An increase in intracellular non protein-bound iron concentration occurs, for instance, as a result of (i) long-term transfusions to patients with anemia of genetic disorders such as β-thalassemia, sickle cell disease, and Diamond Blackfan syndrome, and (ii) bone-marrow failures such as aplastic anaemia and myelodysplastic syndromes [18]. As there exists no active mechanism to excrete iron from the body, a progressive accumulation of body iron easily occurs. Such redox-active iron can be taken up by liver, cardiac, and endocrinal cells through uptake mechanisms that are independent of transferrin receptor and the excess iron in parenchymal tissues can cause serious clinical sequelae, such as cardiac failure, liver disease, diabetes, and eventual death. Since iron-mediated damages have also been implicated in disease development, exploration of iron-chelating mechanism of polyphenol antioxidant behaviour has also become necessary. Iron-mediated oxidative damage is just not limited only to living organisms. Due to the presence of iron in the environment, iron-generated hydroxyl radical is also responsible for food spoilage and wood rotting. Hence, polyphenolics of natural origin that can be used as preservatives for food, cosmetics, and pharmaceuticals have been widely investigated. Per cent Fe^{II} chelating capacities of the fractions of the *B. erecta* leaf-extract were found to be in the order MeOH > Me_2CO > Et_2O (Fig. 2). MeOH fraction possessed 73.4 % of the chelating capacity of the standard drug studied, viz., deferoxamine. Deferoxamine is a trihydroxamic siderophore, which is widely employed for the treatment of iron over-load and it chelates Fe^{II} with high affinity under aerobic conditions, probably due to the formation of the more stable Fe^{III}-deferoxamine[18]. The other two fractions respectively exhibited 63.1 and 59.4% of the deferoxamine-chelating capacity (Fig. 2).

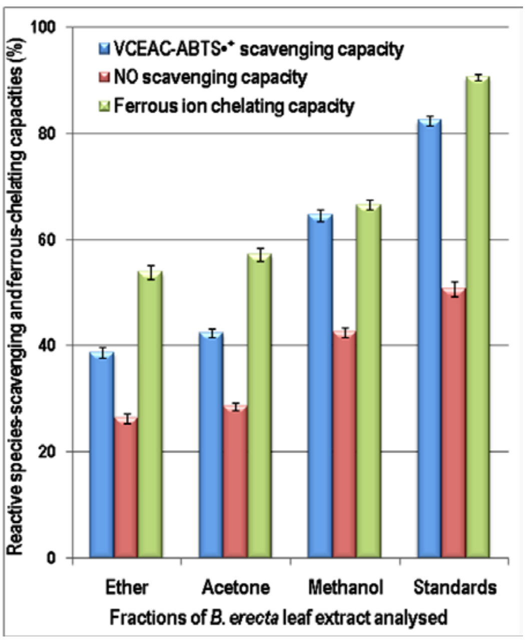


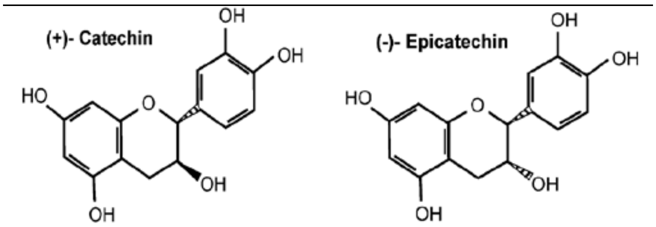
Fig. 2 Reactive species scavenging and Ferrous-chelating capacities of *B. erecta* leaf-extract fractions

Data represents Mean±SD, n=3
Standard for VCEAC and NO scavenging = Rutin and for Fe^{II} chelation = Deferoxamine.

Isolation and characterisation of the phenolic metabolites

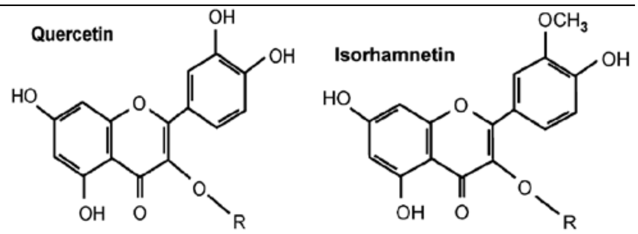
A systematic chemical analysis of the leafy matter has resulted in the isolation and characterisation of antioxidant phenolic metabolites belonging to two flavonoid sub-classes (Fig. 3). The two dietary flavonols, viz., quercetin (**3**) and isorhamnetin (**4**) and their glycosides, rutin (**5**), narcissin (**6**) isoquercitrin (**7**) and isorhamnetin 3-O-β-D-glucopyranoside (**8**), as well as the two flavan-3-ols, [(+)-catechin] (**1**) and [(-)-epicatechin] (**2**) are well known antioxidant phytometabolites. All the phenolic isolates were characterised on the basis of their physical properties, chemical reactions (including characteristically coloured products formation and rigorous hydrolytic studies) and spectral (UV, ^{1}H- and ^{13}C-nmr) features [20-23].

Flavan-3-ols



(**1**) (**2**)

Flavonols



R= H; quercetin (**3**)	R= H; isorhamnetin (**4**)
R= α-L-rhamnopyranosyl(1→6)-β-D- glucopyranoside; rutin (**5**)	R= α-L-rhamnopyranosyl(1→6)-β-D- glucopyranoside; narcissin (**6**)
R= β-D-glucopyranoside; isoquercitrin (**7**)	R= β-D-glucopyranoside; isorhamnetin 3-O-β-D-glucopyranoside (**8**)

Fig. 3 Sub-classes of flavonoid metabolites isolated from *B. erecta* leaves

CONCLUSION

Countless number of studies have substantiated that Traditional Medicine is often the only accessible and the most affordable treatment available in developing countries and also offer an opportunity of improving the nutritional status and health care of the rural communities. Plant-based antioxidants and colourants are being used more commonly today to preserve food quality in the food industries. Characterisation of the dietary antioxidants and their capacities are necessary to validate the safety and traditional uses and also to standardise preparations involving these plants. As a result, widespread screening of medicinal and food plants possessing antioxidant capacities are in progress. The common weed, *B. erecta*, which is determined to possess reactive oxygen and nitrogen scavenging capacity and transition metal ion chelating capability, can well be exploited as a natural and healthy source of antioxidants. The flavonoids elaborated in the taxon may potentially contribute, synergistically with other classes of phytometabolites, to the antioxidant and other biological activities observed for this functional leafy vegetable.

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