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Standardization and development of broccoli based product

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Abstract
The objective of present investigation "Standardization and development of Broccoli based product." Was to standardize and develop different products by using broccoli and Organoleptic evaluation of develop products. Broccoli is low calorie food and an excellent source of dietary fiber. It is anti-cancer vegetable, it contains anticancer components glucosinolates. The development of standardized products i.e. soup & manchurian. These products were developed by keeping in mind according to eating habits of people for the standardization of the broccoli based product and given to the panel of 10 judges; products were tested for flavor and taste, body and texture, colour and appearance, overall acceptability. The Organoleptic evaluation of products was done by using score card method (9-point hedonic scale). Products were developed (soup and manchurian). The highest average score for overall acceptability was found in experimental products.
The order for acceptability of the developed products was Paratha (T1 9, 8.8 8.7 & 9), Momos, (T1 8.9,8.7,8.7& 89), Manchurian (T18.4 8.7,8.7 & 8.7), Cutlet (T18.7, 8.6,8.7 &8.6), Soup (T1 8.4 8.5 8.4 & 8.4).

Keywords: Broccoli, Phytochemicals, isothiocyanates, cancer.

Introduction
Broccoli is an edible green plant in the cabbage family whose large flowering head is eaten as a vegetable. The word broccoli comes from the Italian plural of broccolo, which means "the flowering crest of a cabbage", and is the diminutive form of brocco, meaning "small nail" or "sprout". Broccoli is often boiled or steamed but may be eaten raw.
Broccoli may prove to be a natural wonder drug for many types of cancer, including breast cancer, cancer of the uterus, prostate cancer, and cancers of various internal organs like the lungs, colon, liver, kidneys, and the intestines.
This is due to the presence of strong anti-carcinogenic compounds like glucoraphanin, diindolylmethane, beta-carotene, selenium and other nutrients like vitamin C, vitamin A and vitamin E, zinc, potassium and certain amino acids, which are also good anti-cancer agents.

Objectives
- To standardize and develop products using broccoli.
- Organoleptic evaluation of developed products.

Materials and Methods
The present study was undertaken to broccoli based products to evaluate its quality. The experiment conducted during the course of investigation has been portrayed under the fallowing headings. The study was conducted in department of Food and Nutrition, Faculty of Home Science, KNIPSS Sultanpur.

Collection of ingredient: the material was purchased from the local market of Sultanpur.
Preparation of product: the required material was used for the development of broccoli food products related recipes.

Sensory evaluations: the prepared products will be evaluated by the random chosen panelists to determine. Its appearance, colour, flavor, taste, texture, over all acceptability.

Soup

Ingredients	Amount	
	Controlled	Experimental
Broccoli	---	250g.
Tomato	250g.	---
Butter	20g.	20g.
Onions	50g.	50g.
Garlic	20g.	20g.
Black pepper	5 g.	5g.
Corn flour	10g.	10g.
Salt	To taste	To taste.

Method

- Heated 2 cups of water in a deep pan, added the broccoli stalks and cooked on a medium flame for 4 to 5 minutes.
- Added the broccoli florets, onions, garlic, celery and salt, mixed well and cooked for 5 minutes, while stirring occasionally.
- Removed from the flame; allow it to cool a little.
- Once slightly cooled, blend with a hand blender till smooth.
- Transfer the prepared broccoli mixture into the same pan, added the corn flour-milk mixture, mixed well and cooked on a medium flame for 2 minutes, while stirring continuously.
- Added the pepper powder, mixed well and cooked on a medium flame for another 1 minute.

Manchurian

Ingredients	Amount	
	Controlled	Experimental
Broccoli	---	250g.
Carrot + cauliflower	100+150g.	---
Pepper powder	10 g.	10g.
Oil	200g.	200g,
Ginger	10g.	10g.
Onion	50g.	50g.
Green chilly	10g.	10g.
Garlic	10g.	10g.
Corn flour	50g.	50g.
Vinegar soy sauce	50g.	50 g.
Red chili sauce	25g.	25g.
Salt	Add to taste.	Add to taste.

Method

For preparing bolls

- Washed broccoli in running water and cut into small florets. Chopped green chili and broccoli florets in a blender.
- Added all purpose flour, corn flour, salt, pepper, finely chopped ginger & garlic in a bowl.
- Added chopped broccoli florets to the above mixture. Mixed well and make small balls. Broccoli will leave enough water to make the balls. So no need to added extra water to make balls.
- Heated oil in wok or heavy bottomed vessel for deep frying. Deep fry the broccoli balls till they turn brown, turn on other side and fried till they turn crisp and brown.

For Preparing Sauce

- Heated oil in pan. Added ginger, garlic and green chilly. Fried it till raw smell goes off. Added onions and fry till they turn translucent. Added soy sauce, red chili sauce and vinegar.
- Mixed 1 tbsp of corn flour with 6 tbsp of water and added it to the pan. Fry till sauce thickens. Added fried broccoli balls to it.

Result and Discussion

The data were collected on different aspects per plan were tabulated and analyzed statistically. The result from the analysis presented and discussed chapter in the fallowing sequence.

Organoleptic evaluation of broccoli based products.

- Flavor and taste.
- Body and texture.
- Color and appearance.
- Over all acceptability.

Evaluation of broccoli Soup-

Product	Flavor& taste	Body \ texture	Color & appearance	Overall acceptability
T0(controlled)	7.5	7.5	7.7	7.5
T1(experimental)	8.4	8.5	8.4	8.4

This table shows that the experimental (T1) obtained maximum 8.4, 8.5, 8.4 and 8.4 for flavor & taste, body & texture, color &appearance and overall acceptability ; while control (T0) 7.5, 7.5, 7.7 and 7.5 obtainedfor flavor &taste, body & texture, color & appearance and overall acceptability respectively. This indicated that the experimental (T1) soup was found to be fallen under category of " Liked Very Much to Liked Extremely".

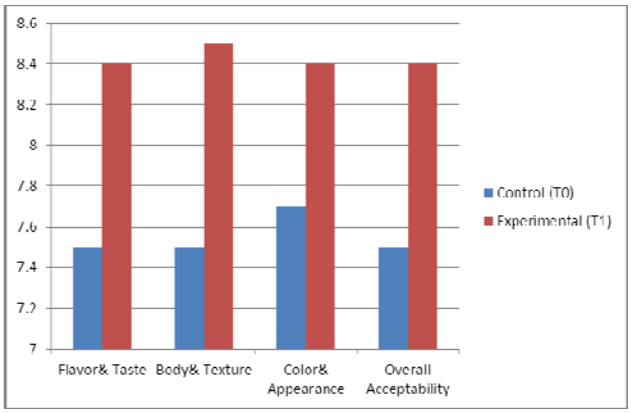

Fig 1: Mean overall acceptability of soup

Evaluation of broccoli Manchurian

Product	Flavor& taste	Body \ texture	Color & appearance	Overall acceptability
T0(controlled)	7.7	7.9	7.9	7.8
T1(experimental)	8.4	8.7	8.7	8.7

This table shows that the experimental (T1) 8.4, 8.7, 8.7 and 8.7 obtained maximum for flavor &taste, body & texture, color & appearance and overall acceptability; while control (T0) obtained7.7, 7.9, 7.9 and 7. 8 for flavor &taste, body & texture, color & appearance and overall acceptability respectively. This indicated that the control (T1) Manchurian was found to be fallen under category of "Liked Very Much to Liked Extremely".

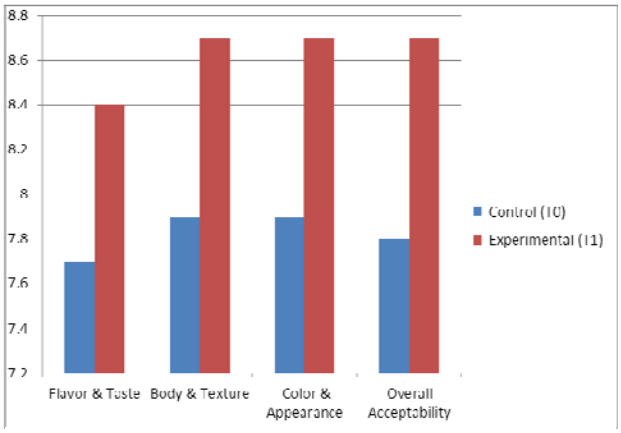

Fig 2: Mean overall acceptability of Manchurian

Summary & Conclusion

Broccoli is an edible green plant in the cabbage family whose large flower head is eaten as a vegetable. Broccoli is often boiled or steamed but may be eaten raw. It's also a fat-free, low calorie vegetable. Broccoli has an impressive nutritional profile. It is rich in vitamins and minerals such as vitamin A as beta carotene, vitamin C, phosphorus, magnesium, calcium, folic acid and potassium. Broccoli is a rich source of phytonutrient glucosinolates, flavonoids, and various other antioxidant compounds that boost our health in a major way. This popular vegetable has a wide variety of nutritional and medicinal benefits, including its ability to prevent many types of cancer, improve our digestive system, lower cholesterol, detoxify the body, maximize vitamin and mineral uptake, prevent allergic reactions, boost the immune system, protect the skin, prevent birth defects, lower blood pressure, eliminate inflammation, and improve vision and ocular health. Let's take a look at some of the nutritional assets contained in broccoli that make it such an important part of our diet.

The present investigation entitled "Standardization and development of broccoli based products with these two objectives.

- To standardize and develop products using broccoli products.
- Organoleptic evaluation of developed products.

The experimental (T1) soup obtained maximum 8.4, 8.5, 8.4, and 8.4 for flavor & taste, body & texture, colour& appearance and overall acceptability; while control (T0) obtained 7.5, 7.5, 7.7, and 7.5 for flavor &taste, body & texture, colour& appearance and overall acceptability respectively. This indicated that the experimental (T1) soup was found to be fallen under category of **"**Liked Very Much to Liked Extremely**".**

The experimental (T1) Manchurian obtained maximum 8.4, 8.7, 8.7, and 8.7 for flavor &taste, body & texture, colour & appearance and overall acceptability; while control (T0) obtained 7.7, 7.9, 7.9, and 7.8 for flavor & taste, body & texture, colour & appearance and overall acceptability respectively. This indicated that the experimental (T1) Manchurian was found to be fallen under category of "Liked Very Much to Liked Extremely".

The developed products were given to the panel of 10 judges products were tested for flavor and tested for flavor and taste, body and texture, colour and appearance, overall acceptability. The Organoleptic evaluation of products was done by using score card method (9-point hedonic scale). The result of broccoli based products Soup & Manchurian.

The highest average score for overall acceptability was found in experimental products made by developed broccoli based products were mostly accepted by panel member.

Recommendation

- More products will be developed by using broccoli.
- Intervention of developed products will be done.
- Proximate and other analysis will be done.

Limitations of the Study

- The study was carried out for short period so that time and other resources were limited to extent.
- Proximate analysis was not done due to limited laboratory facilities.

Acknowledgement

All glory to the almighty, whose blessing in the success behind this project praise pride and perfection belong to almighty. So first of all I would like to express my deepest sense of gratitude to the omniscient power of the universe, the almighty God.

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