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Formulation of value added products by incorporating cinnamon for polycystic ovarian syndrome patients

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Abstract

Cinnamon or *Cinnamomum verum* is an evergreen tree. The bark of the tree is commonly used and referred to as cinnamon. It's native to the Lauraceae family, in Sri Lanka. An increasing awareness towards the health benefits of cinnamon has spotlighted the spice across the globe. The main objective of the present investigation was to estimate iron and calcium content of the cinnamon powder and formulate value added products by incorporating cinnamon powder for Polycystic Ovarian Syndrome patients was to. Value added products were developed through standardization of commonly consumed recipes - *Khakhara*, Tofu *tikka*, Roasted *namkeen* and *moong dal* and oats *tikki*. Cinnamon powder was used in different variations ranging from 1gm to 3gm for the production of recipes. The developed value added products were evaluated for sensory characteristics by a semi trained panel of experts. The mean score were found to be ranging from 3.8 to 4.8 for *Khakhara*, 3.6 to 4.4 for Tofu *tikka*, 4.1 to 4.7 for Roasted *namkeen* and 4.4 to 4.7 for *Moong dal* and oats *tikki*. The iron and calcium was estimated. The cost of all the variations of each product ranges from Rs.5.57- Rs.6.77 (*Khakhara*), Rs.9.26- Rs.10.46 (Tofu *tikka*), Rs. 37- Rs.38.20 (Roasted *namkeen*) and Rs.11.26- Rs. 12.36 (*Moong dal* and oats *tikki*). On the basis of this study it can be concluded that the cinnamon has a great scope in the field of value added recipes development and commercialization.

Keywords: Cinnamon, PCOS, *Khakhara*, Tofu *tikka*

Introduction

Cinnamon is a spice that has ancient origins and is popularly used as flavourings, as a condiment and in cooking. It is also known to provide various medicinal benefits that include treating PCOS, lowering of cholesterol, helpful in diabetes. It is obtained from the bark of the cinnamon tree. The importance of cinnamon in cookery and medicine has been known since time immemorial, which is evident from the fossil remains that interpret its cultivation in ancient times. It's not only known for as a strong flavoured spice, but it has gained tremendous applications in therapeutic intervention. The bark itself is used for extracting essential oil. It contains more than 80 nutrients, beneficial for proper functioning of the body (Maheshwari, 2013)

Polycystic Ovarian syndrome is a condition in which a women's level of the sex hormone estrogen and progesterone are imbalanced. It leads to the growth of ovarian cysts. It can cause problems with women's menstrual cycle, fertility, cardiac function and appearance. (www.webmd.com)

Cinnamon reduces heavy menstrual bleeding. Uterine fibroids are lumps of tissue that form in the uterus and cause excessive bleeding menstrual bleeding. Women find that losing weight is impossible when living with PCOS. Cinnamon is the natural way to improve weight loss in women with PCOS. Daily usage of dried bark powder for PCOS patient is 1 capsule, 3 times a day or 3gm= 1 tsp. of loose powdered cinnamon root. (www.healthline.com)

Objectives

- To estimate the calcium and iron content of cinnamon powder.
- To standardize and develop value added products by incorporating cinnamon powder.
- To evaluate the organoleptic characteristics of developed value added products.
- To calculate the cost of different variation of developed recipes.

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Materials and Methods

The present study entitled “Formulation of value added products by incorporating cinnamon for Polycystic Ovarian Syndrome patients”. The study was conducted in the Department of Foods and Nutrition, The IIS University, Jaipur.

Collection of ingredient: The cinnamon bark was procured from the local market of Jaipur city and ground to powder.

Estimation of the nutrients: Iron and calcium was estimated by using standard methods.

Nutrients	Method
Calcium	EDTA titrimetric method (AOAC, 2005)
Iron	Wong’s method (NIN, 2003)

Development of the value added products: All the raw materials for value added product was procured from local market of Jaipur city. Developed products were *Khakhara*, Tofu *tikka*, Roasted *namkeen* and *Moong dal* and oats *tikki* consisting of 1-3gm of cinnamon powder. So, four variations of each recipe were developed- 1 standard with no cinnamon powder and 3 others containing 1-3gm of cinnamon powder.

Evaluation of the organoleptic characteristics: The developed recipes were evaluated by semi trained 6 panel members on a 5 point rating scale for appearance, colour, taste, after taste and overall acceptability.

Cost Analysis of the developed recipes: Cost of all the variations was calculated according to the latest market rate list.

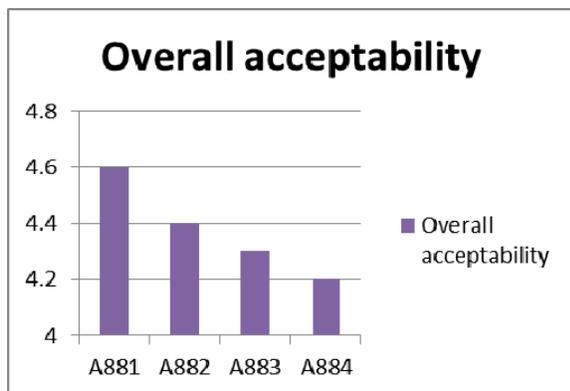
Results and discussion

Table 1: Estimated value of Iron and Calcium content of Cinnamon powder

Nutrients	Estimated value	Standard value
Calcium(mg)	56.2mg	281mg (per 28g)
Iron(mg)	0.21mg	2.3mg (per 28g)

Table 2: Coding of different variations of *Khakhara*

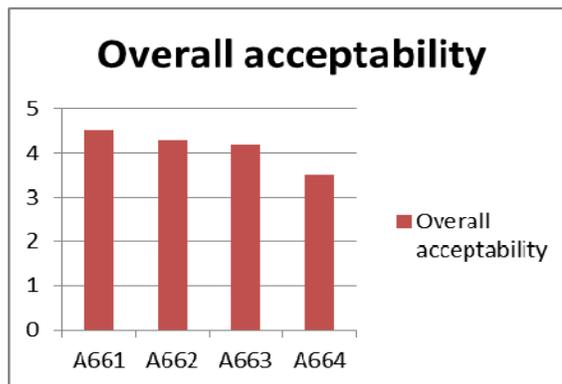
Product Code	Amount Of Cinnamon Powder
A551	NIL
A552	1g
A553	2g
A554	3g



The values of mean scores obtained on a Five Point Rating Scale for different attributes like appearance, colour, taste, after taste, over all acceptability for *Khakhara* with varied amount of Cinnamon powder. The product A552, having 1g of Cinnamon powder was found to have the highly acceptable with overall acceptability mean score of 4.5. The product A554, having 3g of cinnamon powder with mean overall acceptability score of 3.7 and product A553, having 2g of cinnamon powder with mean overall acceptability score of 3.6.

Table 3: Different amount of the Cinnamon powder added to Tofu *tikka*

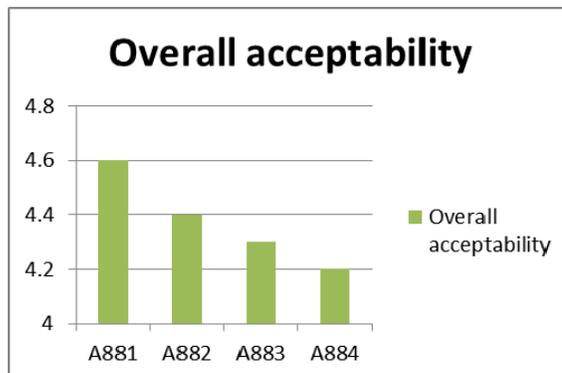
Product Code	Amount Of Cinnamon Powder
A661	Nil
A662	1g
A663	2g
A664	3g



The values of mean score obtained for different attributes like appearance, colour, taste, after taste, overall acceptability on a five point rating for Tofu *tikka* with varied amount Cinnamon powder. The product A662, having 1g of Cinnamon powder was found to be highly acceptable, with an overall acceptability mean score of 4.3. The second most acceptable product was A663 having 2g of Cinnamon powder with overall acceptability mean score of 4.2. A664 having 3g of Cinnamon powder was found to be least acceptable with overall acceptability mean score of 3.5.

Table 4: Different amount of the Cinnamon powder added to Roasted *namkeen*

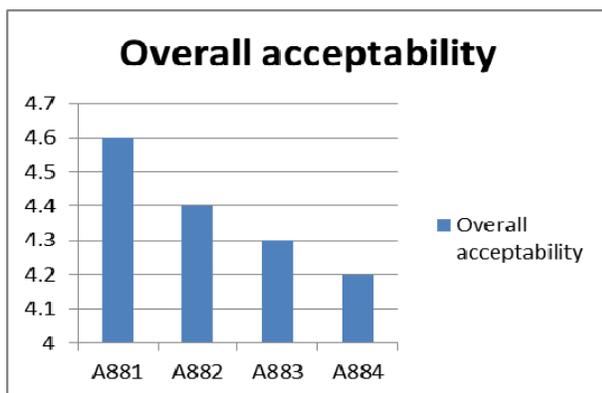
Product Name	Amount Of Cinnamon Powder
A771	NIL
A772	1g
A773	2g
A774	3g



The values of mean obtained from Five Point Rating Scale for different attributes like appearance, colour, taste, after taste, overall acceptability for Roasted *namkeen* with varied amount of Cinnamon powder. The product A772, having 1g of Cinnamon powder was found to be highly acceptable with an overall acceptable mean score of 4.8. The second most acceptable product was A773, having 2g of Cinnamon powder with an overall acceptability mean score of 4.2. A774 having 3g of Cinnamon powder was found to be least acceptable with an overall acceptability mean score of 3.9.

Table 5: Different amount of the Cinnamon powder added to *Moong dal* and *oats tikka*

Product Name	Amount of Cinnamon Powder
A881	NIL
A882	1g
A883	2g
A884	3g



The values for different attributes like appearance, colour, taste, after taste, overall acceptability as obtained on a 5 point rating scale for *Moong dal* and *oats tikki* containing varied amount Cinnamon powder. All the variations of *moong dal* and *oats tikki* were found to be acceptable with overall mean 4.4.

A study was conducted to determine the effect of cinnamon on menstrual cyclicity and metabolic dysfunction in women with polycystic ovary syndrome (PCOS). In a prospective, placebo controlled, double-blinded randomized trial, 45 women with PCOS were randomized (1:1) to receive cinnamon supplements (1.5 g/d) or placebo for 6 months. These preliminary data suggest that cinnamon supplementation improves menstrual cyclicity and may be an effective treatment option for some women with PCOS (Kort and Lobo, 2014).

Table 6: Cost calculated for the variation in selected recipes

Product Name	Cost
<i>Khakhara</i>	Rs. 5.5- Rs. 6.77
<i>Tofu tikka</i>	Rs. 9.26- Rs. 10.46
<i>Roasted namkeen</i>	Rs. 37- Rs. 38.2
<i>Moong dal</i> and <i>oats tikki</i>	Rs. 11.6- Rs. 12.36

Conclusion

The present study was carried out with the main objective to estimate the calcium and iron content of cinnamon powder. To determine the sensory evaluation and acceptability of the selected recipes incorporated from cinnamon powder. The value added products were served to 6 panel members. Evaluation of sensory characteristics, like appearance, colour,

taste, after taste, over all acceptability was done by five point rating scale and the results were statistically analyzed. It indicated that more or less similar acceptability was their among the panellists. It was observed that cinnamon is easily available in the market but is not so much acceptable by the consumers, because of its very hot aromatic taste, but the recipes prepared in the laboratory carries the potential to be carried to community. Therefore, the results of the present study clearly indicate that there is great scope of developing various value added recipes with cinnamon powder.

Recommendations

- ❖ Nutritional composition of Cinnamon can be analyzed.
- ❖ Nutritional composition of the developed products can be analyzed.
- ❖ Development of more products for therapeutic use like *Bhakarvadi*, *Chakli*, soups, can be done.
- ❖ Nutrient loss after food processing can be calculated.
- ❖ Commercial development of the cinnamon products can be done.

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