Since pre-historic times, humans had been using plants to cure bodily disorders and hereby kept their health in perfect state of fitness and so lived a long life. Due to the after-effects caused by the synthetic drugs, people are now increasingly becoming inclined towards the traditional medicines (Meena et. al., 2014).

The medicinal plants have played an important role in the socio-cultural and spiritual ground of tribal and rural lives. The plants including the medicinal plants are potential renewable natural resources. Approximately 8000 species of the plants, accounting for around 50 percent of the flowering plant species of India have been used for preparation of different useful medicines. It had been estimated around 25,000 effective plants based formulations in various folk medicines are used commonly by rural communities all over India and approximately 10,000 designed formulations are also available in medicinal manuscripts. All medicinal preparations were considered from plants either in the simple form or the most complex form of crude extracts mixtures. A large proportion of the active ingredients and chemical compounds of some medicinal plants are used as drugs. These drugs have been discovered with the help of the ethno-botanical knowledge and traditional uses of the various plants. The source of ethno-botanical knowledge is generally useful for the product inventors and for the financial rewards to the pharmaceutical company (Meena et. al., 2014).

There are large numbers of plants generally used in India for medicinal reason. India is presently considering the laws on the Biological Diversity Act (BDA) and Protection of Plant Varieties Farmer’s Rights Act (PVFRB) (Fulekar and Jadia, 2006).

The medicinal plants provide an efficient local relieve for disease free life. The importance of ethno-medicine has been valued by various sections of the society. The health care programmes are focussing on use of herbal medicines (Singh, 1998). The traditional ethno-medicinal studies had been done in recent year had received much attention due to their wide range of local acceptability and clues for the new or lesser-known medicinal plants (Tripathi, 2000).
The exploration of ethno-botanical plays a vital role in bringing to light information about plant species of the rich flora that provides the good sources of safer and cheaper potent drugs for the benefit of mankind. In India, approximately 70 percent of inhabitants still depend on herbs. Our country has approximately 2,500 species of plants from around 1000 genera which are used by traditional healers (Chandal et. al., 1996).

It had been documented that a huge amount of traditional knowledge about the medicinal plant species and their uses are still carried and are orally transmitted by indigenous peoples (Nadkarni, 1998). The documentation of traditional knowledge especially on the use of medicinal plants had provided many important drugs of modern day (Joshi, 2000 and Kirtikar and Basu, 2001).

The medicinal plants are a source of drugs since centuries mostly in developed and developing countries. The traditional medicines play an important role in treating number of diseases and many plants and its constituents are used in number of medicines. The medicinal property of herbs is due to the presence of different secondary metabolites and chemical constituents present in plants. These secondary metabolites such as alkaloids, flavonoids, terpenoids, tannins, glycosides are commonly found in most of the plants and are responsible for their therapeutic properties. They are also known as bioactive compounds. These bioactive compounds act as anti-oxidant agent. The six different plants belonging to different families were selected for the present study namely Delonix regia, Lallemantia royleana, Phyllanthus maderaspatensis, Plantago ovata, Rosa indica and Solanum nigrum. The plant parts studied include the petals of Rosa indica, seeds of Lallemantia royleana, Phyllanthus maderaspatensis and Plantago ovata, the petals and leaves of Delonix regia and the berries, flowers and leaves of Solanum nigrum. The anti-oxidant activity was screened in methanolic plant extracts and all of them showed positive results.

The maximum yield was obtained in the methanolic extract of R. indica petals (6.75 %) and minimum yield was in methanolic extract of P. ovata seeds (1.7 %) as compared to other plant extracts. The yield may be due to the presence of phyto-chemical and total phenolics. The total phenolic content of 10.79 GAE/g was found to be the highest in S. nigrum berries, while lowest in D. regia flowers and was found to be 2.67 GAE/g as compared to other plant extracts. The total tannins content was also found to be highest in
S. nigrum berries and was 3.64 TAE/g, while was lowest in L. royaleana seeds and found to be 0.18 TAE/g when compared with other plant extracts.

In the present study, all the plants were screened for phyto-chemical analysis for alkaloids, anthraquinones, flavonoids, phlobatannins, glycosides, saponins, steroids, tannins and also for terpenoids. The study showed the presence of glycosides and tannins in all the plant extracts, while flavonoids are absent only in the methanolic crude extract of Solanum nigrum flower extract, and phlobatannins are absent in Delonix regia leaves. The presence of these constituents is responsible for therapeutic properties of plants. Therefore, the present study was directed at examining the anti-oxidant activities of the selected plants that are also used in Unani system of medicine.

In one of the study done by Mariajancyrani and co-workers (2013) reported that the chloroform extract of D. regia leaves showed the presence of flavonoids, steroids, tannins and terpenoids. While the present study also revealed the presence of phyto-constituents in the D. regia leaves extract which were anthraquinones, flavonoids, glycosides, steroids, tannins and terpenoids. While in another study done by Shewale and team (2012) reported the presence of steroids, flavonoids, phenolic compounds and tri-terpenoids in the ethanolic extract of D. regia.

Khursheed and team (2012) conducted phyto-chemical test on the ethanolic extracts of Delonix regia petals detected the presence of alkaloids, steroids, flavonoids, proteins, tannins, saponins, carbohydrates, phenols and tri-terpenes. The preliminary phyto-chemical screening was also done by Shanmukha and co-workers (2011) on the ethanolic extract of D. regia petals showed that the D. regia petals contain alkaloids, flavonoids, proteins, amino acids, cardio glycoside, tannins and phenolic compounds. The present study also showed the presence of phyto-constituents in the D. regia petals extract which were alkaloids, flavonoids, phlabotanins, glycoside and tannins.

Sundari and team (2012) reported the presence of flavonoids, saponins, steroids and tannins in the ethanolic extract of flowers of Rosa indica, whereas, another study conducted by Britto and Gracelin (2011) on methanolic extract of R. indica petals showed the presence of alkaloids, flavonoids, phenolic compounds and tri-terpenoid. The present study revealed that the methanolic extract of R. indica petals contain alkaloids,
anthraquinones, flavonoids, phlobatansins, glycosides, saponins, steroids, tannins and terpenoids.

Djaafar and Ridha (2014) showed the presence of alkaloids, flavonoids, glycosides, saponins, and tannins in the methanolic extract of leaves, flowers and berries of *S. nigrum*. The methanolic extracts of berries also contain terpenoids. Likewise in the present study it is found that the methanolic extract of *S. nigrum* flowers possess alkaloids, phlobatansins, glycosides, saponins, and tannins, while the methanolic extract of *S. nigrum* leaves showed presence of alkaloids, anthraquinones, flavonoids, phlobatansins, glycosides, saponins, steroids, tannins and terpenoids, whereas the methanolic extract of berries showed the presence of alkaloids, flavonoids, phlobatansins, glycosides, saponins, steroids, tannins and terpenoids.

Ravichandran *et. al.*, (2012) conducted phyto-chemical analysis in the methanolic as well as in hexane extract of whole plant of *P. maderaspatensis*. Methanolic extract of seeds of *P. maderaspatensis* reported the presence of tannins, tri-terpenoids, flavonoids, proteins and carbohydrates, whereas the hexane extract showed the positive results for carbohydrates, flavonoids and tannins. The present study showed the presence anthraquinones, flavonoids, phlobatansins, glycosides, steroids, tannins and terpenoids in the methanolic extract of *P. maderaspatensis*.

The different constituents in plant extracts namely flavonoids, alkaloids, tannins and other phenols act as an anti-oxidant agent. In the present study, different plant extracts were used to evaluate anti-oxidant activity and all the plants showed significant anti-oxidant activity. The number of scientists reported that polyphenols are anti-oxidants with redox properties, which allow them to act as reducing agents, hydrogen donators, and singlet oxygen quenchers. Some show metal chelation properties (Proestos *et. al.*, 2013). The anti-oxidant properties were evaluated by DPPH scavenging assay, alkaline DMSO method, nitric oxide scavenging assay, hydrogen peroxide method, and total anti-oxidant capacity method. The methanolic extract of *Phyllanthus maderaspatensis* seeds showed strongest anti-oxidant activity by nitric oxide free radical scavenging assay with IC$_{50}$ value of $52.33 \pm 0.30 \mu g/ml$. The methanolic extract of *Plantago ovata* seeds showed the strongest anti-oxidant activity with alkaline DMSO method, DPPH scavenging assay and as well as by phospho-molybdenum method of total anti-oxidant capacity having IC$_{50}$ value of $59.73 \pm 3.62 \mu g/ml$, $80.53 \pm 2.773 \mu g/ml$, $125.00 \pm 0.00 \mu g/ml$ respectively. The
anti-oxidant activities were found in different extracts and the values obtained were in dose dependent manner.

In the present study the crude methanolic extract of leaves of *D. regia* showed potent anti-oxidant activity by different methods. The nitric oxide assay observed high anti-oxidant activity showing IC$_{50}$ values of 108.4 $\pm$ 0.3 $\mu$g/ml. The minimum activity was observed in total anti-oxidant capacity where IC$_{50}$ value was found to be 976.84 $\pm$ 13.149 $\mu$g/ml. Similarly, the crude methanolic extract of leaves of *D. regia* showed anti-oxidant activity also by alkaline DMSO method, and the IC$_{50}$ value was found to be 179.66 $\pm$ 2.30 $\mu$g/ml, whereas, the crude methanolic extract of *D. regia* leaves showed scavenging activity by DPPH method having IC$_{50}$ value of 332.2 $\pm$ 3.983 $\mu$g/ml. Similarly, the methanolic extract of *D. regia* leaves showing IC$_{50}$ value of 326.43 $\pm$ 5.773 $\mu$g/ml using hydrogen peroxide scavenging method. Likewise, one of the studies carried out by Mariajancyrani and co-workers (2013) reported that the chloroform extract of *D. regia* leaves showed anti-oxidant activity by DPPH radical scavenging assay, hydrogen peroxide scavenging assay and reducing power assay. The anti-oxidant activity was found to have the inhibition percentage of 45.28 percent with DPPH assay, 33.83 percent with reducing power assay and 19.36 percent with hydrogen peroxide assay.

The methanolic extract of seeds of *P. maderaspatensis* showed significant anti-oxidant activity in the present study. The maximum IC$_{50}$ value of the methanolic extract of seeds of *P. maderaspatensis* was found to be 52.33 $\pm$ 0.30 $\mu$g/ml, by using nitric oxide method and the minimum anti-oxidant activity was shown by the extract in total anti-oxidant capacity. Similarly, the methanolic extract of seeds of *P. maderaspatensis* showed anti-oxidant activity by alkaline DMSO method, and the IC$_{50}$ value was found to be 890.53 $\pm$ 6.10 $\mu$g/ml, whereas, methanolic extract of *P. maderaspatensis* seeds showed activity by DPPH method having IC$_{50}$ value of 200.00 $\pm$ 2.19 $\mu$g/ml $\mu$g/ml. The methanolic seeds extract of *P. maderaspatensis* gave IC$_{50}$ value of 236.06 $\pm$ 4.681 $\mu$g/ml by hydrogen peroxide scavenging method.

The anti-oxidant activity of *P. ovata* had not been reported before by any of the researchers but many scientists had studied other species of Plantago family for their anti-oxidant activity. Galvez and his team (2005) had studied anti-oxidative activities of methanol extracts of five Plantago species (*P. afra, P. coronopus, P. lagopus, P. lanceolata, and P. serraria*) by using the DPPH scavenging assay and inhibition of Fe$^{2+}$/ascorbate-induced
lipid peroxidation on bovine brain liposomes. All extracts showed anti-oxidant activity by both the methods. Whereas, *P. serraria* exhibited the strongest anti-oxidant activity as a DPPH scavenger, while, *P. lanceolata* and *P. serraria* were found to be most active in the lipid peroxidation inhibition assay. Yet in another study, conducted on the extract of leaves and seeds of *Plantago major*, another species of *Platago* showed that the ethanolic extracts of leaves and seeds exhibit potent anti-oxidant activity. The percent inhibition was found to be more than 80 percent for seeds extract, whereas, in the leaves extract the percent inhibition was found to be more than 90 percent at the concentration of 100 ppm (Kobeasy *et. al.*, 2011).

In the present study the methonolic seeds extract of *P. ovata* sowed potent anti-oxidant activity in all the test performed, The IC$_{50}$ value was found to be $59.73 \pm 3.62 \, \mu g/ml$ by using alkaline DMSO method, while the IC$_{50}$ value was found to be $176.3 \pm 2.35 \, \mu g/ml$ by using nitric oxide method, whereas, the IC$_{50}$ value was found to be $248.90 \pm 1.90 \, \mu g/ml$ by hydrogen peroxide method and for DPPH scavenging method the IC$_{50}$ value was found to be $80.53 \pm 2.77 \, \mu g/ml$. On the other hand, the IC$_{50}$ value extract was found to be $125.00 \pm 0.00 \, \mu g/ml$ using total anti-oxidant activity.

Charan and Gupta (2013) conducted anti-oxidant activity of *Rosa indica* petals by free radical scavenging assay using DPPH. The study showed the inhibition of DPPH radical was found to be $83.40\%$ at the concentration of 1000 $\mu g/ml$. The other species of rose also possess anti-oxidant activity and five of these species of Rosaceae were studied by Yilmaz and Ercisli (2011). They had studied anti-oxidant activity in the methanolic extract by $\beta$-carotene linoleic acid assay. The anti-oxidant capacity was in the order of percent inhibition. The percent inhibition of *Rosa canina* was maximum among the plants taken and was found to be 91.4 percent. The percent inhibition of *Rosa pisiformis* extract was found to be 89.6 percent while the percent inhibition of *Rosa dumalis* was found to be 87.3 percent whereas the percent inhibition of *Rosa villosa* was found to be 83.8 percent.

In the present study, the methonolic extract of *R. indica* showed potent anti-oxidant activity in all the test performed using different scavenging assays. The IC$_{50}$ value was found to be $157.2 \pm 2.667 \, \mu g/ml$, $883.23 \pm 4.40 \, \mu g/ml$, $863.33 \pm 2.54 \, \mu g/ml$, $154.06 \pm 3.59 \, \mu g/ml$, $823.75 \pm 3.06 \, \mu g/ml$ by alkaline DMSO, nitric oxide, hydrogen peroxide, DPPH and total anti-oxidant assay respectively.
Maharana and teammates (2012) reported anti-oxidant activity of aqueous extract of *S. nigrum* leaves with IC$_{50}$ value of 165 μg/ml by DPPH method, IC$_{50}$ value of 417 μg/ml by hydrogen peroxide method, IC$_{50}$ value of 483 μg/ml by nitric oxide method and IC$_{50}$ value of 472 μg/ml superoxide method, at the concentration of 500 μg/ml. Other species of *Solanum* (*S. pseudocapsicum*) have also shown significant anti-oxidant activity, in one of the study done by Badami *et. al.*, (2005) the IC$_{50}$ value was found to be 101.50 ± 1.80 μg/ml for DPPH method while the IC$_{50}$ value was found to be 97.60 ± 1.80 μg/ml for nitric oxide method.

In the present study, the methanolic extract of leaves, berries and flowers of *S. nigrum* had shown significant activity with alkaline DMSO, DPPH and nitric oxide method. The methanolic extract of *S. nigrum* showed less anti-oxidant activity using hydrogen peroxide assay and total anti-oxidant capacity assay. Using the alkaline DMSO scavenging method, the IC$_{50}$ value of *S. nigrum* berries extracts was found to be 223.8 ± 3.21 μg/ml, whereas the IC$_{50}$ value of *S. nigrum* leaves extracts was found to be 171.46 ± 1.05 μg/ml, while the IC$_{50}$ value of *S. nigrum* flowers extract was found to be 153.9 ± 2.78 μg/ml and the IC$_{50}$ value of standard (BHT) was found to be 792.49 ± 1.16 μg/ml.

The IC$_{50}$ value obtained by nitric oxide scavenging method in *S. nigrum* berries methanolic extracts was found to be 125.83 ± 4.06 μg/ml, while the IC$_{50}$ value of *S. nigrum* methanolic leaves extracts was found to be 461.46 ± 2.54 μg/ml, whereas the IC$_{50}$ value of *S. nigrum* methanolic flowers extract was found to be 196.56 ± 2.43 μg/ml.

Similarly, the DPPH radical scavenging method showed the IC$_{50}$ value of *S. nigrum* berries methanolic extracts was found to be 190.7 ± 2.35 μg/ml, while the IC$_{50}$ value of *S. nigrum* leaves methanolic extracts was found to be 110.7 ± 1.609 μg/ml and the IC$_{50}$ value of *S. nigrum* flowers methanolic extract was found to be 155.133 ± 2.402 μg/ml. The IC$_{50}$ value of standard (BHT) was found to be 43.40 ± 1.307 μg/ml. The IC$_{50}$ values by hydrogen peroxide scavenging method and total anti-oxidant capacity method was found significantly low as compared to other anti-oxidant assays.

Mahmood and co-workers (2013) had studied the anti-bacterial activity of seed extract of *Lallementia royleyana* (Benth.) and found that the seeds possess significant anti-bacterial activity. The phyto-chemical screening and anti-oxidant activity of *L. roleyana* were not reported in literature. In the present study, the methanolic extract of *L. royleana* seeds
showed the presence of alkaloids, anthraquinones, flavonoids, phlobatanins, glycosides, tannins and terpenoids. The plant has also shown significant anti-oxidant activity with the assays performed. The IC$_{50}$ value of *L. royleana* methanolic seed extract was found to be $308.67 \pm 7.12$ μg/ml, $99.93 \pm 5.70$ μg/ml, $576.50 \pm 0.000$ μg/ml, $140.53 \pm 4.22$ μg/ml and $187.46 \pm 0.55$ μg/ml by alkaline DMSO, nitric oxide, hydrogen peroxide, DPPH and total anti-oxidant activity respectively.
References:


