



Evaluation of Nutritional Parameters and Antioxidant Study of Musk Melon Powder from Lahore, Pakistan

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Abstract: Muskmelon is one of the most consumed fruit crops worldwide due to its pleasant flavour and nutritional value. Antioxidants play a significant role to act as shields for the body from free radical damage. The nutritional and antioxidant activity of *Cucumis melo* powder was analysed to understand its potential benefits. Nutritional analysis showed that muskmelon powder is a good source of carbohydrates, protein, fiber and energy. Antioxidant activity was quantified by 2, 2-diphenyl-1-picrylhydrazyl radical assay. The water extract showed antioxidant activity (44.80%) and the methanol extract (62.64%) at a concentration of 2.5 mg/ml. Therefore, these results suggest that muskmelon powder is not only a good energy source, but also an important source of natural antioxidants in food and nutraceutical applications.

Keywords: Antioxidants; Musk Melon; Nutritional Aspects; Inhibition; DPPH

1. Introduction

Fruits and vegetables are edible plant products, which are soft and pulpy. Due to their high level of moisture, freshly harvested fruits and vegetables can decay quickly. Fewer intakes of fruits and vegetables are associated with high risk of lung cancer and nutritional deficiencies. Fruits and vegetables are considered an important topic of study due to the presence of different compounds, including phytochemicals, antioxidants, vitamins, minerals and dietary fiber. The intake of these compounds decreases the risk of various health problems such as cardiovascular diseases, type-2 diabetes, specific cancer types, obesity and constipation.^[1]

Musk melon, or honey melon, is a member of the specie group *Cucumis melo* (muskmelon). The sweet flesh of honeydew usually has a light green texture, while its skin appears white-yellow. The size and shape are comparative to its close relative, cantaloupe. Honeydew melon can be found all around the world and is eaten directly or added in desserts, soups, snacks, and salads. Musk melons are known as the powerhouses of health due to their abundant amount of nutrients. They are often regarded as the superhero of fruits. They are excessively available in summers and have high percentage of water which makes very highly cooling and hydrating. They don't only smell good, but taste too. The amount of fat present in the melon is almost none. They also contain rich amounts of

carbohydrates, which are degraded when they enter the body. They also contain considerable amount of water. These seeds possess a special fiber which makes them good for weight loss. The high amount of potassium in them is really helpful for losing belly fat. It is also beneficial for controlling blood pressure, increasing eye strength, treating diabetes, lowering cholesterol, boosting immunity, treating ulcers and relieving constipation. It also helps with sleeping disorder, prevents kidney stones, heart diseases, and diminishes the risk of cancer. Cantaloupe melons are well known for their high amounts of vitamin A, vitamin C, potassium and magnesium. It has shown to have many important medicinal properties, including anti-inflammatory, analgesic, anti-cancer, anti-ulcer, anti-microbial, diuretic, anti-diabetic and anti-fertility activity.^[2]

Reactive Oxygen Species (ROS) on reaction with free radicals are themselves transformed to free radicals. ROS consists of free radicals like superoxide anion radicals, non-free radical species, hydroxyl radicals and singlet oxygen.^[3-5] Butylated Hydroxyl Anisole (BHA), Butylated Hydroxyl Toluene (BHT), Propyl Gallate (PG), Tert-Butyl Hydroquinone (TBHQ) are known as synthetic radicals which are known to cause many pathophysiological errors such as diabetes, genotoxicity, cancer, inflammation, Alzheimer's disease, cataracts, retinopathy, rheumatism, skin disease porphyria and senile dementia stroke.^[6] Nutraceuticals are useful for the treatment of various diseases, either as pure active compounds or in plant extracts'

form.^[7] Studies say fruits and the residues are rich sources of antioxidants which can reduce the risk of cancer and associated death rate, and using food having high amounts of polyphenols may decrease the risk of cancers. Plus, various natural sources have been tested for their antioxidant potential and functional properties, primarily for replacing the synthetic antioxidants that are used in the food products, and can be a serious health hazard.^[8] For the investigation of *in vitro* antioxidant potential of plant extracts, various chemical and biochemical tests can be done, introducing new bioactive ingredients. These tests serve as important screening tools for synthetic and natural bioactive compounds and can be used in the chemical, food, and pharmaceutical industries.^[9] The goal of this study is to identify the nutritional parameters and antioxidant activity of methanol and water extracts of musk melon powder.

2. Materials and Methods

2.1. Collection of Materials

The fruit musk melon was procured from a local market of Lahore, Pakistan during summer season, in the third week of June, 2021. All the chemicals and solvents utilized in the study were procured from Merck Specialties Private Limited.

2.2. Extraction and Processing of Musk Melon

The fresh musk melons were collected and dried in the open air and then under shade at room temperature. Musk melons were placed at 60°C in an oven for 12 h to remove the excess moisture. The dried material was then chopped and ground to a powder using a mechanical blender. Methanol and water were added in a Sechelt apparatus and dried leaf powder was collected. The extract was filtered through Whatman filter paper grade 1 and the collected filtrate was placed in a rotary evaporator whose temperature was reduced and temperature was controlled (45–50°C) for evaporation to dryness to remove the solvent. The extract was preserved and stored at 4°C in storage vials for further study.

2.3. Nutritional Analysis

Evaluation of moisture and complete ash contents was done using gravimetric methods at 105°C and ash at ≤ 525°C by AOAC method Ref. 942.05 respectively.^[10] The total nitrogen content was estimated using a Kjeldahl method Ref. 976.05. The crude fat content was examined by extracting the sample in hexane. Total soluble carbohydrate was identified by the difference of the sum of all the proximate composition from 100%. The calorific (energy) value was obtained according to the methods of Akinyeye et al.^[11]

2.4. Antioxidant Study by DPPH Assay

Antioxidant's activity of the extracts was determined based on radical scavenging activity by using 2, 2-diphenyl-1-picrylhydrazyl radical (DPPH) according to Brand-Williams 1995.^[12] A 0.1 mL aliquot of the extract solution (0.5–2.5 mg/mL) was mixed with 2.9 mL of DPPH (0.004 % in methanol) was added. The mixture was shaken vigorously and left to stand for 30 min. The absorbance of the resulting solution was calculated at 517nm using a UV–visible

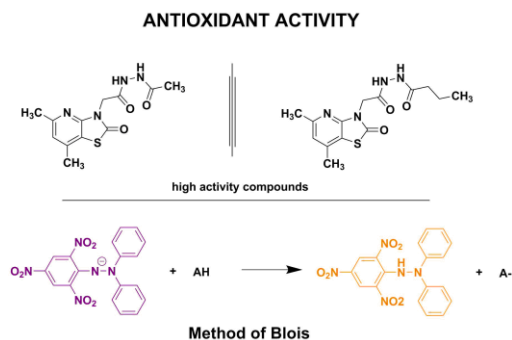


Fig. 1. Mechanism of Antioxidant Activity

spectrophotometer (1700, Shimadzu, Japan). The reaction mixture without DPPH was used for background correction. For calculating antioxidant activity, following equation was used:

$$\text{Antioxidant activity \%} = 1 - [A \text{ sample}/A \text{ control}] \times 100$$

2.5. Statistical Analysis

All data obtained were analysed using descriptive statistic as explained by Olawuyi 1996.^[13] Statistical values that were calculated include mean and standard deviation.

3. Results and Discussions

3.1. Nutritional parameters of musk melon

Nutritional science creates a link between metabolic and physiological responses of the body to the diet. With improvement in the fields of molecular biology, biochemistry, and genetics, the study of nutrition is primarily being concerned about the metabolism and metabolic pathways, the sequences of biochemical steps through which the many substances of living things change from one form to another. Proximate and nutrient analysis of edible fruit and vegetables plays a crucial role in assessing their nutritional significance.^[14,15] The considerable use of vegetable species by the local people in their diet motivated to carry out the present proximate and nutrient analysis.^[16]

The moisture and ash contents were identified to be 8.85% and 2.90% respectively. Protein contents were 5.60% in melon instant drink. 3.69% fat and 6.76% fiber contents were found in prepared drink. The carbohydrate contents in prepared drink were 72%. Food energy of prepared melon powder was found to be 345 Kcal/100g. The results of the obtained nutritional analysis suggest that the prepared melon powder is a good source of instant fiber, protein & energy (table 1). The results were following the study of Manika Mehra et al., 2015.^[17]

Table 1. Nutritional Facts of Melon powder

Sr. #	Parameters	Value g/100g (%)
1.	Moisture	8.85 ± 0.95
2.	Ash	2.90 ± 0.12
3.	Fat	3.69 ± 0.18
4.	Fiber	6.76 ± 0.81
5.	Protein	5.60 ± 0.65
6.	Carbohydrates	72.00 ± 2.14
7.	Energy (Kcal/100g)	345.0 ± 5.65

Table 2. % Inhibition (DPPH) of Musk Melon Water Extract

Sr. #	Concentration (mg/ml)	% Inhibition (DPPH)
1.	0.5	15.20 ± 1.32
2.	1.0	22.32 ± 1.60
3.	1.5	29.04 ± 2.30
4.	2.0	37.65 ± 2.85
5.	2.5	44.80 ± 3.16

Table 3. % Inhibition (DPPH) of Musk Melon Methanol Extract

Sr. #	Concentration (mg/ml)	% Inhibition (DPPH)
1.	0.5	25.12 ± 1.92
2.	1.0	32.32 ± 2.24
3.	1.5	41.04 ± 2.62
4.	2.0	52.55 ± 3.20
5.	2.5	62.64 ± 3.88

3.2. Antioxidant Study

Musk melons contain a high amount of antioxidant flavonoids such as beta-carotene, zeaxanthin, lutein and cryptoxanthin. These antioxidants are able to help protect cells and other structures in the body from oxygen-free radicals and hence; offer protection against colon, prostate, breast, endometrial, lung, and pancreatic cancers. Results of the activity of free radical scavenging of melon instant drink showed that the scavenging of DPPH radical increases as the concentration of antioxidant increases with the highest % inhibition (44.80 %) at 2.5 mg/ml of water extract (table 2) and (62.64 %) at 2.5 mg/ml of water extract (table 3). results showed that it is a potent source of natural antioxidants.

The antioxidant activity of the musk melon extracts were analysed using DPPH radical scavenging. DPPH have the properties of a free radical compound and is often used to test the free-radical scavenging abilities of different types of samples.^[18] The DPPH radical scavenging test is defined as a sensitive antioxidant assay and depends on substrate polarity, plus hydrogen transfer and/or scavenging activity of the radical. Although the DPPH radical slightly resemble biological systems and living organisms, this method is popularly known as indicative of the ability of plant extracts to remove free radicals, and without any enzymatic activity will refer to hydrogen atom or electron donation ability.^[19]

The DPPH radical scavenging assay use is beneficial in analysing the antioxidant efficiency because the stability of this radical is more than the radicals of hydroxyl or superoxide. The DPPH assay is usually based on a hydrogen atom transfer reaction.^[20] In the presence of antioxidants, the decrease in the absorbance of DPPH occurs due to the antioxidant molecules and the radical reaction, which results in the scavenging of the radical by hydrogen donation. This is visualized as a discoloration from purple to yellow (Fig. 1) (Saeed et al., 2018; Schaich et al., 2015.^[21,22] Our result seconds with previous data on the antioxidant activity of musk melon showed by Muhammad Zulfikar et al., 2020^[23] and study published by Hajar Iqbal et al., 2010.^[24]

4. Conclusions

The analysis of musk melon powder nutritional composition has shown that they are potential sources of energy, protein, fat and carbohydrates. They were observed to be very good sources of

natural antioxidants showed the highest antioxidant activity which possesses potential health benefits.

Conflicts of Interest

The authors declare no conflict of interest.

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