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Incorporation of Wheatgrass powder and juice in different food items

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Abstract

Diabetes is a metabolic disease, which causes high blood sugar levels in a person. A person develops diabetes when his body loses the ability to produce enough insulin or when the body is not able to absorb the insulin. When the body is not able to produce insulin at regular intervals at required rates it is called type 1 diabetes. The condition when the patient's cells are not able to absorb and utilize the insulin for the metabolic processes is called type 2 diabetes. The long term impact of diabetes can cause kidney diseases, cardiovascular diseases, neuropathy, retinopathy etc. The existing treatment for diabetes is only allopathy medicine, which has been proven to cause harmful irreversible effects on the patients. The study aims to observe and examine the impact of incorporation of wheat grasses in various food items such as chapattis, milk, biscuits, paneer etc. The study contains detailed information regarding the anti-oxidizing impact of wheat grasses when they are mixed with different food items, which can be used to treat the oxidizing stress in Diabetic patients.

Keywords: Wheatgrass powder, food, grasses

Introduction

Diabetes mellitus can be defined as an endocrine disorder associated with hyperglycemia. The development of this condition takes place due to insulin deficiency in a body. There are two types of diabetes, type 1 diabetes and type 2 diabetes. The common symptoms of diabetes are frequent urination, sudden weight loss, blurry vision etc. Around 415 million people are suffering from diabetes worldwide, with more than 70 million people from India. 90% of the diabetic people are suffering from type 2 diabetes. Recently, researchers have discovered the impact of cereal grasses for treating diabetes. Cereal grasses such as wheat (*Triticum aestivum*), barley (*Hordeum vulgar*) are rich in vitamins, fiber, minerals, amino acids and active enzymes, which can prove to be beneficial against type 2 diabetes. The study aims to understand the various outcomes of the incorporation of wheatgrass juice and powder in food items. The various food items chosen for the incorporation of wheatgrass powder and juice were chapatti, biscuits, flavored milk and paneer.

Review

The increasing rate of diet related diseases have caused people to become diet conscious. Researchers are looking into the ingredients of the food to find a cure for these diseases. Recent studies have discovered the anti-oxidizing compounds in wheatgrass, which can reduce the oxidative stress in diabetic patients (Rahman *et al.*, 2015). To utilize the anti-oxidizing property of wheatgrass, optimized levels of wheatgrass juice and powder were added to different types of food items. After the incorporation of the wheatgrass in certain food items, the outcomes were observed and evaluated.

Incorporation of wheatgrass in chapati

To understand the difference in flavor and appearance, a normal *chapatti* from whole wheat was prepared. The whole-wheat chapatti was used as control (C1) in the experiment. On the other hand, three other chapattis with different percentage of wheat grass powder were also prepared. The three chapattis C2, C3 and C4 contained 5, 10 and 15 % of wheat grass powder respectively (Singh, Verma and Pandey, 2012) ^[10]. The C1 chapatti was the most acceptable chapatti and satisfied all sensory parameters. Among the three wheat grass chapattis, C2 had the highest acceptability score. There was no significant flavor change between all four chapattis. A difference in colour was noticed when the percentage of wheatgrass powder increased from 10%. C4 had 15% wheatgrass powder, which gave it a dark green colour and

Was the least appealing to the sensory parameters (Rana, Kamboj and Gandhi, 2011) ^[7]. The antioxidant capacities of the chapattis were measured after their preparation. The anti-oxidant activity differed from 50.94, 53.62, 56.18 and 62.53 in all 4 chapattis. The anti-oxidant activity was much higher in C3 and C4 with 10% and 15 % of wheat grass powder. However, no significant anti-oxidant activity was noticed in C2 and C1 chapattis (Shaikh, Quazi and Nandedkar, 2011) ^[8]. Thus, it can be concluded that to derive the anti-oxidant potential from chapatti minimum 10% wheatgrass powder should be added.

Incorporation of wheatgrass powder in biscuits

Two sample varieties of *sweet and salty biscuits* with 5%, 10% and 15% of wheatgrass powder were prepared for the observation. In case of the sweet biscuits, the acceptability score of C2 biscuit with 5 % of wheatgrass powder was the highest and the C4 biscuit with 15% of wheatgrass powder was the lowest (Durairaj *et al.*, 2014) ^[3]. There were no significant changes in the in shape, flavor or texture of the biscuits. Although a difference in colour was spotted in biscuits with more than 5% of wheat grass powder. The sensory parameters of C1, C2 and C3 were same; however, it was significantly low for C4 biscuit. While observing the salty biscuits, the acceptability score of C1 was the highest but for C4 it is significantly low. The acceptability scores were inversely proportional to the incorporation of wheatgrass powder. The anti-oxidant activities of the sweet biscuits were 22.79, 22.84, 23.69 and 29.43 (Devi, 2017) ^[2]. On the other hand, the anti-oxidant activities of salty biscuits were 18.84, 21.34, 23.76 and 25.02 (Devi, 2017) ^[2]. In case of the sweet biscuits, the anti-oxidant activity of C4 was highest and there was no notable difference between C2 and C3. In case of the salty biscuits, there was an average difference of ($p > 0.05$) from one another. It was observed that the anti-oxidant quality of the salty biscuits were directly proportional to the incorporation of wheatgrass powder. The experiment concluded that the anti-oxidant capacity of the biscuits can be enriched with the incorporation of the wheatgrass powder.

Incorporation of wheatgrass juice in paneer

The process of preparation of paneer involves heating the milk at high temperatures followed by acid coagulation with citric acid, lactic acid, tartaric acid etc (Kanchana *et al.*, 2011) ^[4]. To carry out the experiment, wheatgrass juice was incorporated into cow's milk to make the paneer. Three samples with 3%, 6% and 9% percentage of wheatgrass juice were prepared for the observation. Normal milk was used as the control product and was labeled as M1 and the wheatgrass incorporated three samples were labeled as M2, M3 and M4. The acceptability scores of M1, M2, M3 and M4 respectively were 8.52, 8.50, 8.05, and 7.55 (Devi, 2017) ^[2]. There was a difference in flavor of ($p > 0.05$) of M4 than rest of the samples. Although there was, no significant sensory changes were observed in the experiment so it can be concluded that minimum 9% of wheatgrass juice can be incorporated in paneer. The anti-oxidant activity of the wheatgrass incorporated paneer was M1- 1.07%, M2-13.35%, M3- 15.77% and M4- 16.49%. The anti-oxidant activity of M4 paneer was the highest. According to Aydos *et al.*, (2011) ^[1], it has been observed that the anti-oxidant compounds in milk or paneer is destroyed due to the application of extreme heat during the processing methods. The anti-oxidizing capacity of

the paneer can be increased with the increase in percentage of wheatgrass juice.

Incorporation of wheatgrass juice with flavored milk

The key ingredients to prepare the flavored milk for the experiment were cow milk and wheatgrass juice. Before proceeding with the experiment three samples with wheatgrass juices were prepared. Plain cow milk with sugar and flavoring agents was used as the control item in the experiment (M1). The percentages of wheatgrass juice incorporated in the three samples were 3%, 6% and 9% and were labeled as M2, M3 and M4. After the incorporation of wheatgrass juice, the colour of the three samples changed to green. The shade of the milk got darker with the increase in percentage of wheatgrass juice. There was no significant difference between the samples in terms of sensory scores. The anti-oxidant activity of the wheatgrass flavored milk was ($p > 0.05$) higher than M1. The anti-oxidant activity of wheatgrass flavored milk was M2- 10.19%, M3- 14.77% and M4- 17.05%. According to Shakya *et al.*, (2012) ^[9], the experiment concluded that the standard recipe of wheatgrass flavored milk is to add 9% wheatgrass juice to it.

Incorporation of wheatgrass juice with chicken balls and chicken nuggets

To perform the experiment with chicken balls and nuggets, both were added wheatgrass powder of ratios 1, 2 and 3%. The preparation method of chicken nuggets and balls was different. The control product of chicken nuggets was labeled as CN1 and the other three wheatgrass incorporated samples were labeled as CN2, CN3, and CN4. No significant sensory impact was noticed amongst the three samples. In case of chicken balls, the control product was considered as CB1 and the wheatgrass incorporated samples were considered as CB2, CB3 and CB4. The sensory parameters changed for CB3 and CB4. The antioxidant activity of the four chicken ball samples were 11.21%, 13.30%, 14.38% and 15.39%. The antioxidant activity of the chicken nuggets was 25.13%, 31.94%, 32.25% and 33.14%. Another noticeable change found in both nuggets and balls is that their colour changed to a darker shade of green with the increasing percentage of wheatgrass powder.

Incorporation of wheatgrass juice in lemon and pineapple juice

The experiment moved forward to incorporation of wheatgrass juice in lemon and pineapple juices. Plain lemon juice (J1) was used as the control of the experiment. Four samples of lemon and pineapple juices were prepared with various percentages of wheatgrass juices namely 8% (J2), 9% (J3), 10% (J4), and 15% (J5). After the incorporation there has been made the colour of both the lime and the pineapple juices have changed to varying degrees of green depending on the rate of wheatgrass juice incorporation. The antioxidant activity of the lime juice samples are J1- 56.58%, J2- 58.59%, J3- 60.30%, J4- 62.28%, J5- 63.94%. The antioxidant activity of the pineapple juice samples are J1- 62.29%, J2- 74.48%, J3- 77.46%, J4- 79.06%, J5- 84.27%.

Incorporation of wheatgrass powder in food sprinkler

To increase the consumption of the wheatgrass powder amongst the diabetic patients, a recipe for a multipurpose food sprinkler was prepared. Three different samples were prepared along with the control sample (S1) with 40% (S2),

45% (S3) and 50% (S3). There was no significant change in the sensory parameters due to the three samples (Devi, 2017)^[2]. No significant change in appearance was also noticed. The antioxidant activity of the wheatgrass powder incorporated samples were- S1- 61.95%, S2- 83.33%, S3- 83.91%, S4- 84.76%.

Incorporation of wheatgrass in idli

Idli is a traditional Indian food, which can be prepared with black gram dhal, parboiled rice and salt. For this experiment, four samples other than the control sample (I1) were prepared with 0.5%, 1%, 2% and 3% of wheatgrass powder. The samples showed significant changes due to the implementation of high temperature over a period of number. After the incorporation of wheatgrass powder in the idli batter, the batter volume increased, pH value of the batter increased, bacteria content in the lactic acid increased. The batter was fermented at 30 degree Celsius for 20 hours.

Incorporation of wheatgrass powder in health drinks

Research has proven that wheatgrass has antioxidant properties which can be used for cancer prevention and detoxification of heavy metal from the body. In the experiment of incorporation of wheatgrass juice in health drinks, it was observed to have effective impact in reducing rectal bleeding. According to Devi (2017)^[2], wheatgrass helps in improving the blood flow, digestion and detoxify the body. The health drink mixed with good amount of phytochemicals is regarded as a functional food (Shaikh, Quazi and Nandedkar, 2011)^[8]. Daily consumption of this milk can help in maintenance of hemoglobin and protein and can be very effective for post-surgery cancer patients.

Incorporation of wheatgrass powder in ice-cream

Ice-cream has also been too experimented to understand its reaction against wheatgrass juice. During the preparation of the samples pomegranate juice was also added in the ice-cream to give it a natural flavor. Plain pomegranate ice-cream was used in the experiment as the control product (T0). The other four samples were prepared with 1% (T1), 2 % (T2), 3 % (T3) and 4% (T4) of wheatgrass juice incorporation. The antioxidant activities observed in the samples are: T1- 22.93%, T2- 29.33%, T3- 38.46%, T4- 41.83%.

Conclusion

The study aims to support the theory that incorporation of wheatgrass in different foods might increase their anti-oxidant activity, which in turn, could help to reduce the oxidizing stress in diabetic patients. The study proves that incorporation of wheatgrass powder in chapattis and biscuits over 10% can lower the sensory score and the acceptability score. Whereas, while incorporating wheatgrass juice in food items like milk and paneer, 6% is the most acceptable ratio. The retention capability of anti-oxidants in paneer and milk are much less, because they have to go through extreme temperatures during their preparation.

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