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Phytochemical Characterization of *Triticum Aestivum* (Wheat Grass)

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Abstract
Many drugs commonly used today are of herbal origin. Some are made from plant extracts; others are synthesized to mimic a natural plant compound. Wheatgrass (*Triticum aestivum* L.) is one of the most widely used health foods, but its functional groups and mechanisms remain unidentified. Wheat germinated over a period of 6-10 days is generally called wheatgrass. During germination, vitamins, minerals, and phenolic compounds including flavonoids are synthesized in wheat sprouts. The present study was designed to evaluate relative contribution of different phytochemicals in various extracts of wheat grass; the leaves of the selected medicinal plant were washed, air dried and then powdered. The various extract of leaves sample was used for the phytochemical analysis to find out the phytochemical constituents in the plant. Phytochemical analysis results of this medicinal plant showed the presence of terpenoids, flavonoids and alkaloids were found. Qualitative phytochemical analysis of this plant confirms the presence of various phytochemicals like alkaloids, flavonoids, tannins, terpenoids, steroids, and glycosides in their methanolic leaves extract. The present study dealt with highlighting of the phytochemicals with respect to the role of this plant in traditional medicinal system. The phytochemical analysis of the plants is very important commercially and has great interest in pharmaceutical companies for the production of the new drugs for curing of various diseases. It is expected that the important phytochemical properties recognized by our study in this indigenous medicinal plant will be very useful in the pharmacological field.

Keywords: Wheatgrass, phytochemical, qualitative, analysis

1. Introduction
Plant Medicine, sometimes referred to as Herbalism or Botanical Medicine, is the use of herbs for their therapeutic or medicinal value. An herb is a plant or plant part valued for its medicinal, aromatic or savory qualities. Herb plants produce and contain a variety of active substances that act upon the body. Preliminary screening of phytochemicals is a valuable step in the detection of bioactive principles present in medicinal plants and may lead to novel environmentally friendly bioherbicides and drug discovery.

Wheat, (*Triticum* species) a cereal grass of the Gramineae (Poaceae) family, is the world's most edible grain cereal-grass crop. Nowadays, researchers have known Wheatgrass is a nutrient-rich type of young grass in the wheat family, is many times richer in levels of vitamins, minerals and proteins as compared to seed kernel, or grain products of the mature cereal plant [1]. At present, wheatgrass is quickly becoming one of the most widely used supplemental health foods and is available in many health food stores as fresh produce, tablets, frozen juice, and powder. Wheatgrass provides a concentrated amount of nutrients, including iron; calcium; magnesium; amino acids; and vitamins A, C and E and large amounts (70%) of chlorophyll [2]. Some proponents tout wheatgrass as a treatment for cancer [3], ulcerative colitis [5] and joint pain, and also serve as antioxidant [4]. It has been suggested that wheatgrass has a greater nutritional value than several everyday foods, and ingesting wheatgrass is comparable to eating a large amount of vegetables [9]. In their study, Marwaha *et al* had thalassemia patients drink wheatgrass juice daily, and as a result, half required over 25% less packed red blood cells.

The effectiveness of the plant extracts is mainly due to the presence of bioactive constituents like phenolics, flavonoids and others [6]. During germination, vitamins, minerals, and phenolic compounds including flavonoids are synthesized in wheat sprouts, and wheat sprouts reach the maximum antioxidant potential [8]. Wheatgrass is used to treat many conditions, but so far there isn't enough scientific evidence to support effectiveness for any of these uses. By this study, we have embodied the most effective solvent extract of wheat grass, to determine the

total phenolic and flavonoid and other phytochemical contents. Details on the qualitative and quantitative compositions of various solvent extracts of wheatgrass would provide useful information on therapeutic use.

Materials and methods

Cultivation of *Triticum Aestivum*

Wheat, (*Triticum* species) a cereal grass of the Gramineae (Poaceae) family, is the world's largest edible grain cereal-grass crop. The wheat plant is an annual grass. In early growth stages the wheat plant consists of a much-compressed stem or crown and numerous narrowly linear or linear-lanceolate leaves.

Extraction of plant material

The ninth day grass of *Triticum aestivum* was cultivated, collected and chopped with the help of knife. It was dried in shade and then powdered with a mechanical grinder. The powder was passed through sieve and stored in a labeled air tight container for further studies.

Wheatgrass powder was subjected to soxhlet extraction by using various solvents like double distilled water, methanol, ethylacetate and chloroform for about 24h. Each solvent extract was evaporated to dryness.

Qualitative Screening

Carbohydrates: In a test tube containing 2.0 ml of plant sample, 2 drops of freshly prepared 20% alcoholic solution of a naphthol was added and mixed. To this solution 2.0 ml of concentrated sulphuric acid was added so as to form a layer below the mixture, formation of the red violet ring at the junction of the solution and its disappearance on the addition of an excess of alkali solution indicate the presence of carbohydrates.

Proteins: 1 part of mercury was digested with 2 parts of HNO_3 and the resulting solution was diluted with 2 volumes of water. To a small quantity of decoction, 5-6 drops of Million's reagent was added. A precipitate which turned red on heating was formed and it indicates the presence of proteins.

Alkaloids: 1.36gm of mercuric chloride was dissolved in 60ml distilled water and 5gm of potassium iodide and diluted to 100ml with distilled water. To 1.0ml of acidic aqueous solution of samples, few drops of reagent were added. Formation of white or pale precipitate showed the presence of alkaloids (Harborne, 1973).

Flavonoids: In a test tube containing 0.5ml of various extracts of the samples, 5-10 drops of dilute HCl and a small piece of Zn or Mg were added and then solution was boiled for few minutes. In the presence of flavonoids, the reddish pink or dirty brown colour was produced (Harborne, 1973).

Tannins: In a test tube containing about 5.0 ml of an various extract, a few drops of 1% solution of lead acetate was added. A yellow or red colour precipitate was formed, indicating the presence of tannins (Harborne, 1973).

Phenols: To 1.0ml of alcoholic solution of samples, 2.0 ml of distilled water followed by a few drops of 10% aqueous ferric chloride solution were added and the formation of blue or green colour indicates the presence of phenols (Harborne, 1973).

Saponins: In a test tube containing 5ml of various extract of sample, a few drops of sodium bicarbonate was added. The mixture was shaken vigorously for 3mins. A honey comb like froth was formed and it showed the presence of saponins (Harborne, 1973).

Glycosides: A small amount of various extract of sample was dissolved in 1ml of water and aqueous solution of sodium hydroxide was added. Formation of a yellow colour indicates the presence of glycosides (Harborne, 1973).

Steroids: To 2.0ml of various extracts of samples, 1.0 ml of concentrated H_2SO_4 was added carefully along the sides of the test tube. Formation of red colour chloroform layer indicates the presence of steroids (Harborne, 1973).

Terpenoids: 0.5 ml of extract was mixed with 2 ml of chloroform in a test tube. 3 ml of concentrated sulfuric acid was carefully added to the mixture to form a layer. A reddish brown coloration was formed for the presence of terpenoids.

Quantitative Analysis

Chemicals: Vanillin reagent -1% vanillin in 70% conc.H2SO4, Catechin standard 110 µg/ml, Ethanol (80%), Folin-Ciocalteau reagent (1N), Sodium carbonate (20%), Standard gallic acid solution (100µg/ml in water).

Estimation of Total Carbohydrate: The total carbohydrate content was estimated by the method of Hedge and Hofreiter, 1962.

Estimation of Protein: The total Protein content was estimated by the Lowry's method.

Estimation of Alkaloids: Total alkaloids was measured by the method of Harborne, 1973

Estimation of Phenols: The amount of total phenols was estimated by the method proposed by Mallick and Singh (1980).

Results & Discussion

Plant are endowed with various phytochemical molecules such as vitamins, terpenoids, phenolics, lignins, tannins, flavonoids, quinines, alkaloids, and other metabolites, which are rich in antioxidant activity [11]. Studies have shown that many of the phytocompounds possess anti-inflammatory, anti-diabetic and antimicrobial activities [12]. In recent years, secondary plant metabolites (phytochemicals), previously with unknown pharmacological activities, have been extensively investigated as a source of medicinal agents [13].

Plant derived substances have recently become a great interest owing to the versatile applications. Medicinal plants and herbs are the richest bio-resource of drugs of traditional systems of medicine, modern medicine, pharmaceutical intermediates and chemical entities for synthetic drugs.

Table 1: Phytochemical screening of *Triticum aestivum*

S.No	Parameters	Methanol	Ethylacetate	Chloroform	Aqueous
1	Carbohydrates	+	+	+	+
2	Proteins	+	-	-	+
3	Alkaloids	+	-	-	+
4	Flavonoids	+	-	-	-
5	Tannins	+	-	-	+
6	Phenols	+	-	-	+
7	Saponins	-	-	+	+
8	Glycosides	+	-	-	+
9	Steroids	+	-	-	-
10	Terpenoids	+	-	-	-

(+)=indicates presence of compounds (-)=indicates absence of compounds

Phytochemical screening of *Triticum aestivum* using various extracts like aqueous, methanol, ethylacetate and chloroform.
Phytochemical qualitative analysis of *Triticum aestivum* presented in the Table 1.
The screening analysis was performed in order to identify various secondary metabolites which is present in *Triticum aestivum* using a wide range of solvents namely aqueous, methanol, ethyl acetate and chloroform.
The screening analysis of *Triticum aestivum* using various solvents revealed the presence of carbohydrate, protein, alkaloids, tannins, phenols, in the methanolic and aqueous extracts. While the presence of saponins was noted in chloroform extract.
The result of our present study is further supported with similar studies reported by Gaurav Kumar *et al*.
The qualitative phytochemical analysis results explored the presence of a wide range of phytochemical constituents which signifies the *Triticum aestivum* as a valuable therapeutic natural source which will serve as an effective herbal option to compact dreadful infectious diseases.

Table 2: Quantitative analysis Of *Triticum Aestivum*

Species	Carbohydrates(mg/g)	Proteins(mg/g)	Alkaloids(mg/g)	Phenols(mg/g)
Triticum Aestivum	164.0	120.0	150.0	0.50

The level of carbohydrate in *Triticum aestivum* (extract) is represented in the above table. It was found to be 164.0 mg/g.
Carbohydrate is a biological molecule consisting of carbon, hydrogen, and oxygen atoms on the basis of mass, the carbohydrates are the most abundant class of biomolecule in nature. They occur as food reserves in the liver and muscles of animals. In addition, they are the important source of energy required for the various metabolic activities of the living organisms. Plants are richer source of carbohydrates in comparison to the animals. The polysaccharides serves as storage of energy (starch and glycogen) and also as structural components (cellulose and chitin). The derivatives of carbohydrate performs main other important key roles in the immune system, fertilization process, preventing pathogenesis, blood dotting and development.
The presence of good store of carbohydrates in *Triticum aestivum* reveals the efficacy of *Triticum aestivum* as the phytochemicals store.
The results of our work goes in accordance with report of Shirude Anup Asokh.
The level of protein in *Triticum aestivum* (extract) is represented in the above table. It was found to be 120.0 mg/g.
Proteins occur in every part of the cell and constitute about 50% of the cellular dry weight. It perform a wide variety of specialized and essential functions in the living cells (Satyanarayana.U and Chakrapani.U., 2011).
The results of our present study is further supported with the similar reports presented by Shirude Anup Asokh.
The level of alkaloids in *Triticum aestivum* (extract) is represented in the above table. It was found to be 150 mg/g.
Many alkaloids are poisonous some are used clinically and others are additives. They are used as analgesics, antimalarial, antihypertensive, cough depressant, hyper glycemic agents etc [17].
The results of our present study is further supported with the similar reports presented by the University of Plymouth.
The level of phenols in *Triticum aestivum* (extract) is represented in the above table. It was found to be 0.50 mg/g.
Phenolic compounds are secondary products which possess an aromatic ring bearing a hidroxyl substituent and most are of plant origin. Phenolic compounds are physiologically active against herbivores or pathogens are now used as pharmaceuticals, herbicides etc (Elmas Özeker., 1999) and are reported to have antioxidant activity [20].
The results of the present work is further substantiated with the report of Gaurav Kumar.

Conclusion

Scientific research is increasingly confirming what was known to our ancestors form experience. While plants continued to provide us pleasure with their beauty (colour and fragrance) and enhance the taste of our food by their flavour, we seemed to have become moreish. Young cereal plants were valued in ancient times. It had been said that people in the ancient Middle East ate the green leaf tips of the wheat plant as a delicacy [14]. It helps to prevent tooth disorders, constipation, skin diseases etc [21].
With this wide potential, medicinal application and therapeutic value, the present work has been undertaken and the inferences are summarized as follows.

- ★ Phytochemical qualitative screening exhibited a good range of primary metabolites and a wide range of secondary metabolites (alkaloids, tannins, phenols, saponins and glycosides) present in *Triticum aestivum.*
- ★ The quantification of Alkaloids (150mg/g) and Phenols (0.5mg/g) indicates the quantum store of valuable secondary metabolites compounds in *Triticum aestivum.*

Herbs are staging comeback and 'herbal renaissance' is happening all over the globe, the herbal products today

symbolize safety in contrast to the synthetic drugs that are regarded as unsafe to human and environment. Although, herbs had been raised for the medicinal, flavoring and aromatic qualities for centuries. The synthetic products of the modern age surpassed their importance for a while. However, the blind dependence on synthetic drug is over and people are retaining to the natural with hope of safety and security. With this rational evidence and on scientific basis, hence study justify and supports the use of *Triticum aestivum* in traditional folk medicine.

References

1. Tirgar1 PR, Thumber BL, Desai TR. Isolation, Characterization and Biological Evaluation of Iron Chelator from Triticum Aestivum (Wheat Grass). International Journal of Pharma and Bio Sciences. 2011; 2:288-296.
2. Chia-Che Tsai, Chih-Ru Lin, Hsien-Yu Tsai, Chia-Jung Chen, Wen-Tai Li, Hui-Ming Yu *et al*. The journal of biological chemistry. 2013; 288:17689-17697.
3. Alitheen NB, Oon CL, Keong YS, Chuan TK, Li HK, Yong HW. Cytotoxic effects of commercial wheatgrass and fiber towards human acute promyelocytic leukemia cells (HL60). Pak. J Pharm Sci. 2011; 24:243-250.
4. Das A, Raychaudhuri U, Chakraborty R. Effect of freeze drying and oven drying on antioxidant properties of fresh wheatgrass. Int. J. Food Sci. Nutr., 2012; 63:718-721.
5. Ben-Arye E, Goldin E, Wengrower D, Stamper A, Kohn R, Berry E. Wheat grass juice in the treatment of active distal ulcerative colitis. Arandomized double-blind placebo-controlled trial. Scand. J Gastroenterol. 2002; 37:444-449.
6. Chon SU, Heo BG, Park YS, Kim DK, Gorinstein S. Total phenolics level, antioxidant activities and cytotoxicity of young sprouts of some traditional Korean salad plants. Plant Foods for Hum Nutr. 2009; 64:25-31.
7. Garima Shakya, Sankar Pajaniradje, Muddasarul Hoda, Varalakshmi Durairaj, Rukkumani Rajagopalan. GC-MS Analysis, *In Vitro* Antioxidant and Cytotoxic Studies of Wheatgrass Extract. American Journal of Phytomedicine and Clinical Therapeutics. 2014; 7:877-893.
8. Kulkarni SD, Tilak JC, Acharya R, Rajurkar NS, Devasagayam TPA, Reddy AVR. Evaluation of the antioxidant activity of wheatgrass (Triticum aestivum L.) as a function of growth under different conditions. Phytother Res. 2006; 20:218-27.
9. M Handzel, J Sibert, T Harvey, H Deshmukh, C Chambers. Monitoring the Oxygenation of Blood during Exercise after Ingesting Wheatgrass Juice. The Internet Journal of Alternative Medicine. 2008; 8:1.
10. Marwaha RK, Deepak B, Siftinder K, Amita T. Wheat Grass Juice Reduces Transfusion Requirement in Patients with Thalassemia Major: A Pilot Study. Indian Pediatr. 2004; 41:716-720.
11. Wei Zheng, Shiow Y Wang. Antioxidant Activity and Phenolic Compounds in Selected Herbs. Journal of Agricultural and Food Chemistry. 2001; 49:5165-5170.
12. Joan IA, Campbell-Tofte, Per Molgaard, Kaj Winther. Harnessing the Potential Clinical Use of Medicinal Plants as Anti-Diabetic Agents. Botanics: Targets and Therapy. 2012; 2:7-19.
13. Alluri V Krishnaraju, Tayi VN Rao, Dodda Sundararaju, Mulabagal Vanisree, Hsin-Sheng Tsay, Gottumukkala V Subbaraju. Assessment of Bioactivity of Indian Medicinal Plants Using Brine Shrimp (Artemia salina) Lethality Assay. International Journal of Applied Science and Engineering. 2005; 3:125-134.
14. Gaurav Kumar, Loganathan Karthik, Kokati Venkata Bhaskara Rao. Antibacterial Activity of Aqueous Extract of Calotropis Gigantea Leaves–An In Vitro Study. International Journal of Pharmaceutical Sciences Review and Research. 2010; 4:141-144.
15. Shirude Anup Asokh. Phytochemical and Pharmacological Screening of Wheat Grass Juice (Triticum Aestivum L.). International Journal of Pharmaceutical Sciences Review and Research. 2011; 9:159-164.
16. Satyanarayana U, Chakrapani U. Biochemistry (43). Kolkata. Third Reprinted Edition. Books and Allied (P) Ltd., 2011.
17. Jack G Woolley. Plant Alkaloids. Encyclopedia of Life Sciences Nature Publishing Group / www.Els.Net.., 2011, 2001, 1-11.
18. University of Plymouth, Medicinal Properties of Triticum Aestivum. L: Effects of Freezing on Chlorophyll and Antioxidant Content of Aqueous Wheat Grass Extract, 2012.
19. Elmas Özeker. Phenolic Compounds and Their Importance. Anadolu. J of Aari. 1999; 9:114-124.
20. Marja P Ka¨Hko¨Nen, Anu I Hopia, Heikki J Vuorela, Jussi-Pekka Rauha, Kalevi Pihlaja, Tytti S Kujala. *et al*. Antioxidant Activity of Plant Extracts Containing Phenolic Compounds. J Agric Food Chem. 1999; 47:3954-3962.
21. Manisha Vats, Harneet Singh, Satish Sardana. Phytochemical Screening and Antimicrobial Activity of Roots of Murraya Koenigii (Linn.)Spreng. (Rutaceae). Brazilian Journal of Microbiology. 2011; 42:1569-1573.