**ABSTRACT**

The aim of the present study was to calculate in vitro antimicrobial activity of *Berberis asiatica* fruit extracts against 13 Gram-positive and Gram-negative bacteria and fungus strains. The ethanolic fruit extracts of *Berberis asiatica* showed significant activity 15±1 mm, 14±1mm and 13±1mm against Streptococcus pyogenes, Streptococcus aureus and Bacillus cereus against food poisoning bacteria and fungus, Development of a product with nutritional profile and secondary metabolites as a model, a wild edible fruit of Himalaya (*Berberis asiatica*) was screened. The fruits have been found to rich in nutrients such as crude protein 3.3%, carbohydrates 17.39%, crude fibre 3.4%, ash content 1.25% and minerals as calcium, magnesium, potassium and phosphorus (1.0, 8.4, 1.98 and 0.24 mg/100g) respectively. The plant material was separated into its selected part fruit air dried ground to moderately fine powder and Soxhlet extracted with increasing polarity solvent (Petroleum ether, chloroform, ethyl acetate, acetone, methanolic, and water). Each extract was evaporated to dryness under reduce pressure using rotary evaporator.

**Antibacterial assay**

The disc diffusion assay methods were used to determine the growth inhibition of bacteria by plant extracts. Diluted bacterial culture (100μl) was spread over nutrient agar plates with a sterile glass L-rod. 10mg/ml and 50mg/ml of the each extracts were applied to each filter paper disc (Whatman No. 1, 5 mm diam.) and allowed to dry before being placed on the agar plate. Each extract was tested in triplicate (3 discs/ plate) and the plates were inoculated at 37°C for 24 h. After incubation, the diameter of inhibition zones was measured with a caliper.

**Antifungal assay**

The antifungal activity was tested by disc diffusion method. The Sabouraud dextrose agar plates were each similarly seeded with each fungal strain. The 24 hrs. broth culture of each bacterium and 7 days inoculated fungus culture were used to seed sterile Sabouraud dextrose agar at 45°C respectively, and fungal plates were incubated at 25-28°C for 7 days after which diameter of zones of inhibition were measured. Each disc filled with extract.

**Nutritional & Mineral assay**

The number of water molecule is contain % of moisture, Pt. ether and hexane soluble part is called crude fat and the non soluble part of acid- base medium is called crude fibre (cellulose and lignin), and mineral estimated by flame photometry.

**Quantification of Total Phenolics Content**

Total phenolics content in the methanolic extract of fruit part of selected species were estimated colorimetrically using the Folin-Ciocalteu calorimetric method.

**Quantification of Total Flavonoids Content**

Flavonoids content in the methanolic extract of plant was determined by Aluminum chloride colorimetric method. Methanolic extract of sample (0.5 ml) was diluted in distilled water (1.5 ml) and mixed with 10% Aluminum chloride (0.5 ml). In this mixture 1 M potassium acetate (0.1 ml) and distilled water (2.8 ml)
was added and incubated at room temperature for 20 minutes. The absorbance of resulting reaction mixture was measured at 415 nm using UV-VIS spectrophotometer. Quantification of total flavonoids content was done on the basis of standard curve of quercetin prepared in 80% (v/v) methanol. Results were expressed in mg quercetin equivalent (QE) per gram of fresh weight.

**Assay of Antioxidant Activity DPPH**
Traditional DPPH (1, 1-diphenyl-2-picyrylhydrazyl) assay was carried out with minor modification. 100 μM DPPH was dissolved in pure 80% ethanol. DPPH cation (3 ml) was mixed with sample extract (1 ml) and kept in dark at room temperature for 20 minutes. Reduction in the absorbance at 520 nm was recorded by UV-VIS spectrophotometer. Results were expressed in mm ascorbic acid equivalent (AAE) per 100 g few of plant material

**RESULTS AND DISCUSSION**
Plants are important source of potentially useful structures for the development of new chemotherapeutic agents. The first step towards this goal is the in vitro antimicrobial activity assay. The results of antibacterial, antifungal, nutritional value and antioxidant activity, table 1, 2, 3, and 4, reveals that antibacterial, antifungal, nutritional, (antioxidant, phenolics, flavonoids) activity of fruit extracts of was evaluated against ten bacterial and three fungal pathogenic strains

**Antibacterial and antifungal activity**
*Berberis asiatica* ethanolic fruit extract significant activity 15 ±1mm, 14 ±1mm and 13 ±1mm against Streptococcus pyogenes, Streptococcus aureus and Bacillus cereus against food poisoning bacteria and fungi, the order of the species based on total antibacterial activity is as follows: Streptococcus pyogenes >Streptococcus aureus > Bacillus cereus.

**Nutritional value**
The level of nutrients such as crude protein1.3%, carbohydrates17.39%, crude fiber3.4%, ash content1.25% and minerals as calcium, magnesium, potassium and phosphorus (1.0, 8.4 & 1.98 and 0.24 mg/100g) respectively.

- Moisture (%): 65.20 ± 0.15
- Total nitrogen (%): 0.52 ± 0.05
- Crude fat (%): 0.80± 0.05
- Soluble carbohydrates: 24.98± 0.16
- Vit A mg/100g: 0.09± 0.02
- Berberine mg/100g: 1.08± 0.10
- Tannins: 0.64± 0.05
- Acidity: 1.07± 0.02
- Mg mg/100g: 0.061± 0.08
- Fe mg/100g: 0.079± 0.04
- Soluble solids: 18.90± 0.20
- Pectin: 0.37± 0.04
- Ca mg/100g: 0.065 ± 0.05
- K mg/100g: 0.44± 0.20
- N mg/100g: 0.528± 0.04
- Phenolics mg/100g: 670± 0.12
- Flavonoids mg/100g: 190.40± 0.52

**Antioxidant activity**
03.20± 0.12

**Phytochemical screening**
The phytochemical screening for the presence of glycosides, flavonoids, phenols, resin and tannins. However, alkaloids were absent. This analysis revealed that, the fruits contained higher value of fat, protein, fiber and minerals as compared to the cultivated fruits with apple and 200 gm fruits contain sufficient amount of nutrients, required per day by a person.

**CONCLUSION**
The in vitro antimicrobial studies present *Berberis asiatica* to have considerable efficacy against various pathogenic bacteria. The study provides a scientific basis for the use of the plant as folk medicine. The fruit of the plant is a good source of essential nutrients including minerals, carbohydrates, proteins and lipids. However, more advanced pharmacological and clinical studies would be required to investigate in vivo mechanism of nutraceuticals effects of this important wild plant.

**ACKNOWLEDGMENT**
We sincerely acknowledge the financial support granted by UCS&T/R&D/CHEM-16/09/10/6539/1, 06/01/2010 (UCOST) Dehra Dun to work on a project. The present research paper is the outcome of the same.

**REFERENCES**
Table 1, Antibacterial activity of ten bacterial strains against *Berberis asiatica* plant extract. Disc size, 5 Mm, Inhibitory zone size ±1 Mm, Mm means (millimetres) and – indicate (NIZ) No inhibitory zone.

<table>
<thead>
<tr>
<th>Bacterial Name</th>
<th>Petroleum ether Extract</th>
<th>Chloroform Extract</th>
<th>Ethyl acetate Extract</th>
<th>Acetone Extract</th>
<th>Methanol Extract</th>
<th>Water Extract</th>
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<tr>
<td>Genus /Species/Subspe. MTCC (Code)</td>
<td>10 Mg/ ml</td>
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<td>10 Mg/ ml</td>
<td>50 Mg/ ml</td>
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Table 2, Fungal activity of three fungal strains against *Berberis asiatica* plant extract. Disc size, 5 Mm, Inhibitory zone size ±1 Mm, Mm means (millimetres) and – indicate (NIZ) No inhibitory zone.

<table>
<thead>
<tr>
<th>Fungal Name</th>
<th>Petroleum ether Extract</th>
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<th>Methanol Extract</th>
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Figure 1.1 and 2.1, Antimicrobial activity of ten bacterial strains & three fungal strains against *Berberis asiatica* plant extract
Fig. 1.1; Comparison of *Berberis asiatica* fruit and Apple for Nutrients value.

Fig.1.2; Comparison of per day intake of nutrients by Adults with the nutrients present in the fruits of *Berberis asiatica*.

Fig. 1.3; Comparison of per day intake of minerals by Adults with the mineral present in the fruits of *Berberis asiatica*. 

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