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Total antioxidant capacity of some common seeds and effect of sprouting and its health benefits

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Abstract

The aim of study was to evaluate the antioxidants capacity of extracts of sprouted and unsprouted seeds viz., Green gram (*Vignaradiata*), Moth bean (*Vignaconifolia*), Chick pea (*Cicerarietinum*). The extracts of sprouted and unsprouted seeds were prepared. The sample seeds were examined and compared with their total antioxidant capacity. The total antioxidant capacity assessed by phosphomolybdenum method. The result showed that green gram, moth bean, chick peas differ in their total antioxidant capacities. In sprouted seeds, green gram was higher antioxidant capacity over moth bean and then chick peas, so the sprouted seeds of green gram were found to be much effective in total antioxidant capacity.

We have concluded from our study that the sprouting increases the health benefits by increasing its free radical scavenging abilities which otherwise if reduced causes oxidative stress leading to provide base for many diseases.

Keywords: Antioxidants, Total antioxidant capacity, PMA method, Moth bean, Green gram, Chickpea.

1. Introduction

Free radicals are independently existing species which are potent destructors of biological entities [7] which are highly reactive and unstable [1]. Free radical attack on all kind of molecules in body including majorly nucleic acids, protein and lipids [8]. Many research articles have been proved their role in more than 50 various disorders. (Figure 1) Antioxidants are naturally occurring substances that combat oxidative damages in biological entities. Antioxidant achieves this by preventing oxidation process that can damage cells in the body [5]. These antioxidants can also be termed as reducing agents. Antioxidants are considered as important in fight against the damage caused by free radicals [6]. Although human body has its own defenses against oxidative stress, these become weak with age or in the illness [7]. Also free radical action can be inhibited by specific antioxidant therapy [4].

Oxidative stress is developed when free radical production exceed than the availability of antioxidants [6]. Antioxidants are chiefly available to us through vitamins, enzymes and minerals for ex. Vitamin C or Ascorbic Acid is water soluble and it scavenges for free radicals that are present in aqueous environment within human body [9][13]. Since its effectiveness had been understood the researchers have started exploring the antioxidant capacities of various food constituents. However the effect of sprouting on antioxidant area is not much reconnoitered.

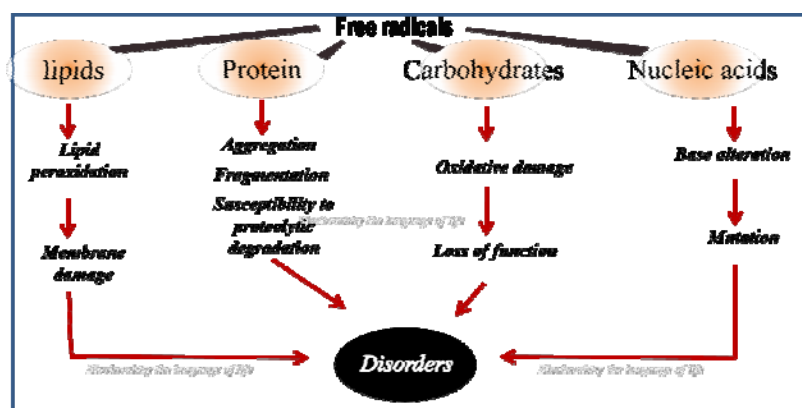


Fig 1: Potential hazards caused by free radicals.

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Free radicals scavenging properties and antioxidants effects of crude extracts of sprouted and unsprouted green gram, moth bean and chick peas has been explored in present study (Figure 2). Scanty literature is available related to total antioxidant capacities of these seeds. However few articles have been published mainly focusing on various chemicals present in these seeds, few of which are good antioxidants.



Fig 2: Various seeds used in study.

These are the common pulses and used from even lower to higher socioeconomic group in almost all Indian population especially in Maharashtra. Therefore they are easily available in the local market.

Total antioxidant capacity (TAC) is the nonenzymatic antioxidant ability of the sample to reduce any oxidant chemical. Various methods have been employed to estimate antioxidant capacities. Phosphomolybdic acid (PMA) method is widely used method to estimate TAC in various plant extracts including seeds [10].

While planning present study we decided to focus on the staple food items of lower socioeconomic groups. Pulses are considered to be superior protein source over the years, but its free radical scavenging ability is not much discovered. Also many researchers support the sprouting of seeds for its better nutritional quality. So in the present study we planned to use the common pulses, which are generally consumed in sprouted and unsprouted form by the major population.

Objectives

In our endeavors to discover the nutritional value in regard with antioxidant we have aimed our study keeping following objectives.

- 1) To evaluate TAC of green gram, chickpea and moth bean in both sprouted and unsprouted forms.
- 2) Statistical comparison of TAC in both sprouted and unsprouted forms.

The secondary objective of the study will be to understand health benefits of sprouted and unsprouted grains

Hypothesis

If the total antioxidant capacity is effective in seeds then it is more medicated diet and also if we can recommend sprouting to improve its quality.

Scope and Limitations

Today people have become much more health conscious. Many studies revealed benefits of antioxidants. Market has been flooded with many products claiming to contain antioxidants. Unfortunately influenced by advertisements people fail to notice their food and its ability to provide quality nutrition. Besides this antioxidant therapies are widely suggested along with conventional treatment while treating various disorders. Most interesting part of it is that results are very much positive than before. Present study will help to understand the studied seeds and their potential to give antioxidants. Our finding may also motivate people to obtain

these antioxidants from the diet rather than falling prey to advertisements.

As there were wide variety in seeds, our study focuses mainly on three types of dietary seeds Viz. Green gram (*Vignaradiata*), Moth bean (*Vigna conifolia*), Chick pea (*Cicerarietinum*). This study can be extended with other varieties and can be focused on individual antioxidant parameters.

2. Materials and Method

Collection of seeds

Three types of seeds, Viz., green gram, moth bean, chick peas, were collected from local market of Dighanchi. The seeds taken were soaked in water and drain off the water after 8 hours. The seeds were then covered with dry cotton cloth at room temperature processing for sprouting to 8 hours. On the contrarily other 8hrs soaked seeds were directly used for further study i.e. without sprout.

Preparation of Extract

The sprouted and unsprouted seeds were taken and are pulverized. 5g of crushed sample were taken of each sprouted and unsprouted seeds in pre weighed beaker and homogenized with 10ml distilled water. Filtration was repeated until get clear filtrate. This filtrate was used as a sample to evaluate TAC levels.

Total Antioxidant Capacity

The antioxidant capacity of sprouted and unsprouted seed extract determined by phosphomolybdenum method. The sprouted extract was used as test and unsprouted extract considered as control. The Phosphomolybdenum reagent prepared as-0.04g of sodium thiosulphate, 0.049g ammonium molybdenum in 10ml of 0.6M sulphuric acid. The unknown concentrations tubes were prepared containing 0.2ml of extract, 1.8ml distilled water, 2ml Phosphomolybdenum reagent. For each unknown concentration of sprouted and unsprouted extracts 10 tubes were prepared. The blank preparation was done to 2ml of distilled water with 2ml Phosphomolybdenum reagent. Beside these, standards were made with different concentrations ranging 10-50 μ g/ml. All the tubes were incubated at 95 $^{\circ}$ C for 90 minutes. After cooling at room temperature the absorbance was measured at 695nm using UV/VIS spectrophotometer.

Data Analysis and Interpretations

1. Values obtained from calculation were expressed with standard deviation
2. Average values were calculated for each group after analysis.
3. Comparison was done using student's T-Test.

3. Results

1. TAC values

After following the procedure the values of various samples are obtained as mentioned in following table.

Table 1: Values of TAC of different seeds

Seeds	type	TAC value -Mean \pm (Eq. to μ g % of Ascorbic acid)
Green gram	Unsprouted	3922 \pm 254
	Sprouted	5744 \pm 352
Moth bean	Unsprouted	2656 \pm 189
	Sprouted	3867 \pm 204
Chickpea	Unsprouted	2367 \pm 199
	Sprouted	2689 \pm 156

2. Comparative analysis

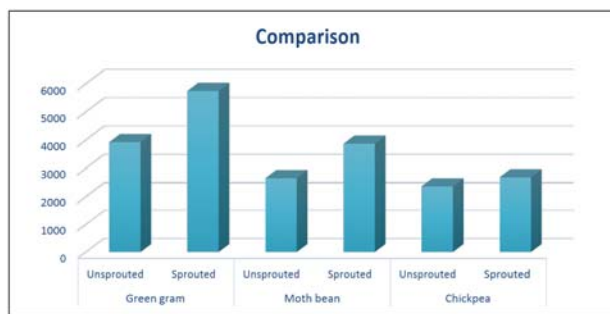


Fig 3: Comparison of various seed and their types.

- Statistical analysis was done using t-Test.
- Values of TAC in green gram are found to be significantly high, followed by moth been as compared with chickpea.
- Values of TAC in sprouted seeds are significantly more than those of unsprouted seeds especially in green gram & moth bean. Whereas no significant change has been seen in chickpea.

4. Discussion

The study reveals that the sprouted seeds have higher antioxidant capacity over unsprouted seeds especially green gram was higher antioxidant capacity over moth been and then chick peas.

Most of comparative investigation related to this research has not done yet. The chick pea (*Cicerarietinum*) showed high antioxidant activity in study [2, 14]. But in present study comparing to TAC, green gram showed significant antioxidant capacity over chick pea.

The results of this study shown that sprouts have higher antioxidant capacity than dry seeds. According the study “the metabolic activity of seeds increases as they hydrated during soaking. Most of the biochemical changes occur during hydration and during sprouting. The reserve chemical constituents such as protein, starch and lipids are broken down into simple compounds that are used to make new compounds” [3]. Sprouts provides a good quality of vitamins A, E and C plus B complex. Every soaking seed overnight in water yields greatly increased amount of Vitamin B as well as vitamin C [12]. In sprouted seeds antioxidant potential increases due to their generation of several antioxidant phytochemicals, vitamins [11].

5. Conclusions

The effects of extracts of Green gram (*Vignaradiata*), Moth bean (*Vignaaconifolia*), Chick pea (*Cicerarietinum*) were analysed. The total antioxidant capacity was measured by Phosphomolybdenum method. It conclude that

- The sprouted seeds were higher antioxidant capacity over unsprouted seeds, so sprouted seeds were much effective than unsprouted seeds.
- In sprouted seeds, green gram was higher antioxidant capacity over moth bean and then chick peas, so the sprouted seeds of green gram were found to be much effective in total antioxidant capacity.

Scope for Future Work

This study will helpful -

- To know the antioxidant capacity in various seeds, Fruits and Vegetables.

- To study relation between sprouted and unsprouted seeds of various varieties.
- To study antioxidant capacity in one type of seed with its varying varieties.

Limitations of Study

The present study focuses mainly on total antioxidant capacity. The power of individual antioxidant molecules is not explored. Further other nutritional qualities are also not studied as many research papers are published on overall nutritional benefits of grains.

6. Acknowledgment

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