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PHYTOCHEMICAL SCREENING OF OATS (*AVENA SATIVA)*

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ABSTRACT

Phytochemicals are bioactive plant compounds that have protective or disease preventive properties. They are found in fruits, vegetables, beans, grains and other plants. They have biological properties such as antioxidant activity, modulation of detoxification enzymes, stimulation of immune system, modulation of hormone metabolism and anticancer property. The present study aims at exploiting the presence of various phytochemicals present in fermented oats (*Avena sativa*) and non-fermented oats (*Avena sativa*). The results clearly revealed the presence of phytochemicals such as tannin, alkaloid, quinones, phenols and anthraquinones in fermented oats and tannin, alkaloid and quinones in non-fermented oats. The total phenol content of fermented oats was found to be 67.2 mg catechol equivalent /g.

KEYWORDS: oats, fermented oats, phytochemicals and phenols.

INTRODUCTION

Phytochemicals (from the Greek word phyto, meaning plant) are biologically active, naturally occurring chemical compounds found in plants, which provide health benefits for human further than those attributed to macronutrients and micronutrients (Saxena et al., 2013).[1] They are found in fruits, vegetables, beans, grains and other plants. Phytochemical involves in the action of antioxidant, hormonal action, stimulation of enzymes, interference in DNA replication and antibacterial effect (Lui, 2003).[2] Phytochemicals present in whole grain cereals (wheat, barley, rice, rye and oats) help to reduce oxidative stress and inflammation in

humans (Bird and Belobrajdic, 2014).[3] The biological activities of many phyto- chemicals are attributed to their antioxidant properties. Free radicals in human body cause DNA damage and lipid peroxidation, leading to cancerous cells, atherosclerosis. The body has a natural defense system against these free radicals, consisting of the enzymes superoxide dismutase, catalase and glutathione peroxidase. Dietary antioxidants are also important components of the body's defence (Shewry et al., 2008).[4]

Oats have a distinctive nutritional profile compared with other types of grain, including protein, unsaturated fatty acids, soluble (beta-glucan) and insoluble fibre, micronutrients such as iron, potassium, copper and magnesium, thiamine, folate, zinc and phosphorus (Yu et al., 2012).[5] Oats is a source of many compounds such as vitamin E, phytic acid, phenolic compounds, avenanthramides and sterols that exhibit antioxidant activity. (Brindzova et al., 2012).[6] Consumption of oats helps to reduce weight, lower blood cholesterol level, improve postprandial glycemic, insulinemic responses and boost immune system. (Poulter et al., 1999, Brand, 2001 and Keenan, 2002).[7][8][9]

MATERIALS AND METHODS

Oats purchased from supermarket was cleaned to remove the impurities. Then this was ground to a fine powder using a food processor and stored in air tight container at room temperature till further use.

1 gm of oats was mixed with 50ml of water in the ratio of 1:50 and it was autoclaved for 45 minutes. The same procedure was carried out for fermented oats to which 100µl of *Lactobacillus acidophilus* was added. Then the conical flask was plugged with cotton to keep insects and flies away. Fermentation was carried out for a period of 72 hours at room temperature.

Phytochemical screening

The phytochemical screening was assessed by a standard method as described by (Harborne, 1973; Smolenski et al., 1974; Ayoola et al., 2008; Sureshkumar et al., 2009; Manasboxi et al., 2010, Jana et al., 2010, Sofowora et al., 1993 and Kolawole et al., 2006).[10] [11] [12] [13] [14] [15] [16] [17] major natural chemical groups such as tannin, saponins, flavonoids, alkaloid, quinones, glycosides, cardiac glycosides, terpenoids, phenol, coumarins, steroids, phytosteroids, phlobatannins and anthraquinones

Estimation of total phenol level of fermented oats

Total phenolic content (tpc)

Total phenolic content of sample was assessed according to the Folin–Ciocalteau method (Slinkard & Singleton, 1977) [18] with some modifications. Briefly, 0.1 ml of sample (200, 600 and 1000 µg/ml), 1.9 ml distiled water and 1 ml of Folin–Ciocalteau's reagent were added in a tube, and then 1 ml of 100 g/l Na_2CO_3 was added. The reaction mixture was incubated at 25 °C for 2 hours and the absorbance of the mixture was read at 765 nm. A calibration curve with six data points for catechol was obtained. The results were compared to a catechol calibration curve and the total phenolic content of sample was expressed as mg of catecholequivalents per gram of extract.

RESULT AND DISCUSSION

The results of phytochemical analysis of non-fermented and fermented oats are presented in table 1. The phytochemical screening for non-fermented oats showed positive result for tannin, alkaloid and quinones where as fermented oats showed positive result for tannin, alkaloid, quinones, phenols and anthraquinones.

Table 1: Qualitative phytochemical analysis of oats (*Avena sativa*).

S.No	Phytochemical Test	Non – fermented oats	Fermented oats
1	Tannins test	+	+
2	Saponins test	-	-
3	Flavonoids test	-	-
4	Alkaloid test	+	+
5	Quinones test	+	+
6	Glycosides test	-	-
7	Cardiac glycosides test	-	-
8	Terpenoids test	-	-
9	Phenols test	-	+
10	Coumarins test	-	-
11	Steroids and Phytosteroids test	-	-
12	Phlobatannins test	-	-
13	Anthraquinones test	-	+

- *Presence of phytochemicals (+)*
- *Absence of phytochemicals (-)*

Quantitative analysis of phytochemical

Estimation of total phenol content of fermented oats

From the table 1, it is clear that phenol was absent in the non-fermented oats and present in fermented oats. The total phenol content of fermented oats was estimated using Folin Ciocalteu's reagent and was expressed in the term of catechol equivalents. The phenol content of the fermented oats sample is 67.2 mg catechol equivalent /g.

Phytochemicals have been identified in several grains such as wheat, rice, corn and oats. These phytochemicals involve in biological activities including antiatherosclerotic, anti-inflammatory and antioxidant effects. Phenolic acids and polyphenols present in oats serve as potent antioxidants (Chen at al., 2004).[19]

CONCLUSION

The present study conclusively demonstrates that oats (*Avena sativa*) is a good source of various phytochemical like tannin, alkaloid, quinones, phenols and anthraquinones. Oats is a natural food supplement with strong antioxidant and nutrient profile.

Oats (*Avena sativa*) in general has a rich nutrient profile with reasonable amount of phtochemicals. It is credible to note from the current study that the fermented oats has added number of phytochemicals with a high phenol content of 67.2 mg catechol equivalent /g when compared to non-fermented oats. This finding further emphasises the nutritional significance of fermented oats in our daily diet.

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