health issues such as gastrointestinal problems and respiratory disorders (Table 01).

Ethno Medicinal Information Collected from informants of age ranging from 40-55 Years

Data collected from second group was almost same if consider the local names and English names of the selected plants. However second group gave a bit more information related to the medicinal importance of the plants (Table 02).

C. sinensis can be used to control cholesterol level, reduces the chances of heart attact and also strengthen the immune system if taken orally or in infusion form. Leaves and stem are medicinally important according to the informants.

Similarly leaves and stem of *O. tenuiflorum* has medicinal importance according to the experience of informants. These parts of *O. tenuiflorum* have power of healing. Coughing, Cancer and Teeth disorders can also be cured by using these parts of *O. tenuiflorum.* Data given in Table 02 is clearly indicating that these parts were also preferred to use in the form of decoction and infusion.

Table 03 illustrates that *M. piperita* is the third plant which was preferred to use for medicinal purposes by local informants. In case of *M. piperita*, again the importance was given to leaves followed by stem. These parts of *M. piperita* are used to cure problems related to immune system, central nervous system and kidney.

Ethno Medicinal Information Collected from informants of age ranging from 55-70 Years

Complete and concise information related to the selected medicinal plants was collected from the people of 3rd age group. The reason is that these people were aged, experienced and have almost complete knowledge of medicinal importance of these plants.

According to the informants of this group local name of *C. sinensis* is *Sabz chaye* and in English it is known by the name of Green Tea. The informants preferred leaves and stem however few people also told that roots of *C. sinensis* also have medicinal properties. These parts can be used in the form of decoction, infusion and powder form. It was clear from the information told by people of this group that they have personal experience of usage of these plants. According to the information provided by the informants, *C. sinensis* is used to resis aging process. It also decreases sugar level in the blood. *C. sinensis* is useful in curing arthritis, helps in weight loss and reduces the chances of heart attack.

Informants of the experienced group also shed light on the medicinal importance of *Ocimum O. tenuiflorum.* It is clear from the data given in Table 03 that local and English name of *O. tenuiflorum* is Tulsi. Mostly used parts for medicinal purposes are leaves and stem. A few respondents also highlighted the importance of roots. These parts of plant can be used to cure mouth infections, cancerious problems, skin problems and eye disorders.

Table 03 depicts the medicinal importance of *M. piperita*. It was clear after interviewing the people of this group that mostly leaves and stem are used for medicinal purposes. Local people used the leaves along with spicy material for eating. These parts of plant also bear medicinal importance. The above mentioned parts are used to cure certain disorders related to kidney, central nervous system, gastrointestinal and respiratory problems. Highlighted parts of *M. piperita* also bear antimicrobial properties.

Knowledge about Medicinal Plants and Important Medicinal Plants of Tehsil Shahpur

As mentioned above questionnaire method was used to get the information related to medicinal plant of Tehsil Shahpur. During the survey first and second question was

1. Do you know the important medicinal plants of Tehsil Shapur? (Yes or No)
2. If yes then name them.

It was revealed after survey that 65% of respondents say Yes and 35% say No, while in case of second and third group 73% and 91% say Yes and 27% and 9% say No (Fig 01).

When the respondents were asked to name the important medicinal plants, It was observed that the names of *C. sinensis*, . *tenuiflorum and M. piperita* were told in highest percentage (Fig 02).

Purpose of the Use of Medicinal Plants (Medicine, Food and Fodder)

Data of figure 03 is clearly indicating that 1st age group preferred (55%) the use of selected medicinal plants for improving health issues followed by food (44%) and fodder (1%). Similarly 2nd and 3rd age group also highlighted that selected medicinal plants are highly recommended (51% and 56%) for medicinal purpose followed by food (46% and 43%) and fodder (3% and 1%).

In Which Form Medicinal Plants Are Used (Decoction, Infusion and Powder)

It is quite obvious from the data of Fig. 04 that 1st , 2nd and 3rd age group recommended (65%, 71% and 55%) the use of parts of medicinal plants in the form of decoction and infusion (33%, 29% and 43%). Only 2% from group 1st and 3rd recommended the use of medicinal plants in the form of powder.

Status of Use of Medicinal Parts of Plants

Local people use different parts of plants in different ways i.e. some people suggested to use different parts freshly, some use it after drying. It was also concluded from the information received from respondents that 57 % people suggested that health issues can be treated by using leaves, stem and root either dry or fresh. 31 % people preferred to use different parts of selected plants in dry form while 32 % said that fresh parts of selected plants should be used to cure health problems (Fig. 05).

Parts of Plant Species Used For Ethnobotany in Percentage

From the present ethnobotanical survey from Tehsil Shahpur, District Sargodha, It is quite obvious from the data presented in Fig. 06 that 70 % people suggested the use of leaves of *C. Sinensis* for curing certain health problems followed by stem (44 %), whole plant (29 %) and roots (27 %). As for as the preferred parts in case of *O. tenuiflorum* is concerned, 44 % respondents suggested that leaves bear maximum medicinal properties as compared to stem (33 %), roots (7 %) and whole plants (5 %). Likewise *C. Sinensis* and *O. tenuiflorum*, in case of *M. Piperita*, respondents also highlighted the importance of leaves (67 %) to cure health issues. 31 % people said that stem also bear medicinal characters while the use of roots and whole plant is suggested by 7 % and 5 % peoples.

Diseases Cured By Using Different Parts of Medicinal Plants

Fig. 07 highlighted the percentage of respondents who preferred the use of selected medicinal plants for curing certain diseases. 55%, 58%, 40%, 23%, 23% and 60% recommended that cholesterol level, immune system problems, sugar, arthritis, antimicrobial and heart problems can be cured by using different parts of *C. sinensis.*

It is also clear from Fig. 06 that 67%, 51%, 58%, 52%, 71%, 61%, 73%, 45% and 21% respondents suggested that different parts of *O. tenuiflorum* can be used to cure respiratory, teeth, kidney, cancer, skin, healing, coughing, antimicrobial and heart diseases.

According to the respondents, different parts of *M. Piperita* are used to cure various health problems. Data given in Fig. 07 revealed that 77%, 78%, 65%, 70%, 83%, 68% and 37% respondents mentioned

that different parts are used to cure health issues related to immune system, respiratory, kidney, skin, gastrointestinal, CNS and antimicrobial.

Experience of Collection of Medicinal Plants (All Types or Specific Plants)

In present study it was also asked by the respondents that weather they collected medicinal plants or not? Respondents of 1st, 2nd and 3rd age group revealed that 65%, 60% and 90% people have a experience of collection of medicinal plants while 35%, 40% and 10% respondents don't have experience of plant collection (Fig. 08). 90%, 70% and 33% respondents of group 1st, 2nd and 3rd group collected specific types of plants while 10%, 30% and 67% respondents collected all types of plant used to cure certain diseases (Fig. 09).

Comparison of Ethnomedicinal Knowledge Held by Both Genders in Percentage

Present survey revealed that gender and age group differ in traditional knowledge with respect to medicinal importance of plants. First age group had very little knowledge related to medicinal usage of plants followed by second age group. Reason is that, in modern era knowledge from elder people is not properly transferred to young generation and involvement of young people in trading or government profession. Almost complete detail was provided by third age group (55-70 years of age). It was also observed from the current study that male respondents had more knowledge as compared to female respondents (Fig. 10).

ANTIBACTERIAL ACTIVITY OF SELECTED PLANTS:

4.2.1 Antibacterial Activity of Leaves of Selected Plants Grown in Field:

To check the antibacterial potential of selected plants different solvents were used such as methanol, ethanol and water. Different parts of selected plants e.g leaves, stem and roots were used to check the antibacterial potential of selected plants.

4.2.1.1 ***Antibacterial Activity of Leaves of Green Tea*****:**

Table 04 depicts the antibacterial potential of leaves of selected plants (Green Tea, Tulsi and Mint) against different bacterial strain i.e. *Eschercia coli, Staphlococcus aureus, Pasteurella multocida and Bacillus subtillis.* It is clear from table 04 that antibacterial value of control against *E. coli* was 24 µg/mL in each solvent. In case of green tea highest value was noticed in case of ethanol i.e. 28 µg/mL which was 16.66 % higher as compared to control.

As far as the antibacterial activity of green tea against *S. aureus* is concerned, in control it was 26 µg/mL while in case of methanol, ethanol and water, antibacterial activity was 31, 30 and 47 µg/mL which was 19.23, 15.38 and 80.76 % higher as compared to control.

Data shown in table 04 illustrates that antibacterial activity of green tea against *P. Multocida* was also higher as compared to control (23 µg/mL). Antibacterial activity was 27, 37 and 32 µg/mL in methanol, ethanol and water which was 17.39, 60.86 and 39.13 % higher as compared to control.

The values of antibacterial activity of green tea against *B. substilis* are shown in table 04. In control the antibacterial potential was recorded 27 µg/mL. When the antibacterial potential of leaves of green tea was checked against B. Substilis, it was recorded 31, 40 and 23 µg/mL which was 14.81 and 48.14 % higher in case of methanol and ethanol but 14.8 % less as compared to control.

4.2.1.2 ***Antibacterial Activity of Leaves of Tulsi:***

To check the antibacterial potential of leaves of Tulsi, different solvents were used i.e. methanol, ethanol and water against different strains. When the antibacterial activity *against E. coli* was carried out, it was observed that maximum MIC values were recorded in methanol (44 µg/mL) which was 83.33 % higher than control (24 µg/mL) and can't be comparable with control. MIC value was 43 and 36 µg/mL in case of ethanol and water, which was 79.16 and 50 % higher as compared to control (24 µg/mL) can't be comparable with control.

Antibacterial potential of leaves of Tulsi was much closer to antibacterial potential of control (26 µg/mL) when it was checked against *S. aureus*. Antibacterial potential of leaves of Tulsi against *S. aureus* was 33, 34 and 28 µg/mL which was 26.92, 30.76 and 7.69 % higher as compatred to control (26).

As far as the antibacterial potential of *P. Multocida* is concerned for the leaves of Tulsi, it was higher in case of methanol and water (53 and 33 µg/mL) as compared to control and in case of ethanol it was 43 % (13 µg/mL) lower as compared to control (23 µg/mL).

Maximum values of antibacterial potential were recorded when leaves of Tulsi were subjected to *B. Substilis*. Against this bacterial strain MIC values were 45, 33 and 36 µg/mL which were 66.66, 22.22 and 33.33 % higher as compared to control (27 µg/mL).

4.2.1.3 *Antibacterial Activity of Leaves of Mint:*

Antibacterial activity of Mint against different bacterial strain is also given in Table 04. It is clear from data given in table 04 that MIC values were higher as compared to control (24 µg/mL except in water. The values of antibacterial potential were 55, 39 and 15 µg/mL which were 129.16, 62.5 % higher as compared to control but 37.5 % less in case of water. The antibacterial values were only comparable to control in case of water. Data given in table 04 depicts that the antibacterial values against *S. aureus* were much closer to control (26 µg/mL) in case of methanol and water and can be comparable as compared to control but in case of ethanol much higher value was recorded (54 µg/mL) which was 107.69 % higher as compared to control.When the antibacterial potential of leaves of mint was checked against *P. Multocida* it was observed that in each solvent MIC values were much higher as compared to control (23 µg/mL). Antibacterial values were 71, 67 and 57 µg/mL in case of methanol, ethanol and water which were 208.69, 191.30 and 147.82 % higher as compared to control.As far as the antibacterial potential of leaves of Mint against *B. Substilis* is concerned, no solvent was comparable to the control (27 µg/mL). In methanol,ethanol and water, recorded values were (55, 32 and 46 µg/mL) 103.70, 18.51 and 70.37 % higher as compared to control.

ANTIFUNGAL ACTIVITY OF SELECTED PLANTS:

4.3.1 Antifungal Activity of Leaves of Selected Plants Grown in Field:

To check the antifungal potential of selected plants different solvents were used such as methanol, ethanol and water. Different parts of selected plants e.g leaves, stem and roots were used to check the antifungal potential of selected plants against different fungal strains such as *A. parasiticus, Fusarium solani, Aspergillus niger* and *Sportium ferrugenium.*

4.3.1.1 *Antifungal Activity of Leaves of Green Tea:*

Table 10 depicts the antifungal potential of leaves of selected plants (Green Tea, Tulsi and Mint) against different fungal strain i.e. *A. parasiticus, Fusarium solani, Aspergillus niger* and *Sportium ferrugenium.* It is clear from table 10 that antifungal value of control against *E. coli* was 24 µg/mL in each solvent. In case of green tea highest value was noticed in case of ethanol i.e. 29 µg/mL which was 45 % higher as compared to control.

As far as the antifungal activity of green tea against *F. solani* is concerned, in control it was 19 µg/mL while in case of methanol, ethanol and water, antifungal activity was 31, 30 and 47 µg/mL which was 21.05, 89.47 and 10.52 % higher as compared to control (19 µg/mL).

Data shown in table 10 illustrates that antifungal activity of green tea against *A. niger* was also higher as compared to control (17 µg/mL). Antifungal activity was 11, 24 and 19 µg/mL in methanol, ethanol and water which was 41.17 and 11.76 % higher as compared to control in ethanol and water but 35.2 % lower in case of methanol.

The values of antifungal activity of green tea against *S. ferrugenium* are shown in table 10. In control the antifungal potential was recorded 16 µg/mL. When the antifungal potential of leaves of green tea was checked against S. ferrugenium, it was recorded 23, 35 and 25 µg/mL in methanol, ethanol and water which was 43.75, 118.7 and 56.25% higher in case of methanol, ethanol and water as compared to control.

4.3.1.2 *AntifungalActivity of Leaves of Tulsi:*

To check the antifungal potential of leaves of Tulsi, different solvents were used i.e. methanol, ethanol and water against different strains. When the antifungal activity against *A. parasiticus* was carried out, it was observed that maximum MIC values were recorded in ethanol (29 µg/mL) which was 45 % higher than control (20 µg/mL) and can't be comparable with control. MIC value was 23 and 29 µg/mL in case of methanol and water, which was 15 and 45 % higher as compared to control (20 µg/mL) can't be comparable with control.

The values of antifungal potential of leaves of Tulsi werefar away from antifungal potential of control (19 µg/mL) when it was checked against *F. Solani*. Antifungal potential of leaves of Tulsi against *F. solani* was 35, 41 and 34 µg/mL which was 84.21, 115.78 and 78.94 % higher as compatred to control (19).

As far as the antifungal potential of *A. niger* is concerned for the leaves of Tulsi, it was higher 111.76, 70.58 and 111.76 in case of methanol, ethanol and water (36, 29 and 36 µg/mL) as compared to control (17 µg/mL).

Maximum values of antifungal potential were recorded when leaves of Tulsi were subjected to *S. ferrugenium*. Against this fungal strain MIC values were 41, 33 and 34 µg/mL which were 156.25, 106.25 and 112.5 % higher as compared to control (16 µg/mL).

4.3.1.3 *Antifungal Activity of Leaves of Mint:*

Antifungal activity of Mint against different fungal strain is also given in Table 10. It is clear from data given in table 10 that MIC values were higher as

compared to control (20µg/mL). The values of antifungal potential were 27, 43 and 36 µg/mL which were 35, 115 and 80 % higher as compared to control.

Data given in table 10 depicts that the antifungal values against *F. solani* were much closer to control (19 µg/mL) in case of methanol and can be comparable to control but in case of ethanol and water, much higher value was recorded (44 and 37 µg/mL) which was 131.57 and 94.73 % higher as compared to control (19 µg/mL).

When the antifungal potential of leaves of mint was checked against *A. niger* it was observed that in each solvent MIC values were much higher as compared to control (17 µg/mL). Antifungal values were 43, 33 and 26 µg/mL in case of methanol, ethanol and water which were 152.94, 94.11 and 152.94 % higher as compared to control.

As far as the antifungal potential of leaves of Mint against *S. ferrugenium* is concerned, no solvent was comparable to the control (16 µg/mL). In methanol,ethanol and water, recorded values were (36, 30 and 35 µg/mL) 125, 87.5 and 118.75% higher as compared to control

Discussion

Main aim of the present study was to explore the ethno-botanical importance of the selected plants of Tehsil Shahpur, District Sargodha. Surveys were carried out to gather the information related to medicinal uses of selected plants. Questionnaire method was used to collect the ethno-medicinal data. Data was collected from 3 different age groups mentioned in the Results section.

According to the respondents almost all parts of the *C. sinensis* are used to cure various health disorders i.e. arthritis, cancer, heart problems, immune system (Table 01, 02, 03). Biochemistry studies of *C. sinensis* revealed that a large number of polyphenols are present in the leaves and stem of *C. sinensis* which are considered as potent antioxidants. If taken on regular bases these polyphenols play a crucial role in the body and help in curing certain health problems (Koo and Cho 2004). Tsuneki et al. (2004) also highlighted the ethno-botanical importance of *C. sinensis* during their survey to various locations. Tsuneki and his colleagues reported that *C. sinensis* can be useful in curing heart diseases and also lowers the blood pressure. Similar kind of data was also reported by Zaveri in 2006. Zaveri (2006) carried out epidemiological and analytical studies on *C. sinensis* and observed that many chronic disorders can be cured by using different parts of *C. Sinensis*.

Ethnobotanical importance of *O. tenuiflorum* was also highlighted by the informants in the present study. According to informants, teeth disorders, coughing, respiratory disorders and cancerous problems can be cured by using leaves and stem of *O. tenuiflorum* in the form of decoction and infusion (Table 01, 02, 03). It was observed that *O. tenuiflorum* activates antioxidant enzymes such as catalases and superoxide dismutases that play a role in the protection of cellular organelles and membranes (Shivananjappa and Joshi 2007). Tulsi also plays a vital role in reducing the cancerous activity in the body of organism (Siddique et al. 2007). Certain biochemical compounds present in the *O. Tenuiflorum* reduce the growth or kill cancerous cells by inducing apoptosis (Jha et al. 2012). It's not only reduces the damage but also play a key role in preparing the body to act efficiently to stop the action of toxic compounds by uplifting the activity of P450 enzymes found in liver which usually detoxify harmful chemicals that are injurious to health (Rastogi et al. 2007). Broad research on biochemistry of this plant made it clear that in future it will be helpful in providing security against harmful pollutants, pesticides, heavy metals and many other industrial toxins due to presence of many active biocompounds (Manikandan *et al*., 2007). Many other scientists shed light on the medicinal importance of *O. Tenuiflorum* during their research. It was reported by the researchers that leaves, stem and root of *O. Tenuiflorum* is helpful in treating many disorders like skin diseases, asthma, cardiac and urinary problems. Skin diseases, coughing and fever (Singh et al. 2010; Mohan et al. 2011).

M. piperita was the third plant in the present study which was preferred by local people on the basis of medicinal importance. *M. Piperita* is useful in curing a number of health problems such as it boosts immune system, cures kidney, respiratory and skin problems by taking in the form of infusion and decoction. It is also useful against many microbes. Actual mechanism of action of its different parts is still to be known. However some other research workers proved it medicinal importance during their surveys that it can be useful in treating various health disorders like gastrointestinal, respiratory and central nervous system problems. It also bear antimicrobial properties (Kozan et al. 2006; Naseri et al. 2008).

Conclusion and Recommendation

From the current survey in Tehsil Shahpur, Districh Sargodha, it is concluded that this tehsil is full of medicinal plants but anthropogenic activities which

are increasing day by day are real threat to plant diversity. Over grazing, deforestation are also main problems for the local plant biodiversity. So there is need to conserve this precious data because reintroducing programs of important medicinal species are not possible in near future. Local people still rely on the medicinal plants although modern health care centres are also present. Our survey can be a baseline and a connection can be established between traditional health workers and scientific research centres which can be useful in novel drug discovery. Awareness programs should be carried out so that people should know the importance of plant diversity.

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Fig. 01: *Information of Local People about Medicinal Plants*

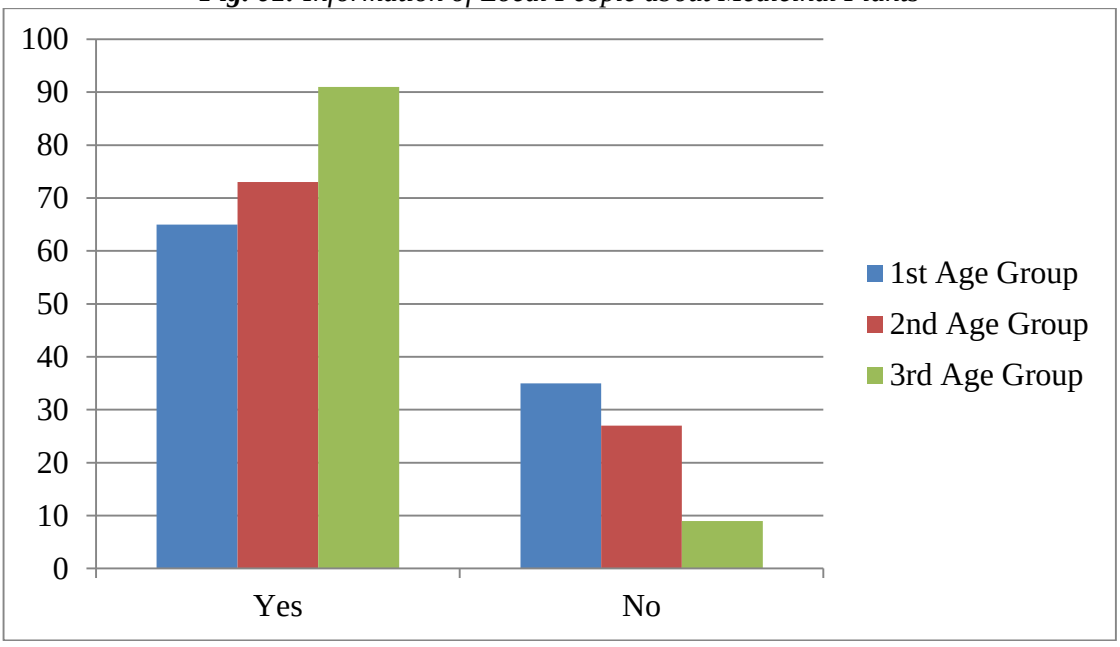

Fig. 02: *Medicinal Plants Known By Local Peoples*

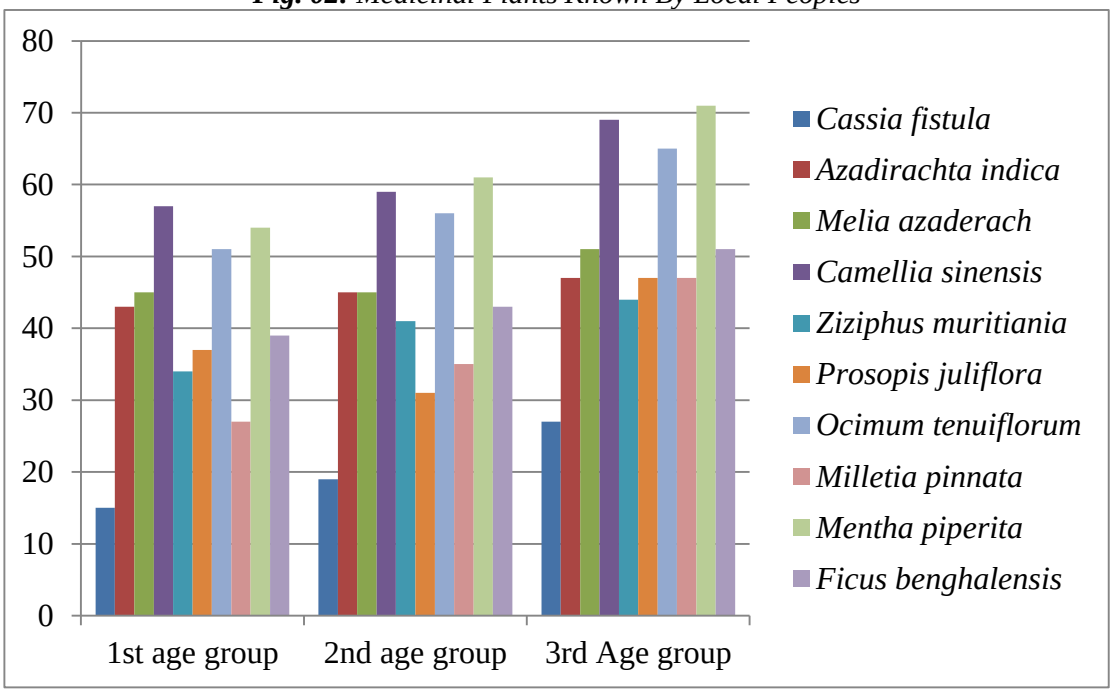

Fig. 03: *Purpose of Use of Medicinal Plants*

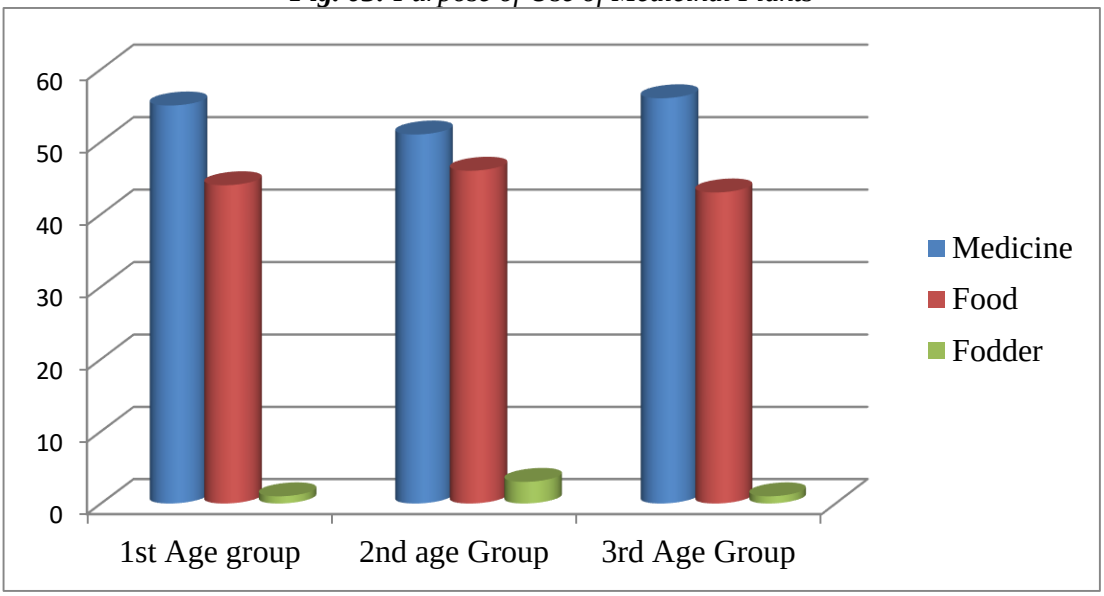

Fig. 04: *Form in Which Medicinal Plants Are Used*

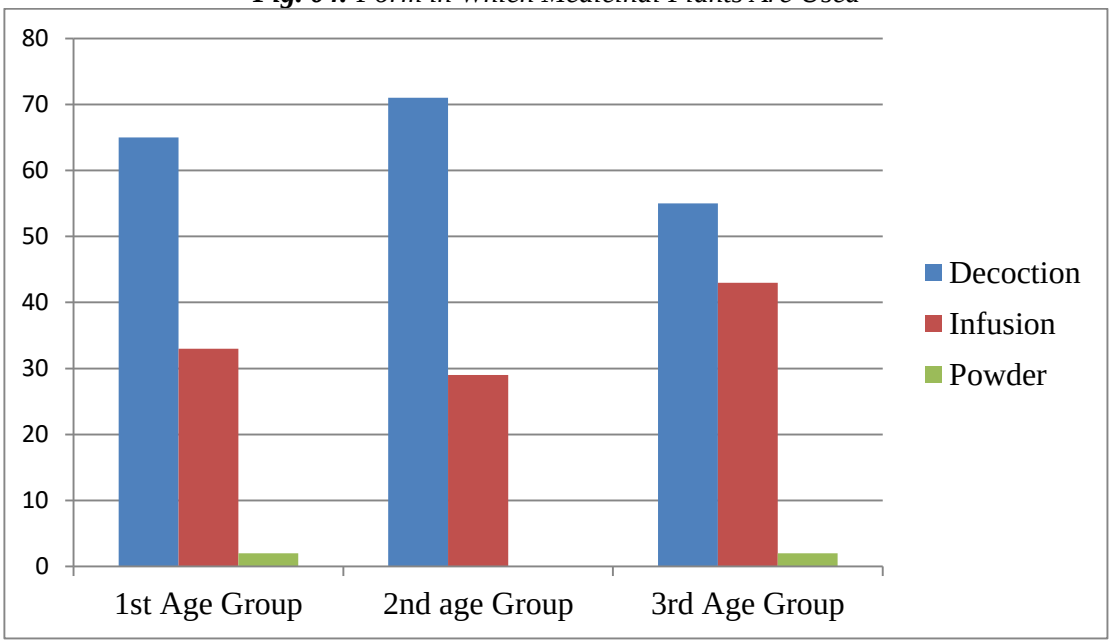

Fig. 05: *Status of Use of Medicinal Parts of Plants*

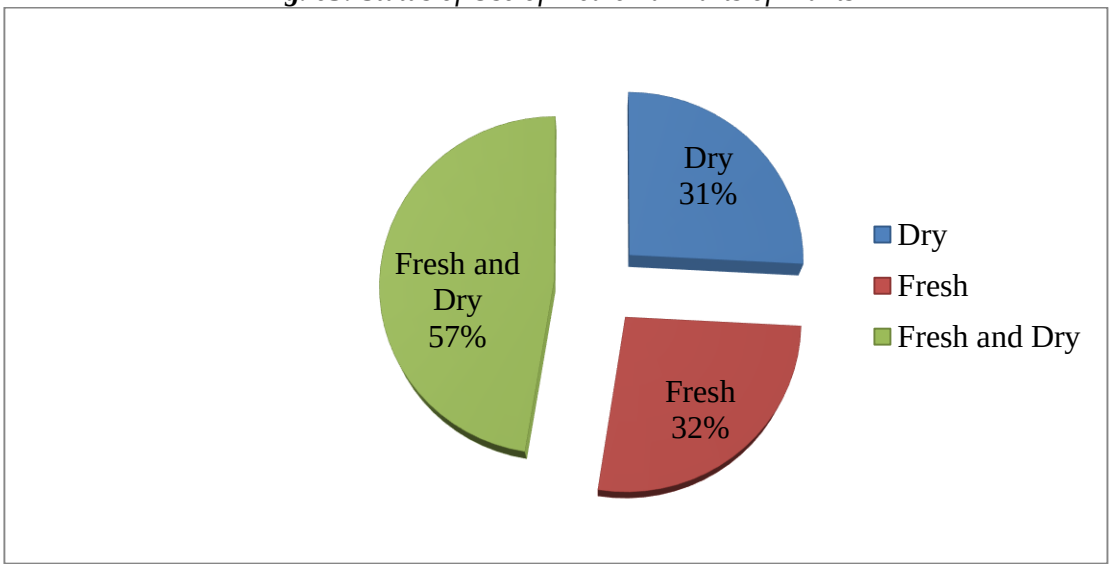

Fig. 06*: *Parts of Plant Species Used For Ethnobotany in Percentage

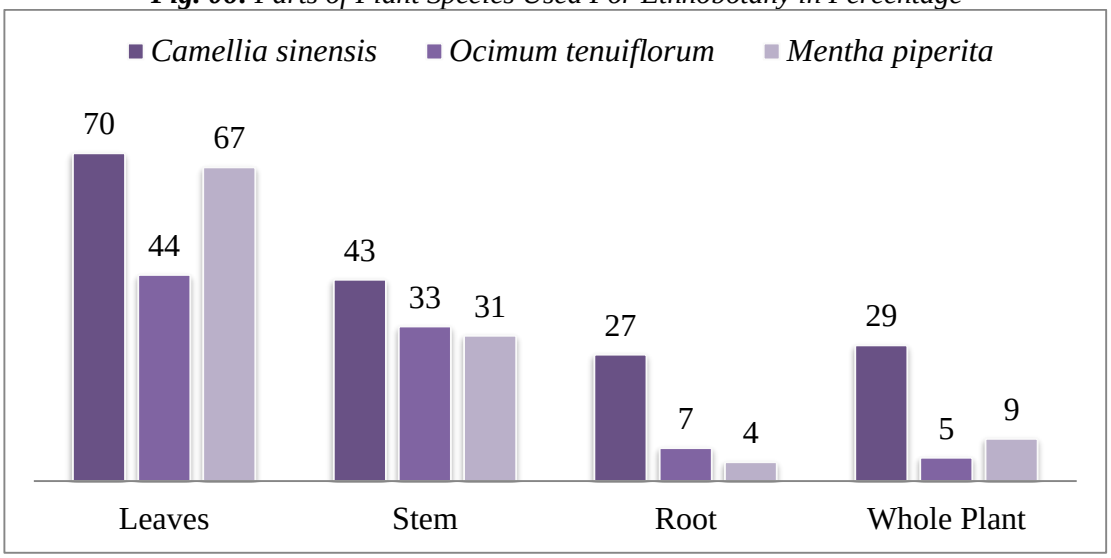

Fig. 07:* *Different Types of Diseases Cured By Selected Medicinal Plants

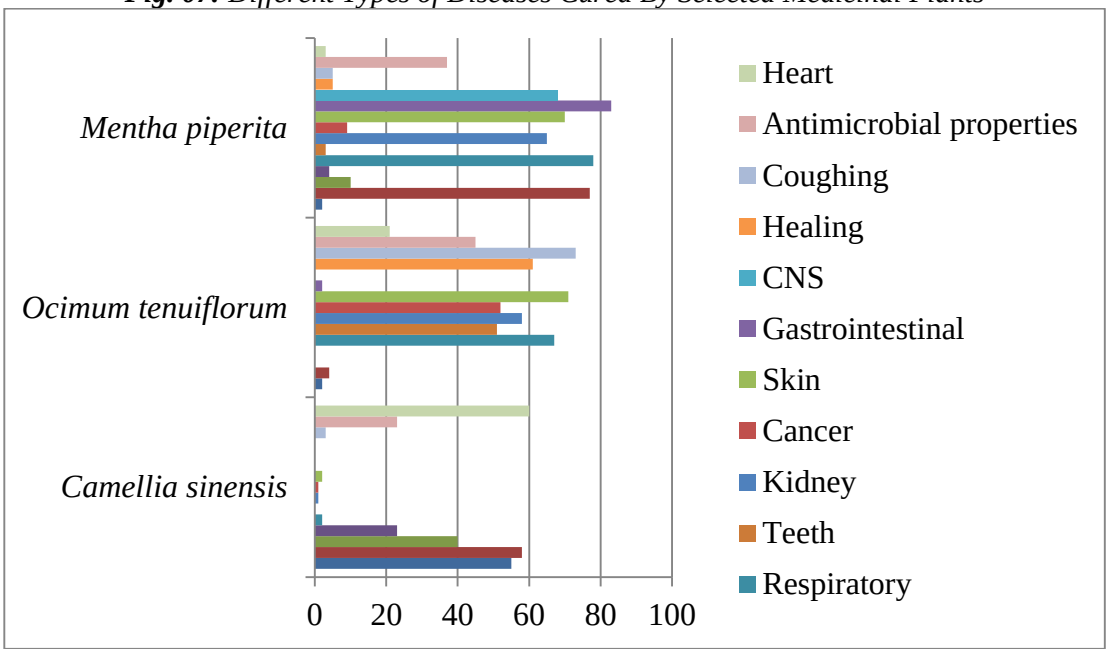

Fig. 08:* *Experience of Collection of Medicinal Plants

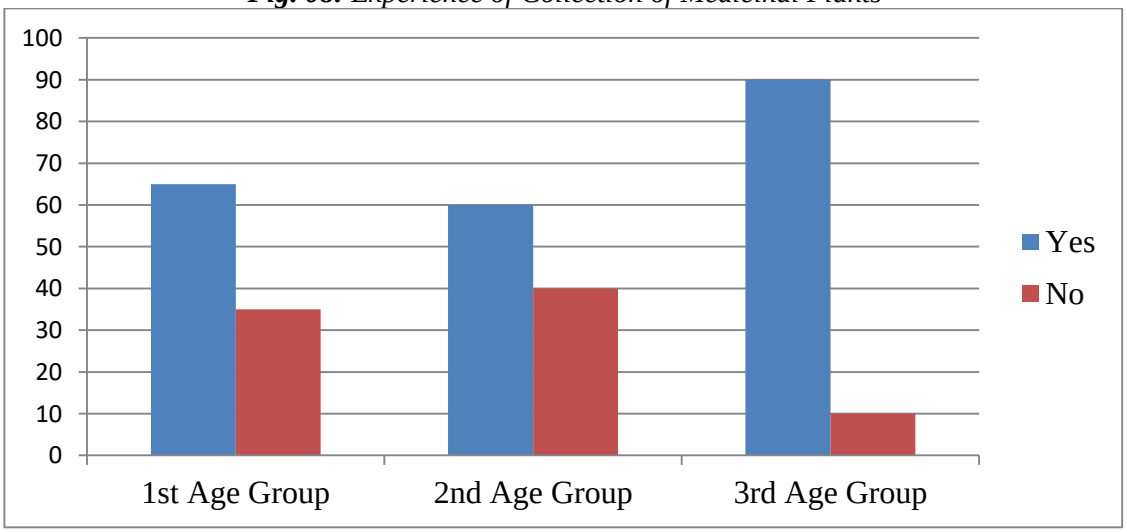

Fig. 09: *Collection of Specific Type of Plants or All Types*

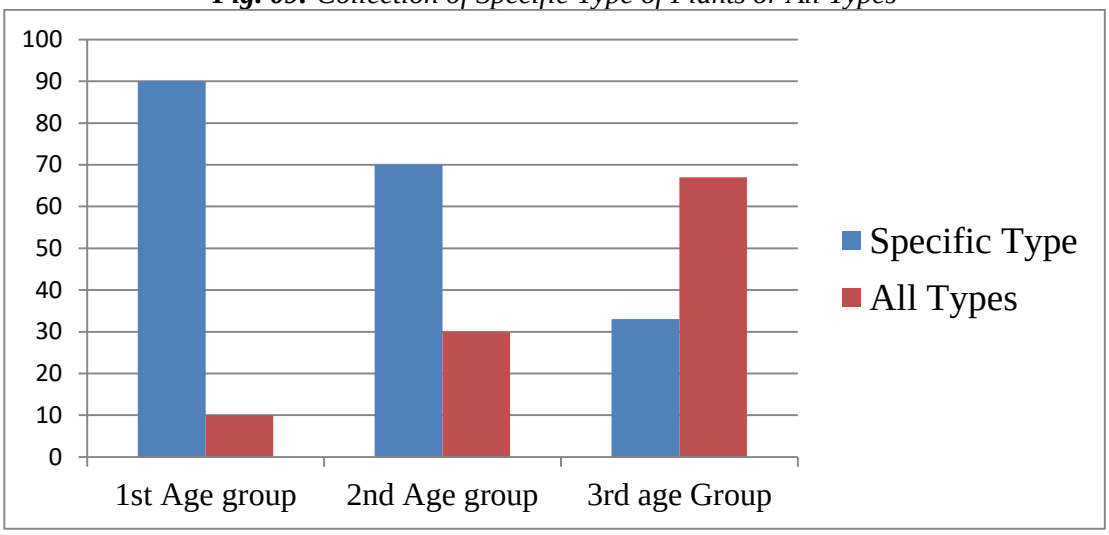

Fig. 10: *Comparison of Ethnomedicinal Knowledge Held by Both Genders in Percentage*

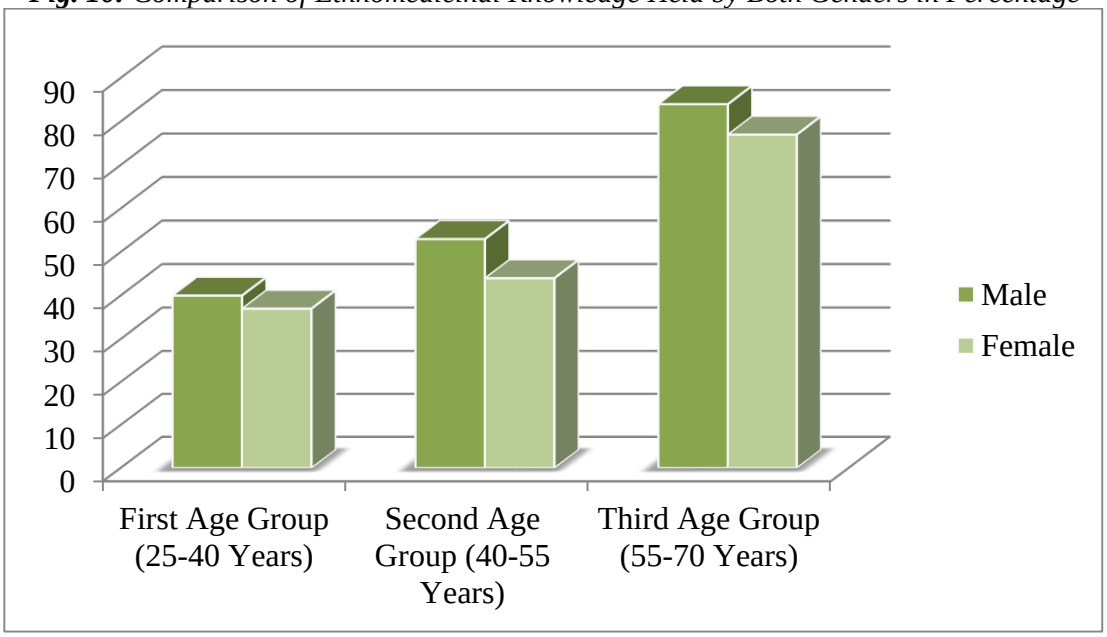

Table 01: *Ethno Medicinal Information Collected From informants of age ranging from 25-40 Years*

Sr. No	Scientific name	Local name	English name	Part used	Form used	Diseases treated
01	*Camellia sinensis*	Sabz Chaye	Green Tea	Leaves and Stem	Decoction, infusion and powder	Lowers cholesterol Boost immune system Reduces heart attack,
02	*Ocimum tenuiflorum*	Tulsi	Tulsi			Fever, Cold, Sore throat, Respiratory problems
03	*Mentha piperita*	Podina	Mint			Gastrointestinal problems, respiratory disorders

Table 02: *Ethno Medicinal Information Collected From informants of age ranging from 40-55 Years*

Sr. No	Scientific name	Local name	English name	Part used	Form used	Diseases treated
01	*Camellia sinensis*	Sabz Chaye	Green Tea	Leaves and Stem	Decoction, infusion and powder	Lowers cholesterol Boost immune system Reduces heart attack, Strengthen immune system
02	*Ocimum tenuiflorum*	Tulsi	Tulsi			Cancer, Cold, Sore throat, Respiratory problems, Healing ability, Coughing, Teeth disorders

03	*Mentha piperita*	Podina	Mint			Gastrointestinal problems, respiratory disorders, immune system, CNS problems, Kidney problems

Table 03: *Ethno Medicinal Information Collected From informants of age ranging from 40-55 Years*

Sr. No	Scientific name	Local name	Part used	Form used	Diseases treated
01	*Camellia sinensis*	Green Tea	Leaves, stem and root	Decoction, infusion and powder	Lowers cholesterol Boost immune system Reduces heart attack, Strengthen immune system, resists aging process, decreases sugar level of blood, helpful in preventing arthritis, helps in weight loss
02	*Ocimum tenuiflorum*	Tulsi			Cold, Sore throat, Respiratory problems, Healing ability, Coughing, Teeth disorders, Kidney stones, Cancer, mouth infection, skin probem, eye disorders
03	*Mentha piperita*	Mint			Gastrointestinal problems, respiratory disorders, immune system, CNS problems, Kidney, Skin problems, Antimicrobial properties

Table: 04 MIC (µg/Ml) of extracts of leaves of selected plants grown in field against selected Bacterial strains

	Antibacterial activity of the leaves of selected plants field grown							**Control**
Bacterial Strains	**Solvents**	**Green Tea**	**%increase/ decrease over control**	**Tulsi**	**% increase / decrease over control**	**Mint**	**% increase/ decrease over control**	**Rifampicin**
E. coli	Methanol	26 ± 0.07	8.33	44 ± 1.03	83.33	55 ± 0.24	129.16	24 ± 0.19
	Ethanol	28 ± 0.03	16.66	43 ± 1.03	79.16	39 ± 0.10	62.5	24 ± 0.19
	Water	19 ± 0.05	-20.8	36 ± 0.03	50.00	15 ± 0.13	-37.5	24 ± 0.19
S. aureus	Methanol	31 ± 0.21	19.23	33 ± 0.15	26.92	27± 0.67	3.84	26 ± 0.21
	Ethanol	30 ± 0.13	15.38	34 ± 0.19	30.76	54± 0.67	107.69	26 ± 0.21
	Water	47 ± 0.05	80.76	28 ± 0.07	7.69	29 ± 0.12	11.53	26 ± 0.21
P. multocida	Methanol	27± 0.18	17.39	53 ± 0.36	130.4	71 ± 0.14	208.69	23 ± 0.51
	Ethanol	37± 0.16	60.86	13 ± 0.34	-43.47	67 ± 0.13	191.30	23 ± 0.51
	Water	32± 0.12	39.13	33 ± 0.24	43.47	57 ± 0.07	147.82	23 ± 0.51
B. substilis	Methanol	31 ± 0.09	14.81	45 ± 0.14	66.66	55 ± 0.14	103.70	27 ± 0.17
	Ethanol	40 ± 0.06	48.14	33 ± 0.07	22.22	32 ± 0.15	18.51	27 ± 0.17
	Water	23 ± 0.13	-14.8	36 ± 0.16	33.33	46± 0.23	70.37	27 ± 0.17

Table: 05. MIC (µg/Ml) of extracts of leaves of selected plants grown in field against selected fungal strains

Fungal Strains	**Antifungal activity of the leaves of selected plants grown in field**							**Control**
	Solvents	**Green Tea**	**%increase/ decrease over control**	**Tulsi**	**%increase/ decrease over control**	**Mint**	**%increase/ decrease over control**	**Rifampicin**
Aspergillus parasiticus	Methanol	25 ± 0.15	25	23 ± 0.05	15	27± 0.11	35	20 ± 0.11
	Ethanol	29 ± 0.17	45	36 ± 0.07	80	43 ± 0.18	115	20 ± 0.11
	Water	27± 0.12	35	29 ± 0.03	45	36 ± 0.07	80	20 ± 0.11
Fusarium solani	Methanol	23± 0.14	21.05	35 ± 0.18	84.21	17 ± 0.09	-10.52	19± 0.11
	Ethanol	36± 0.16	89.47	41 ± 0.14	115.78	44 ± 0.03	131.57	19± 0.11
	Water	21± 0.08	10.52	34 ± 0.11	78.94	37± 0.07	94.73	19± 0.11
Aspergillus niger	Methanol	11± 0.17	-35.2	36 ± 0.12	111.76	43± 0.17	152.94	17± 0.11
	Ethanol	24± 0.04	41.17	29 ± 0.16	70.58	33± 0.12	94.11	17± 0.11
	Water	19± 0.13	11.76	36 ± 0.12	111.76	26± 0.16	152.94	17± 0.11
Sportium ferrugenium	Methanol	23 ± 0.15	43.75	41 ± 0.17	156.25	36 ± 0.08	125	16± 0.11
	Ethanol	35 ± 0.13	118.7	33 ± 0.14	106.25	30 ± 0.04	87.5	16± 0.11
	Water	25 ± 0.14	56.25	34 ± 0.08	112.5	35 ± 0.18	118.75	16± 0.11