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Traditional and modern method of processed foods and its application

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Abstract

Foods are substances or mixture of substances both solid and/or liquid, which are intended for human consumption or ingestion for their nutritional of pleasurable benefits. This study was carried out to investigate the potential of various additives and physico-chemical attribute of processed foods. The effectiveness of preserve foods were tested with two parameters such as pH value, moisture content at the interval of 0 days,5 days, 15 days, 25 days. Two type of methods are used to preserve i.e. traditional and modern method. Under the traditional method I use salting and sun drying method and under the modern method, Ultrasonication and microwave method are used. In ultrasonication method, Nano particle such as Titanium dioxide is use as a preservative. Result of processed foods on physico-chemicals showed that pH was reduced on 25th days and moisture content was reduced on 25th days. Thus it is believe that preservation has the potential in reducing the physiochemical parameters and increase the shelf life of processed foods.

Keywords: traditional, modern, processed foods, ultrasonication, preservatives, physiochemical

Introduction

Preservation of Food is the process of treating and handling food to stop or greatly Slow down spoilage (loss of quality or nutritive value) caused or accelerated by micro-organisms (jean P.B., 1995) [5]. Preservative are the compounds used to prevent and retard the microbial spoilage. Preservatives can be divided into two types. Depending on their. Class I preservatives refer to those preservative which are naturally occurring include salt, honey, sugar. Class II preservatives refers to preservative which are synthetically manufactured. Food preservative can be used alone or in conjunction with other methods of preservation (abdulmumeen *et al*. 2012).

Food preservatives and their functions

- To improve or maintain nutritional value of food.
- To enhance quality and to reduce wastage.
- To enhance consumer acceptability and keeping quality to make the food more readily available.
- To inhibits the growth of bacteria, yeast, and molds in foods through the application.

Table 1: Preservatives with their maximum possible limits and food products where they can be used (Sharif, 2017).

Preservatives	Class	Max. possible limit	Product where they are
Sodium and potassium benzoate, benzoic acid	Antimicrobial	200ppm	Pickles, margarine, fruit juices, jams cheese, baked goods, snacks
Methyl and propyl paraben	Antimicrobial	0.1%	Baked goods, beverages, dresssings, Sorbic acid, Sodium,
potassium and calcium sorbates	Antimicrobial	200ppm	Dairy products, bakery goods sweets, syrups jams, jellies, beverages
Sulfites and sulfur dioxide	Antimicrobial	200-300ppm	Dry fruits and fruits, molasses, or bster fried or frozen potatoes, shrimp and lobster
Propionates	Antimicrobial	0.32%	Bakery products, cheese, fruits
Nitrites and nitrates	Antimicrobial	100-200ppm	Meat products
Propyl gallate	Antioxidant	200ppm	Baked foods, meats
BHA (butylated hydroxy-anisole) and BHT	Antooxidant	100ppm	Baked foods and snacks, meat, (Butylated hydroxytoluen)
Tert-butylhydro-quinone (TBHQ)	Antioxidant	100ppm	Baked foods and snacks, meats
Ascorbic acid Citric acid	Antienzyme	200-350ppm	Soft drink, juices, wines and cured meats

Traditional and modern method of food preservation

There are two type of food preservation: Traditional method and modern method.

Traditional method such as drying canning pickling, pasteurization, freezing and modern method such as microwave, ultrasonication, high pressure processing cryogenic freezing. Drying is the oldest method of food preservation which reduces water activity sufficiently to prevent or delay bacterial growth. Drying also reduce weight and increase the self-life of foods.

Ultrasonication

Ultrasound is defined as sound waves having frequency that exceeds the hearing limit of the human ear (~20 kHz).

Ultrasound is one of the emerging technologies that were developed to minimize processing, maximize quality and ensure the safety of food products. Ultrasound is applied to impart positive effects in food processing such as improvement in mass transfer, food preservation, assistance of thermal treatments and manipulation of texture and food analysis (Knorr *et al*., 2011) [9]. Based on frequency range, the applications of ultrasound in food processing, analysis and quality control can be divided into low and high energy. Low energy (low power, low intensity) ultrasound has frequencies higher than 100 kHz at intensities below 1 W·cm2, which can be utilized for non-invasive analysis and monitoring of various food materials during processing and storage to ensure high quality and safety. It is also used for the quality control of fresh vegetables and fruits in both pre- and postharvest, cheese during processing.

High energy (high power, high-intensity) ultrasound uses intensities higher than 1W·cm−2 at frequencies between 20 and 500 kHz, which are disruptive and induce effects on the physical, mechanical or chemical/biochemical properties of foods. These effects are promising in food processing, preservation and safety. This emerging technology has been used as alternative to conventional food processing operations for controlling microstructure and modifying textural characteristics of fat products (son crystallization), emulsification, deforming, modifying the functional properties of different food proteins, inactivation or acceleration of enzymatic activity to enhance shelf life and quality of food products.

Microwave heating Microwave heating refers to the use of electromagnetic waves of certain frequencies to generate heat in material. For food applications most commonly used microwave frequencies are 2450MHz and 915MHz.

Materials and Methods

Preparation of raw materials

Select fresh vegetables such as cauliflower, carrot, potato, colocassia, lemon and remove the peel from vegetables and than Wash, Cut into the slices. Blanch at 70 °c for 2-3 minutes with different preservative and additives such as Sodium benzoate, sodium chloride titanium dioxide (Nano particle) by traditional and modern method and dried in order to reduce the moisture, soften the tissue in microwave, dehydrator, Ultrasonication etc.

Processing and packaging of processed foods by different packaging materials

Materials use in processing of processed food

Fresh vegetables of good variety such as cauliflower, carrot, potato, colocassia, lemon, salt, sodium benzoate, sodium chloride, titanium dioxide, water etc**.**

Processing of Vegetables

For preserving the vegetables, cauliflower (1kg), carrot (1kg) were selected from market, washed and peeled, and blanched with salt and sodium benzoate at 72°C for 2-3 minutes and dried in dehydrator at temperature 30°C and potato (1kg), arbi (1kg) were selected from market, washed and peeled and blanched with titanium dioxide (Nano particle) at 72°C for 2-3 minutes and dried in the sun drying.

Materials used in packaging of vegetables

Polythene, glass jar, aluminium foil.

Physiochemical testing: physiochemical testing includes changes in pH and moisture content at the interval of 0 days, 5 days, 15 days, 25 days. pH was checked by using pH paper and moisture content (%) was calculated by formula.

Result and Discussion

The potential of additive and preservative to be used in vegetables preservation was assessed by the measurement of pH, moisture content. Below are details of each sample

Table 2: Distribution of sample

Treatments	Sample preparations
T1	Cauliflower preserved by microwave heating
T2	Taro root preserved by ultrasonication method
T3	Potatoes chips preserved by ultrasonication method
T4	Carrots preserved by sun drying
T5	Lemon preserved by salting method

Table 3: Effect of preservation by Microwave (T1) on physicochemical properties of cauliflower

Before preservation		After preservation		
		5 days	15 days	25 days
pH	5.6	5.	4.8	4.
Moisture Content (%)	92	7.8	50.0	10.9

The pH of the cauliflower before processing and preservation was 5.6 and after preservation of cauliflower by T1 treatment the ph become lower the highest pH was 5.1 on 5th day of preservation whereas the lowest pH was 4.0 on 25th day.

The moisture content of the cauliflower before processing and preservation was 92 and after preservation of cauliflower by T1 treatment the moisture become lower, the highest moisture was 78 on 5th day of preservation whereas the lowest moisture was 10.9 on 25th day.

Table 4: Effect of preservation by Ultrasonication (T2) on physiochemical properties of Taro root.

Before preservation		After preservation		
		5 days	15 days	25 days
pH	5.5	5.1	4.8	4.2
Moisture Content (%)	72	63	35	18.9

The pH of the Arbi chips before processing and preservation was and after preservation of Arbi chips by T2 treatment the highest pH 5.1was on 5th day of preservation whereas the lowest pH was 4.2 on 25th day.The moisture content of the arbi chips before processing and preservation was 72 and after preservation of arbi chips by T2 treatment the highest moisture was 63 on 5th day of preservation whereas the lowest moisture was 18.94 on 25th day.

Table 5: Effect of preservation by Ultrasonication (T3) on physiochemical properties of potato chips.

Before preservation		After preservation		
		5 days	15 days	25 days
pH	6.1	5.8	5.2	4.3
Moisture Content (%)	75	57	36	22.5

The pH of the potato chips before processing and preservation was 6.1 and after preservation of potato chips by T3 treatment the highest pH was 5.8 on 5th day of preservation whereas the lowest pH was 4.3 on 25th day. The moisture content of the potato chips before processing and preservation was 75 and after preservation of potato chips by T3 treatment the highest moisture was 57 on 5th day of preservation whereas the lowest moisture was 22.5 on 25th day.

Table 6: Effect of preservation by sun drying method (T4) on physiochemical properties of carrots.

Before preservation		After preservation		
		5 days	15 days	25 days
pH	5.2	4.8	4.2	3.9
Moisture Content (%)	86	48	22	6.6

The pH of the carrots before processing and preservation was 5.2 and after preservation of carrots by T3 treatment the highest pH was 4.8 on 5th day of preservation whereas the lowest pH was 3.9 on 25th day. The moisture content of the corrots before processing and preservation was 86 and after preservation of carrots by T3 treatment the highest moisture was 48 on 5th day of preservation whereas the lowest moisture was 6.6 on 25th day.

Table 7: Effect of preservation by salting method (T5) on physiochemical properties of lemon.

Before preservation		After preservation		
		5 days	15 days	25 days
pH	3	2.5	2.1	1.8
Moisture Content (%)	85	65.2	43.1	24.2

The pH of the lemon before processing and preservation was 6.43 and after preservation of lemon by T4 treatment the highest pH was 2.5 on 5th day of preservation whereas the lowest pH was 1.8 on 25th day. The moisture content of the lemon before processing and preservation was 85 and after preservation of lemon by T4 treatment the highest moisture was 65.2 on 5th day of preservation whereas the lowest moisture was 24.2 on 25th day.

Physicochemical analysis

Physiochemical parameters in volve in present study was-

- pH
- Moisture Content

The physicochemical attributes include pH, moisture content of processed and preserved processed foods were checked at the gap of 5, 15, 25 days by pH paper, dry oven respectively.

Table 8: Variation in pH of processed food after preservation by different treatment (T1, T2, T3, and T4)

Days	T1	T2	T3	T4	T5
0 day	5.6	5.5	6.1	5.2	3
5 days	5.1	5.1	5.8	4.8	2.5
15 days	4.8	4.8	5.2	4.2	2.1
25 days	4.0	4.2	4.3	3.9	1.8
Standard deviation	0.58	0.26	0.34	0.19	0.31

The pH value of the processed foods after preservation lying in the acidic range. The value for the fresh vegetables for T1 and T2 found to be 5.1 on day of after 5 days of preservation. The changes in pH were occurred. After Day first the maximum pH was 5.8 by treatment 1(T3) on 5th day and the minimum pH was 1.8 by treatment 4 (T6) on 25th day.

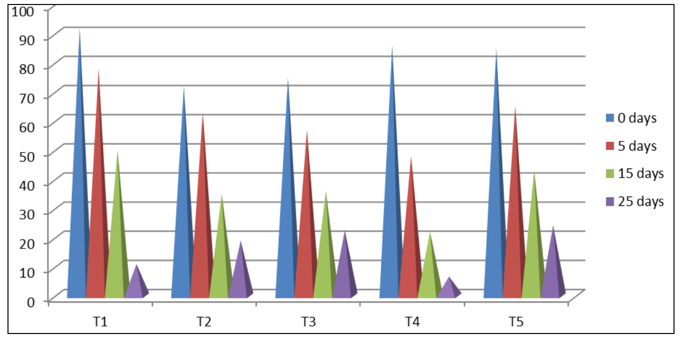

Fig 1: Variation in pH of different vegetables after preservation

Table 9: Variation in moisture content of different vegetable after preservation by different treatment (T1, T2, T3, T4, and T5)

DAYS	T1	T2	T3	T4	T5
0 day	92	72	75	86	85
5 days	78.0	63	57	48	65.2
15 days	50.0	35	36	22	43.1
25 days	10.9	18.9	22.5	6.6	24.2
Standard deviation	15.4	11.09	10.01	15.03	11.45

The moisture content of the vegetables after preservation lying in the solid range. The changes in moisture were occurred. After Day first the maximum moisture content was 92 by treatment 4(T1) on 5th day and the minimum moisture content was 6.6 by treatment 3 (T4) on 25th day

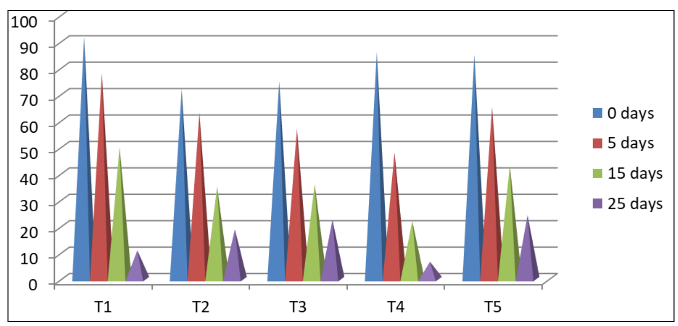

Fig 2: Moisture content of vegetables after preservation by different treatment

Conclusion

Most food product requires protection against microbial spoilage during processing and transportation. Food additives help to assure the availability of wholesome appetizing and foods that increase the consumer demand. This study relies on the techniques used for preservation that protect foods against the action of microorganism (fungi and/or bacteria)and their increase the shelf life of processed foods. Use of additive and preservatives by different methods was decrease the and moisture content which maintain the acceptability of processed foods for longer shelf life.

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