ISSN: 2230-9926

Available online at http://www.journalijdr.com

IJDR

International Journal of Development Research
Vol. 5, Issue, 06, pp. 4686-4688, June, 2015

International Journal of
DEVELOPMENT RESEARCH

Full Length Research Article

QUANTITATIVE AND QUALITATIVE ANALYSIS OF THE ETHANOLIC EXTRACT OF WATERMELON PEELS

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ARTICLE INFO

Article History:
Received 07th March, 2015
Received in revised form
08th April, 2015
Accepted 22nd May, 2015
Published online 28th June, 2015

Key Words:
Watermelon,
Peel,
Ethanol,
Phytochemicals

ABSTRACT

The present study was undertaken to investigate the phytochemicals present in the ethanolic extract of watermelon peel (*Citrullus lonatus, family Cucurbilaceae*). Watermelon which was obtained from Eke-Awka market, Anambra state, Nigeria was analyzed quantitatively and qualitatively for the presence of phytochemicals such as tannins, flavonoids, alkaloids, saponin, terpenoids, and phenols using standard chemical methods. The qualitative results obtained showed that, phenol, terpernoid, saponin, proteins, flavonoid and alkaloid were present. Phenol, flavonoid, saponin, alkaloids and oxalate contents of watermelon peel extract were quantified and results showed the following: phenol (2.08mg/g), flavonoid (2.60%), saponin (6.20%), alkaloid (4.40%) and oxalate 0.43mg/100g. The results obtained from this study indicate that the peels will be of medicinal importance which suggest the possibility of utilizing the peels as functional foods or herbal drug to prevent or manage some critical diseases of man.

INTRODUCTION

Watermelon, citrullus lanatus (thunb) is a tropical fruit, which grows in almost all parts of Africa and South East Asia (koocheki *et al.,* 2007). It belongs to the family of cucumber (cucurbitaceae). It is large oval round or oblong in shape. The skin is green with dark green rind or sometimes pale green stripes that turn yellowish green when ripe. It is a very rich source of vitamin and often used as appetizers depending on how it is prepared (Kenje and Grum, 2003). It serves as a good source of lycopene (a red carotenoid pigment which act as anti-oxidant during normal metabolism and protect against cancer (Perkins and Collins, 2004). Water melon contains a significant amount of citrulline and after consumption of several kg an elevated concentration is measured in the blood plasma. This could be mistaken for citrullinaemia or other urea cycle disorder (Mandel *et al.,* 2005). The juice or pulp from water melons is used for human consumption, while the rind or peels and seeds are major solid wastes (Bawa *et al.,* 1997). The peels are usually discarded and applied to feeds or fertilizers, due to their unpleasant taste but they are also edible and sometimes used as vegetables. In china they are stir-fried, stewed or more often pickled. When stir-fried the de-skinned and de-fruited rind is cooked with olive oil, garlic, chili pepper, scallion, sugar and rum. Pickled watermelon is also commonly consumed in the southern USA, Russia, Ukraine, Romania and Bulgaria (Southern, 2010). In Nigeria watermelon peels are fermented, blended and consumed as juice (Erukainure *et al.,* 2010). Water melon seeds contain cucurbocitrin to aid the lowering of blood pressure and improve kidney function. Watermelon contains large amount of beta carotene and is a significant source of lycopene (Collins *et al.,* 2005). It is a good source of fiber which helps to improve bowel regularity and works to prevent colon and rectal cancer. Water melon peels contain phytochemicals such as saponins, phenol, flavonoids and alkaloids. These phytochemicals have biological effects like anticancer, anti diabetic, anti-inflammatory, which are for therapeutic effect, medicinal values or can be used in the pharmacological production of drugs reducing the risk of chronic disease and to meet nutrient requirement for optimum health (Liu, 2004).

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MATERIALS AND METHODS

Sample Collection and Identification: Watermelon fruit used in this study was sourced from Eke Awka market, Awka,

Nigeria. It was identified by a taxonomist in Botany Department, Nnamdi Azikiwe University, Awka, Nigeria.

Sample Processing

The watermelon sample was cut and the peels were separated from the flesh. The peels were shade dried at normal room temperature in a drying room for 6 days. The dried peels were ground using a manual grinder, reducing the size to smaller form (powdered form). The powdered sample was stored in an air tight container and was kept to be used for the phytochemical analysis.

Sample Extraction of Water Melon Peels

100g of water melon peel was weighed with an analytical weighing balance and 600ml of absolute ethanol measured with a volumetric cylinder was added to it and left for 24hrs (1 day). It was then filtered with whatmann's no.42 filter paper. The ethanol extract was concentrated using soxhlet apparatus and the concentrated extract was used for analysis.

METHODS

Qualitative Analysis

Qualitative analysis was carried out using the methods of Trease and Evans (1989) and Harborne (1973).

Quantitative Analysis

The methods of Obadoni and Ochuko (2001); Boham and Kocipai-Abyazam (1974); Trease and Evans (1989) were used for quantitative analysis of the ethanolic extract of the peel

RESULTS

The result of the Qualitative Analysis of the sample is presented in Table 1: Qualitative Analysis of Sample.

Table 1. Qualitative Analysis

Parameters	Quantity
Alkaloid	++
Phenol	+
Tannin	-
Saponin	++
Flavonoid	+
Terpenoid	+
Steroid	+
Cardiac glycoside	-
Reducing sugar	-

Keys, + trace amount.
++ present in a large amount.
- not present.

The result of the Quantitative Analysis of the sample is presented in Table 2.

Table 2. Quantitative Analysis of Sample

Phytochemical Parameters	Quantity
Phenol	2.08mg/g
Flavonoid	2.60%
Saponins	6.20%
Alkaloids	4.40%
Oxalate	0.43mg/100g

DISCUSSION

Phytonutrients are natural bioactive compounds from plants with general benefits to human health. The phytochemical screening of qualitative analysis of watermelon peel showed the presence of saponin, flavanoids, terpernoids, alkaloids and steroids while tannins and cardiac glycoside were not detected. Saponin, flavonoids, phenol and alkaloids contents were quantified. Quantitative analysis of the extract showed that watermelon peel is rich in alkaloid (4.40%). It has been speculated widely that alkaloids ranked the most efficient therapeutically significant phytochemical for analgesics, antispasmodic and bactericidal effect. Saponin content of the peel was 6.20%. Saponin has been reported to show medicinal as well as exhibiting physiological activities. The rich presence of saponin reported in this study implies that the peel of water melon can exhibit the following characteristics of saponin: formation of foam in aqueous solutions, hemolytic activity, cholesterol binding properties and bitterness (Hassan, 1993). In the immune system, the administrations of antigen in combination with saponin (immunoadjuvants) enhance immune response against antigens. Saponin serves as antibiotic, helping the body to fight infection and microbial invasion (Nijveldt *et al.,* 2001).

Oxalate which has a negative effect on mineral availability was observed in reduced quantity in the extract. Diets high in oxalate increase the risk of renal calcium absorption and oxalate has been indicated as a source of kidney stones (Chai and Lieman, 2004). There was decrease in the total phenolic (2.08mg/g) and flavonoid (2.60%) contents of the watermelon peel compared to the amount of alkaloids and saponin. Studies revealed that the consumption of flavonoids can be used in the management of coronary heart disease (Kneki *et al.,* 1996). The relationship between phenol content and antioxidant activity has been studied in different food stuff (Jayaprakasha *et al.,* 2008). Antioxidant activity of food stuff increases with the presence of total phenolic and flavonoid content. Therefore the presence of phenol and flavonoid in the extract of watermelon peel indicates that the peel has potential for antioxidant activities although the potential may be low considering the low level of phenol in the extract.

Conclusion

The qualitative and quantitative screening on the ethanol extract of the peels of water melon revealed some powerful and important phytochemicals of pharmaceutical and medicinal importance indicating that the peels will be of medicinal importance which suggest the possibility of utilizing the peels as functional foods to prevent or manage some critical diseases of man.

Acknowledgement

We appreciate the technical assistance offered to us by Springboard laboratories, Awka, Nigeria.

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