1. INTRODUCTION
The use of medicinal plants for treatment of various ailments has a long history in traditional system of medicine. Plants synthesize a number of different chemical compounds for various functions, including self-defence against insects, fungi, diseases, and herbivorous mammals. A large number of phytochemicals with established biological activity have been reported. Since a single plant contains different types of phytochemicals with different biological activities, therefore using whole plant as a medicine is not suitable. Further, the phytochemical content and pharmacological actions, if any, of many plants having medicinal potential remain unassessed by rigorous scientific research to define efficacy and safety (Ahn 2017). In the United States only two natural drug candidates with sufficient evidence of medicinal value have been approved by the Food and Drug Adminstration from several hundred applications for new drug status from 1997 to 2012. The earliest historical records of herbs are found from the Sumerian civilisation, where hundreds of medicinal plants are listed on clay tablets. The Ebers Papyrus preserved medical documents from Egypt have reported over 850 plant medicines, while Dioscorides a Greek physician and pharmacologist have documented over 1000 recipes for medicines from 600 medicinal plants in De materia medica, forming the basis of pharmacopoeias for some 1500 years. Drug research makes use of ethnobotany to search for pharmacologically active substances in nature, and has in this way discovered hundreds of useful compounds which include aspirin, digoxin, quinine, and opium. There are different types of compounds present in plants most of which are grouped in four major classes: alkaloids, glycosides, polyphenols, and terpenes. Medicinal plants are widely used in non-industrialized societies, mainly because they are readily available and cheaper than modern medicines.

1.1 Rheum emodi
Rheum emodi (Polygonaceae), also known as revand-chini, belongs to the Himalayan species of Indian rhubarb found in Kashmir, Nepal, Sikkim and Bhutan as a wild at an altitude of 4000–12 000 feet. It has also been grown in certain parts of Assam (Nadkarni, 1954). Roots of the Indian rhubarb are darker, inferior in aroma, have found application as stomachic, bitter and cathartic all over the world (Thakur et al., 1989). There have already been many reports about antibacterial and antifungal activities of the anthraquinones, the naphthoquinones isolated from the plant (Agarwal et al., 1976; Fuzellier et al., 1982; Inamori et al., 1983; Cyong et al., 1987; Harvey and Waring, 1987). In addition the plant has been reported to possess laxative, diuretic, and in vivo

**1.2 Podophyllum hexandrum**

*Podophyllum hexandrum* Royle (Himalayan Mayapple) was known as Aindri (a divine drug) in older times, while in Hindi and Ayurveda it is known with the names of bantrapushi or Giriparpat. The perennial herb *Podophyllum hexandrum* bearing the common names Himalayan May apple or Indian May apple, is situated at lower elevations of Himalayan countries Afghanistan, Pakistan, India, Nepal, Bhutan and in South West China rhizome. It is tolerant to cold temperatures, as would be expected of a Himalayan plant, but is not tolerant to dry conditions (Airi *et al*., 1997, Gupta *et al*., 1983, Giri *et al*., 2000, Choudhary *et al*., 1998). In India *Podophyllum hexandrum* is mostly found in Alpine Himalayas (3000-4000 m) of Jammu and Kashmir, Himachal Pradesh, Sikkim, Uttaranchal and Arunachal Pradesh (Kumar *et al*., 1997). In Kashmir the plant has found its application in traditional system of medicine from ancient times and is locally known as Banwangun, due its red colour fruit (berry) which has the size of a small brinjal. The aqueous extract of the roots of Indian *Podophyllum* has a long history of usage as a common cathartic among the natives of the Himalayas. It has also been used as a medicine in ophthalmia. Thomson in 1890 analyzed resin from the Indian plant and reported the presence of 56% podophyllotoxin content. Podwyssotzki for the first time showed that Podophyllotoxin is the active principle of podophyllin which was obtained in a pure state in 1880. The rhizomes of *Podophyllum hexandrum* are known to contain several lignans which are dimerisation products of phenylpropanoid pathway intermediates linked by central carbons of their side chain (Kamil *et al*., 1989, Kamil *et al*., 1986, Jackson *et al*., 1984). It grows low to the ground with glossy green colour, stiff branches bearing lobed leaves, and it bears a light pink flower and bright red-orange bulbous fruit. It can be propagated by seed. The *Podophyllum hexandrum* grows from 12 to 18 inches high with deeply lobed leaves, fleshy stems, which rise straight up from the soil. The name *Podophyllum* is taken from *podos* and *phyllon*, a leaf having shape of foot, and refers to the resemblance of the leaves to a duck's foot. The plant contains beautiful leaves which are divided into 3 lobes. They are completely unrolled after the plant has
full bloomed. In the spring, white or pale pink coloured 6-petaled flowers are borne at the ends of stout stems; followed by fleshy, oval, red berries. The flower in May-August contains six petals and six stamens, for which it derived its species name as hexandrum, meaning six stamens. Leaves are rounded with 10-25 cm long, deeply cut into 3 ovate, toothed lobes, sometimes further lobed. Fruit is a large scarlet or reddish berry, 2.5-5 cm, with many seeds embedded in pulp. It can be cultivated by seed or by dividing the rhizome. It is found at an elevation of 2800 - 3000 m in the Indian Himalayas, in the pastures of mountains, in organic rich and shaded localities or on the banks of river streams banks as an under growth along with other herbs.

1.2.1 Medicinal Plants

The valley of Kashmir has been a hub for medicinal plants. The people there are using these medicinal plants for the cure and prevention of various ailments from ancient times. A total of 937 plant species belonging to 129 families have so far been reported to have a traditional medicinal use by indigenous communities of Jammu and Kashmir (Gairola et al., 2014). However these days there are new and different medicines for these diseases, which unfortunately are accompanied by toxic effects. So, there is a need to identify and explore various phyoconstituents of natural origin which can be used for the treatment and/or prevention of diseases/infections with no side effects. Thus, there has been a growing demand in natural plant products as these are more compatible to the human body with little or no toxic side effects. In the present study, two plants namely Rheum emodi and Podophyllum hexandrum were assessed for their antimicrobial potential against Gram positive and Gram negative bacteria and against fungal strains. Both Rheum emodi and Podophyllum hexandrum are herbaceous perennial plants which have acquired the endangered status due to their exploitation for local medicinal uses. Rheum emodi or Himalayan Rhubarb is used for fever, cough, indigestion, constipation, diarrhoea, dysentery, menstrual, nephritic and liver disorders (Rehman et al., 2014, Alam et al., 2005, Kaloyanides & Pastoriza 1980, Sevensson et al., 1997, Lieber 1997). It has also been reported to have protective effect in many inflammatory diseases and oxidative stress related injuries (Chai et al., 2012) Podophyllum hexandrum or Himalayan Mayapple is used in the treatment of ulcers, hepatic disorders, wounds, cuts, tuberculosis, constipation, mental disorders and as anti-cancerous agents (Sharma et al., 2006 and Hameed et al., 2014). Rheum emodi has anthraquinone and stilbene as the most common constituents who confer upon them anticancer, antiinflammatory, antioxidant, antimicrobial, antiulcer, hepatoprotective, nephroprotective and
wound healing activities (He et al., 2009, Rehman et al., 2014, Nazir et al., 2013, Conner & Fowler 1993, Ahmad et al., 2017). On the other hand, the major active constituents of Podophyllum are podophyllotoxin, quercetin, lignans and kampherol which show anticancerous, antirheumatic, radioprotective, antimicrobial and antihelminthic properties (Drew et al., 1987, Thakur 1993, Nag et al., 2013 and Chaurasia et al., 2012). Antimicrobial activity studies of Rheum emodi have been done against bacteria like Bacillus subtilis, Bacillus sphaericus, Staphylococcus aureus, Klebsiella sp., Chromobacterium sp., Pseudomonas aeruginosa and Helicobacter pylori (Babu et al., 2003 and Ibrahim et al., 2006). So far, antifungal activity of Rheum emodi has been reported against Alternaria solani, Helminthosporium pennisetium, Curvularia pallescens, Erysiphe cichoracearum, Candida albicans, Cryptococcus neoformans, Trichophyton sp., Aspergillus fumigatus, A. niger and Rhizopus oryzae (Aggarwal et al., 2001, Ismail et al., 2003 and Wani et al., 2013). While a lot of antimicrobial studies have been done for Rheum emodi, very few studies have been done on the antimicrobial activity of Podophyllum hexandrum. The rhizome extract has been reported to inhibit growth of Candida albicans and Aspergillus niger (Wani et al., 2013). The results of the present study exhibited significant antimicrobial activities of methanolic and aqueous extracts of Rheum emodi and Podophyllum hexandrum against the bacteria Pseudomonas aeruginosa and Bacillus megaterium and the fungi Aspergillus flavus and Fusarium solani.

Plants are rich in a variety of secondary metabolites such as tannins, terpenoids, alkaloids, flavonoids, phenols, steroids, glycosoids, and volatile oils (Cowan 1999). It is necessary to identify the phytochemical constituents of local medicinal plants employed by herbalists in the treatment of various ailments. In addition studies on antimicrobial activities of local medicinal plants will expose the plants as potential sources of therapeutic agents (Ebena et al., 1991). The volatile oils of black pepper (Piper nigrum. L.) were assessed for antibacterial activity. The antibacterial and antifungal activities of Zanthoxylum budrungia has been reported (Islam et al., 2001). The use of chemotherapeutic agents in the treatment of infectious diseases has been known from ancient times. The ancient man discovered the therapeutic value of some herbs by trial and error (Sofowara 1993). The alternative use of folkloric medicinal plants detailed their alternative use in medicine in Jamaican society has been studied (Facey et al., 1999).

Podophyllum hexandrum leaf; Verbascum thapsus stem against Bacillus subtilis had interesting Minimum inhibitory concentrations (MICs) with 8 μg/ml. Inhibiting activity of Pseudomonas aeruginosa is particularly interesting from a medical point of view because this
microbial agent is responsible for severe opportunistic infections. These findings were also shown in other plants extracts (Phani et al., 2005; Phani et al.)