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Preliminary phytochemical screening of wild edible fruits from Boda and Kolli hills

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ABSTRACT

Medicinal plant plays a key role for ailment of various chronic diseases due to the presence of phytochemical constituent. The preliminary phytochemical compounds were studied using the ethanol, ethyl acetate, diethyl ether, chloroform, and aqueous extracts of 15 wild edible fruits collected from Boda and Kolli hills. The phytochemical compounds such as phenol, tannins, saponin, alkaloid, flavonoids, steroids, phlobotannins, terpenoids, anthraquinones and cardiac glycosides were screened in 15 edible fruits using standard methods. The diethyl ether extract, ethyl acetate, and ethanol extract of the selected fruits shows the presence of phytochemicals compound. The highest occurrence shows the high therapeutic value possessing majority of a phytochemical constituent of active compounds. In further studies, the compound from these fruits was isolated and used for medicinal purposes.

KEY WORDS: Phytochemical compounds, therapeutic efficacy, wild edible fruits

INTRODUCTION

Herbal medicines are traditionally used about 80% of the world population primarily in developing country like India, for the primary health care (Kamboj, 2000). The traditional medicines plants help us a great promise as an easily available and low cost-effective medicinal agents to cure a wide range of ailments among the people particularly in a tropical area. The people consume several plant or plant derived formulations to cure various diseases and disinfection. Phytochemicals compounds are naturally occurring in medicinal plants parts such as leaves, stem bark, fruits, and roots. These compounds have the ability of defense mechanism against various diseases causing agents such as microbes and virus. Natural products from plants called secondary metabolites are the end products of primary metabolites such as carbohydrates, amino acid, chlorophyll, lipids and so on. They are synthesis large variety of chemical substances known as secondary metabolites which include alkaloids, steroids, flavonoids, terpenoids, glycoside, saponin, tannins, and phenolic compounds (Doss, 2009). The secondary metabolites are very good antioxidant compounds. The richness of phytochemical bioactive compound posses antioxidant, antitumor, anti-inflammatory, anti-atherosclerotic, antimutagenic, anticarcinogenic, antibacterial, antiviral, and antiparasitic activities (Rice-Evans *et al.*, 1995; Ashok Kumar *et al.*, 2008). In recent years, many investigations were progressed with unknown pharmacological activities for the source of therapeutic agents. The aim of this study was to evaluate the phytochemical compounds from aqueous, ethanol, diethyl ether, chloroform, and ethyl acetate extracts of 15 edible fruits.

MATERIALS AND METHODS

Phytochemical Screening Analysis of Secondary Metabolites

Phytochemical tests were carried out using various extract such as aqueous, ethanol, diethyl ether, chloroform, and ethyl acetate to identify various constitutes using standard methods of Trease and Evans, 1997 and Sofowra, 1993. The phytochemical tests in a brief account were conducted as following:

1. Phenol: The extract (0.5 g) was dissolved in 5 ml of distilled water. To this, add few drops of neutral (5%) ferric chloride solution. A dark green color indicated the presence of phenolic compounds.
2. Tannin: The one gram of fruit extract added with 100 ml of distilled water, boiled them, makes them to cool and filtered it. Add 1% ferric chloride drop by

drop to the filtrate. Green black precipitate shows the presence of tannin.

3. Saponins: About 2 ml of sodium bicarbonate (1%) was added to 1 ml of extract and shake it well. Lather like formation remains constant for some time is indicative of the presence of saponin.
4. Alkaloids: Crushed and filtered 1 ml of fruits extract was taken in a test tube. Then, add 2 ml of aqueous hydrochloric acid (1%). Heat it for few minutes. Furthermore, add 2-3 drops of dragendroff reagent in the solution. Reddish brown precipitate color appeared with turbidity depicts shows alkaloid presence.
5. Flavonoids: To the 5 ml of extract was taken, add 1 ml of sodium hydroxide solution (10%). Add two drops of concentrated hydrochloric acid in the side of the beaker. The yellow color changes to colorless which shows the presence of flavonoids.
6. Phlobatannins: The extract was added with 1 ml of aqueous hydrochloric acid (1%) followed by boiling. A red precipitate is indicates the presence of phlobatannins.
7. Steroids: 100 µl fresh extract was taken in a test tube and add 400 µl of acetic anhydride. Then, add 1 or 2 drops of concentrated sulfuric acid. Brown ring at the boundary of mixture shows the presence of steroids.
8. Terpenoids: 2 ml of the organic extract was taken. Then dissolved in 2 ml of chloroform and let them evaporated to dryness. Add 2 ml of concentrated sulfuric acid and heated for about 2 min. Development of a grayish color indicates the presence of terpenoids.
9. Anthraquinone: 1 ml of extract was taken. Add 2 ml of potassium hydroxide (5%). Filter it. A color change into pink was observed. These show the presence of anthraquinone.
10. Cardiac glycosides: 100 µl of extract was taken in a test tube and add 400 µl of acetic anhydride. Then, add 1-2 drops of concentrated sulfuric acid. The presence of glycosides shows by the appearance of blue-green color.

RESULTS AND DISCUSSION

Phytochemical analyzed on the selected 15 fruits extracts shows the presence of bioactive compound which is known to reveal medicinal properties as well as physiological activities (Sofowra, 1993). Screening of the plant extracts is to find out the presence of phytochemicals such as phenols, tannins, flavonoids, saponins, glycosides, steroids, terpenoids, and alkaloids. 10 phytochemical tests were showed the positive and negative in all extract of the 15 fruits extracts showed in Tables 1 and 2. The plant such as *Coccinia indica, Carissa carandas, Carissa spinarum, Ficus benghalensis, Ficus religiosa, Hugnoia mystax, Limonia acidissima, Morinda pubescens, Murraya koenigii, Phoenix loureiroi, Pithecellobium dulce, Phyllanthus emblica, Syzygium cumini, Ziziphus mauritiana,* and *Ziziphus oenoplia* is taken for phytochemical screening. Some of these plants may have the presence of secondary metabolites such as phenol, tannins, flavonoids, alkaloids, saponins, phlobatannins, steroids, terpenoids, anthraquinones, and cardiac glycosides.

Phenol is one of the omnipresent groups of plant metabolites (Singh *et al.,* 2007). In this analysis, most of the selected edible fruits extracts have the presence of phenolic compound except the *C. spinarum* and *L. acidissima.* The presence of phenol had pharmacological properties such as anti-apoptosis, anticarcinogen, anti-inflammation, anti-aging, anti-atherosclerosis, inhibition of angiogenesis, cell proliferation activities, and cardiovascular protection (Han *et al.,* 2007). *C. carandas, C. spinarum,* and *L. acidissima* show the presence of tannins. Tannins involve in protein synthesis. It is a large polyphenolic group of secondary compound. It contains sufficient hydroxyls groups and other suitable groups to form a strong complex with other macromolecules. The presence of tannin used as astringents against diarrhea (Yoshida *et al.*, 1991), as diuretics (Hatano *et al.,* 1991; Okuda *et al.,* 1983), duodenal tumors (Saijo *et al.,* 1989), anti-inflammatory, antiseptic, and hemostatic pharmaceuticals (Haslam, 1996). *H. mystax, Z. mauritiana,* and *Z. oenoplia* shows the presence of saponin in all solvent extracts. The presence of saponin is used to stop hemorrhage and for healing the wounds and ulcers, also it helps in red blood cell coagulation (Okwu and Josiah, 2006). Saponins helps as an anti-inflammatory (Just *et al.,* 1998), precipitating and coagulating red blood cells, cholesterol binding properties, hemolytic activity, and bitterness (Okwu, 2004; Sodipo *et al.,* 2000), and antibacterial properties (Epand *et al.*, 2007). The *H. mystax, L. acidissima, M. pubescens, M. koenigii, P. loureiroi,* and *P. dulce* show the presence of alkaloids compounds. The alkaloids group shows the chemical compounds which contain basic nitrogen atoms. It produced by a large variety of organisms including bacteria, fungi, plants, and animals (Luch, 2009). It has importance medicinal properties is their cytotoxicity (Nobori *et al.,* 1994), analgesic (Antherden, 1969), antispasmodic (Stray, 1998), and antibacterial (Stray, 1998). Flavonoids group helps in plant metabolites to provide cell signaling pathways and antioxidant activity. All fruits extract shows the presence of flavonoids compounds. Flavonoids are the important antibiotics group. These antibiotic principles are effective in defensive mechanism of the plants against different microbes (Hafiza, 2000). The presences of flavonoids are

Table 1: Phytoscreening analysis of secondary metabolites

Botanical name	Phenol					Tannin					Saponin					Alkaloids					Flavonoids				
	EA	E	A	DEE	C	EA	E	A	DEE	C	EA	E	W	DEE	C	EA	E	A	DEE	C	EA	E	A	DEE	C
Coccinia indica	+	+	+	+	+	+	+	+	+	+	+	+	-	+	-	+	+	-	+	-	+	+	+	+	+
Carissa carandas	+	+	+	+	-	+	+	-	-	-	+	+	+	+	+	+	+	-	-	-	+	+	+	+	+
Carissa spinarum	+	+	-	+	+	+	+	-	-	-	+	+	-	+	-	+	+	-	-	-	+	+	+	+	+
Ficus benghalensis	+	+	+	+	+	+	+	+	+	+	-	+	-	-	-	+	+	-	-	-	+	+	+	+	+
Ficus religiosa	+	+	+	+	+	+	+	+	+	+	-	+	-	-	-	-	-	-	-	-	+	+	+	+	+
Hugnoia mystax	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	-	-	+	+	+	+	+
Limonia acidissima	+	+	-	+	+	+	+	-	-	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Morinda pubescens	+	+	+	+	+	+	+	+	+	+	-	+	-	-	-	+	+	+	+	+	+	+	+	+	+
Murraya koenigii	+	+	+	+	+	+	+	+	+	+	-	+	-	-	-	+	+	+	+	+	+	+	+	+	+
Phoenix loureiroi	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	+	+	+
Pithecellobium dulce	+	+	+	+	+	+	+	+	+	+	-	+	-	-	-	+	+	+	+	+	+	+	+	+	+
Phyllanthus emblica	+	+	+	+	+	+	+	+	+	+	+	+	-	+	-	+	+	-	-	-	+	+	+	+	+
Syzygium cumini	+	+	+	+	+	+	+	+	+	+	-	+	-	-	-	+	+	+	+	+	+	+	+	+	+
Ziziphus mauritiana	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Ziziphus oenoplia	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	-	-	+	+	+	+	+

EA: Ethyl acetate, E: Ethanol, A: Aqueous; DEE: Diethyl ether, C: Chloroform

Table 2: Preliminary Phytoscreening analysis of secondary metabolites

Botanical name	Phlobatannins					Steroids					Terpenoids					Anthraquinones					Cardiac glycosides				
	EA	E	A	DEE	C	EA	E	A	DEE	C	EA	E	A	DEE	C	EA	E	A	DEE	C	EA	E	A	DEE	C
Coccinia indica	+	+	-	+	+	-	+	+	-	-	+	+	+	+	+	-	-	-	+	+	-	-	-	+	+
Carissa carandas	-	-	+	-	-	+	+	+	+	+	+	+	-	-	-	-	-	-	-	-	+	+	+	-	-
Carissa spinarum	-	+	-	-	-	-	+	-	+	+	-	-	-	-	-	-	-	-	-	-	+	+	+	-	-
Ficus benghalensis	+	+	-	+	+	+	+	+	+	+	+	+	-	-	-	-	-	-	-	-	+	+	+	+	+
Ficus religiosa	-	+	+	-	-	+	+	+	+	+	+	+	+	+	+	+	+	-	+	+	+	+	-	-	-
Hugnoia mystax	+	+	-	+	+	+	+	+	-	+	+	+	+	+	+	+	-	-	+	+	+	+	+	+	+
Limonia acidissima	-	-	-	-	-	-	-	+	+	+	+	+	+	+	+	-	+	+	+	+	+	+	-	-	-
Morinda pubescens	-	+	-	-	-	+	+	-	+	+	-	-	-	-	-	+	-	+	-	-	+	+	-	-	-
Murraya koenigii	-	-	-	-	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	-
Phoenix loureiroi	-	+	-	-	-	+	+	+	+	+	-	+	-	-	-	+	+	+	-	-	+	+	+	-	-
Pithecellobium dulce	-	-	-	-	-	-	-	+	-	+	+	+	+	+	+	+	+	+	+	+	+	-	+	-	-
Phyllanthus emblica	+	+	+	+	+	+	+	+	+	+	-	+	-	-	-	+	+	+	-	-	+	+	+	+	+
Syzygium cumini	-	+	-	-	-	+	+	+	+	+	+	+	-	-	-	+	+	-	-	-	+	+	+	-	-
Ziziphus mauritiana	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+
Ziziphus oenoplia	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	+	+	+	+	+	+	+

EA: Ethyl acetate, E: Ethanol, A: Aqueous; DEE: Diethyl ether, C: Chloroform

used as pharmacological activity such as antimicrobial activity (Cowan, 1996), antioxidant (Salah *et al.,* 1995), and anticancer activities (Del-Rio *et al.,* 1997; Okwu, 2004). *C. indica, H. mystax, P. emblica, Z. mauritiana,* and *Z. oenoplia* shows the presence of phlobatannins. The phlobatannins are secondary metabolites belongs to phenolic compounds. The presence of phlobatannins has a medicinal properties of antioxidant (Kumari and Jain, 2015), anti-inflammatory (Okwu and Okwu, 2004), wound healing and analgesic activities (Ayinde *et al.,* 2007). *C. carandas, F. benghalensis, F. religiosa, M. koenigii, P. loureiroi, P. emblica, S. cumini, Z. mauritiana,* and *Z. oenoplia* shows the presence of steroids. Steroids are cholesterol derived lipophilic group it is important secondary metabolites. The presence of steroids used in antihormones (Jovanovic *et al.*, 2015), contraceptive drugs (Lopez *et al.*, 2006), anticancer agents (Thao *et al.,* 2015), cardiovascular agents (Rattanasopa *et al.*, 2015), osteoporosis drugs (Hoppé *et al.,* 2011), antibiotics, anesthetics, anti-inflammatory, and antiasthmatics (Aav *et al.*, 2005). *M. koenigii, P. loureiroi, F. religiosa, H. mystax, P. emblica, S. cumini, Z. mauritiana,* and *Z. oenoplia* shows the presence of terpenoids. Terpenoids are secondary metabolites; it has molecular structures that containing carbon as backbones with isoprene units. Isoprene contains five carbon atoms. As a result, the number of carbon atoms is a multiple of five in any terpenoids. The terpenoids consist of two isoprene units, i.e., 10 carbon atoms. The classification of terpenoids based on the number of isoprene units (Ashour *et al.,* 2010). The presence of terpenoids shows significant pharmacological activities, such as antiviral, antibacterial, antimalarial, anti-inflammatory, inhibition of cholesterol synthesis, and anticancer activities (Mahato and Sen, 1997). *L. acidissima, P. dulce, Z. mauritiana,* and *Z. oenoplia* shows the presence of anthraquinone. An anthraquinone are the secondary metabolites. The presence of anthraquinones has the

medicinal properties of antibacterial, antitrypanosomal, and anti-neoplastic activities (Heyman *et al.*, 2009; Tarus *et al.*, 2002; Velez and Osheroff, 2004).

F. benghalensis, H. mystax, P. emblica, Z. mauritiana, and *Z. oenoplia* shows the presence of cardiac glycosides. Cardiac glycosides are the secondary metabolites which help to reduce the blood pressure (Nyarko and Addy, 1990). It has organic compounds containing glycosides (sugar) that act on the contractile force of the cardiac muscle. The presence of cardiac glycosides is used as medicines for treating heart failure and certain irregular heartbeats. Cardiac glycosides are used to lower the blood pressure (Nyarko and Addy, 1990).

The results obtained in the presence study suggest that the identified phytochemical compounds perhaps bioactive constituents and these plants prove an increasingly valuable bioactive compound for significant medicinal worth.

CONCLUSION

The results obtained in this study shown the presence of medicinally important bioactive compound in the selected 15 fruits extract of plants. Many evidences were proved in advance studies which confirmed the identified phytochemicals to be bioactive compounds. Finally, it has been concluded that the presence of various phytochemical compounds in the selected edible fruit extracts has the major bioactive constituents. These bioactive compounds are having a valuable reservoir for the therapeutic merit. Therefore, the selected plant fruits extracts could be a good source for useful drugs.

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