

Project Report

Survey on Quality of Packed Snacks in Market

Submitted in Partial Fulfilment of the Requirement for the Degree of
M.sc Biochemistry

Submitted by

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CERTIFICATE

This is to certify that Ms. Honey Verma has carried out his/her project work entitled “**Survey on Quality of packed snacks in Market**” under my supervision. This work is fit for submission for the award of Master Degree in Biochemistry.

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CANDIDATE DECLARATION

I hereby declare that the dissertation entitled “**Survey on Quality of Packed Snacks in Market**” submitted by me in partial fulfilment for the degree of M.Sc. in Biochemistry to the Division of Biochemistry, School of Basic and Applied Science, Galgotias University, Greater Noida, Uttar Pradesh, India is my original work. It has not been submitted in part or full to any other Universities for the award of diploma or degree.

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List of Abbreviation (complete it)

P	Phosphorus
N	Nitrogen

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Introduction

A snack food is a type of food not meant to be eaten as a main meal of the day –breakfast, Lunch, or Dinner but one rather that is intended to 3.assuage a person's hunger between these meals, providing a brief supply of energy for the body. The term may also refer to a food item consumed between meals purely for the enjoyment of its taste.

Though snack food are categorized and perceived differently from region to region, by manufacturers and consumers, conventionally, snack food embrace a group of savoury, crispy items, which are ready-to-eat and are shelf stable for 2 to16 weeks at the normal room temperature.

Traditionally snacks were prepared from ingredients commonly available in the home, often leftovers, sandwiches made from cold cuts, nuts, and fruit.

Snack foods are typically designed to be portable, quick and satisfying. Processed snack foods are designed to be less perishable, more durable, or more appealing than prepared foods.

They often contain substantial amounts of sweeteners, preservatives, and appealing ingredients such as chocolate, peanuts, and specially designed flavours (such as flavoured potato chips).

In the last five years, revenue from the Indian savoury snacks market has increased significantly to reach Rs. 6 billion (US \$ 123.5 million), more than twice its size previously.

Review of Literature-

Product Characteristics and Packaging Requirement

Irrespective of the group under which snack food fall, most of them have low moisture content and high fat content and, therefore, are highly affected by moisture, oxygen and changes in flavor.

In the category of fried snack food, the presence of oil becomes the key factor for spoilage. The oil is spread over large surface areas and exposed to the oxygen in the atmosphere; unsaturated fatty acids in the oil are prone to oxidative rancidity in the presence of air. These reactions are accelerated by heat, moisture and light, as well as the added salt in the product.

The packaging requirements of snack food are:

Grease proofness

The presence of fat indicates that the main requirement of snack food packaging is that it should be greaseproof. This requirement is of significance not only in reducing the rancidity but also to prevent unsightly staining of the package, smudging of the printing and to avoid the actual seepage of the oil and the greasy package feel.

Rancidity

Another requirement due to the high fat content is the prevention of the product coming in contact with the oxygen in the air. A packaging material with low oxygen permeability is desirable to be used, to prevent oxidation and rancidity of fat.

Loss of Crispness

One of the major properties of snacks is the crispness, which is achieved during the manufacture of the product by one of the drying methods such as roasting, baking or frying to reduce the level of moisture content. Retention of desirable texture (crispness) is directly related to the moisture level in the product. The moisture content of snack is very low, and any increase due to the hygroscopic nature of the product may lead to loss of crispness of the product. Moreover, added moisture also accelerates other biochemical changes such as

oxidative rancidity. Low water vapor permeability of the package is, therefore, another very critical requirement.

Printability

The packaging material should provide a good printing surface. Attractive printing is the order of the day as a number of brands of similar snack food have to compete in the market.

Seal Integrity

To ensure protection against environmental conditions and to provide a long shelf-life, the seal integrity of the pack must be good enough to prevent leakage and/or prevent entry of the air or moisture through the seal areas.

The above requirements for snack food packaging are met by plastics to a large extent in various forms such as flexible pouches of films and laminates, plastic containers and trays and as a component in the composite packs.

According to the Los Angeles Unified School district obesity prevention motion, If any of the ingredients listed below are on the ingredient Statement the product is not approved.

Amino Acids	Bee Pollen	Blue #1	Brewer's Yeast	Bisulfate	Beef Fat
B17	Chromium Picolinate	Coconut Oil	Chicken Fat		Comfrey
Co-enzyme Q10	Creatine Phosphate	Carnitine	Chamomile	Echinacea	Ephedra
Feverfew	Ginseng	Guarana	Gingko Biloba	Garlic extract	Lobelia

Laetrile	Lard	Melatonin	Monosodium Glutamate (MSG)	Mahuang	Omega-3 Fatty Acids
Pangamic Acid	Palm Oil	Palm Kernel Oil	Peanut Oil	Red #40	Royal Jelly
Sodium Nitrate	Sprulina	St. John's Wort	Sodium metabisulfite or sodium bisulfite	Sulfiting Agents/ Sulfur Dioxide	Tallow
Taurine	Ubiquinone	Valerian	Yohimbe	Yellow #5	Yellow #6

Around the world, adults consume energy outside of traditional meals such as breakfast, lunch and dinner. However, because there is no consist definition of a “snack” it is unclear whether those extra eating occasions represent additional meals or snack.

Many industries, including the food, Chemical, and pharmaceutical products industries, depend heavily or exact knowledge of the moisture content of their products as part of quality control.

Such measurements need to be rapid and reproducible in order to allow for immediate correction of the workflow if any flaw appears in the final product.

Drying ovens are based on convection heating of the sample by circulating hot air oven, Sometimes a vacuum is added to speed up the drying process.

While capable of processing multiple samples, and handling large weights of a sample, this technique does take a long time to give the results, typically hours, and requires expert operator input.

Singh and Smith, (1997) compared the effect of the process variable temperature and moisture on the extrusion behavior of wheat starch,

whole meal and flour the extruder pressure, torque and specific mechanical energy and extrudate properties of expansion, water absorption index (WAI) and water solubility index (WSI) were analyzed.

The quality assessment of frying fats and fried snacks during continuous deep fat frying at different large- scale producers. Analytical parameter recorded in order to monitor oil degradation during continuous frying included viscosity. Iodine value, acid value (AV), lipid UV absorption, and diacylglycerol contents. Lipid extracts from fried snacks were also analyzed and the result was similar to those obtained for their frying oil. It was concluded the continuous deep- fat frying produces commercial fried snacks with a relatively uniform and high quality.

Protein Estimation

Kjeldahl method used a hot acid digestion to convert protein to ammonia which is then distilled into a standardized acid and the acid is back titrated to give the quantities estimate. A catalyst is required to converts organic nitrogen into ammonium sulfate.

Digest: the organic compound with strong sulphuric acid in the presence of catalysts while heating.

The total organic N is converted to ammonium sulphate.

Neutralize the digested solution with abundant alkali.

Here, the N is converted to ammonium hydroxide, and then being distilled in to a boric acid solution and converted to ammonium borate.

Titrate ammonium borate with strong acid.

N content in proteins is averagely 16%

Ash content the analysis of ash content in foods is simply the burning away of organic content, leaving inorganic minerals. This helps determine the amount and type of minerals in food; important because

the amount of minerals can determine physiochemical properties of microorganism.

Soxhlet Extraction

The solvent is heated to reflux. The solvent vapour travels up a distillation arm and floods into the chamber housing the thimble of solid. The condenser ensures that any solvent vapor cools, and drips back down into the chamber housing the solid material.

The chamber containing the solid material slowly fills with warm solvent. Some of the desired compound will then dissolve in the warm solvent. When the Soxhlet chamber is almost full, the chamber is automatically emptied by a siphon side arm, with the solvent running back down to the distillation flask. This cycle may be allowed to repeat many times, over hours or days.

During each cycle, a portion of the non-volatile compound dissolves in the solvent. After many cycles the desired compound is concentrated in the distillation flask. The advantage of this system is that instead of many portions of warm solvent being passed through the sample, just one batch of solvent is recycled.

After extraction the solvent is removed, typically by means of a vacuum evaporator, yielding the extracted compound. The non-soluble portion of the extracted solid remains in the thimble, and is usually discarded.

Lipid is soluble in organic solvent and insoluble in water, because of the, organic solvents like hexane, petroleum ether have the ability to solubilize fat and fat is extracted from food in combination with the solvent. Later the fat is collected by evaporating the solvent.

Soxhlet extraction is widely used for many types of solid sample, especially biological and environmental samples. For many years the standard Soxhlet technique has been routinely applied in almost every analytical laboratory.

Soxhlet extraction is an exhaustive technique widely applied to analysts that are sufficiently thermally stable. The extraction solvent is continuously cycled though the matrix, by boiling and condensation,

with the sample being collected in the hot solvent. The technique is not selective and generally further cleanup and concentration are required.

Objectives

- To collect information about various ingredients and Nutritional values in given samples of packed snacks
- Estimation of Moisture content and ash content in packed samples.
- Quantitative estimate of food composition in packed snacks via different parameter.
 - Net oil content
 - Protein Content

Material and Methods

Different brands of Chips selected were:

- LAYS
- UNCLE CHIPS
- BINGO

Different brands of Biscuits selected were:

Brittanie 50-50

- Parle-G
- Parle Marie

Product Range:

Based on the processing method snack food may be broadly classified as:

Chips, Wafers, Crisps

These include deep fried potato chips, strips, sticks rings etc. and represent a substantial share of the snack food market. Banana wafers, jack fruit chips, tapioca wafers, which are popular in South India, also fall into this group.

Extruded Food

These are of two types:

The traditional items made from flours and spices and extruded in the form of sticks, strips or spirals such as sev, boondi, papdi, chakli etc. These items traditionally prepared in households are now marketed in pre-packed forms with different flavors' and seasonings.

The non-traditional pre-formed partly cooked pellets derived from potato, starch from cereals and fried at high temperatures for a short time to give expanded light textured products.

Snack Food Packs on Sale

This group also includes cereal / potato powder mixes, which are extrusion cooked and enrobed with oil and flavor. Many of these products are highly flavored with spices, herbs or cheese. Typical

examples are cheese balls, “cheetos” “kurkure” etc. A large number of products are available in this category and display varying sizes, shapes and textures.

High Value Items

These are roasted / fried / salted / flavored nuts, such as peanuts, cashew nuts, almonds etc.

Chemical Analysis

The samples were grinded before carrying out the chemical analysis

Determination of moisture content

The amount of moisture determines the keeping quality of the product and also affects the texture of the product.

Procedure

1. 5-10g of the sample was taken in a moisture dish.
2. The dish was kept in the oven at 120°C for 1-3 hrs (or till constant weight was noted).
3. The dish was transferred to the desiccators and allowed to cool.
4. The weight is noted.

Formula used

$$\text{Moisture content (\%)} = \frac{W1-W2}{(W1-W)} * 100$$

W = Weight of moisture dish

W1 = Weight of the dish with sample before drying

W2 = Weight of the dish with sample after drying

Net oil content – by soxhlets extraction

A Soxhlet extractor is a piece of laboratory apparatus invented in 1879 by Franz von Soxhlet. It was originally designed for the extraction of a lipid from a solid material.

Normally a solid material containing some of the desired compound is placed inside a thimble made from thick filter paper, which is loaded into the main chamber of the Soxhlet extractor. The Soxhlet extractor is placed onto a flask containing the extraction solvent. The Soxhlet is then equipped with a condenser.

PROCEDURE

- 1) Carefully transfer the moisture free sample into thimble and plug with cotton.
- 2) Place the sample containing thimble in the extractor having small cotton plug at its bottom to avoid passage of any spilled over particles

of test material. Care should be taken to see the height of the thimble to be below siphon level of extractor.

3) Fix the extractor to a clean dry reweighed oil flask.

4) Insert extractor with oil flask to the condenser.

5) Pour required quantity of solvent (Petroleum ether (60-80⁰C)) from the top of condenser with the help of a funnel to about one and a half times capacity of extractor and plug the condenser with cotton to avoid any evaporation loss of solvent.

6) Start cold water circulation through outer jacket after checking for any water leakage.

7) Depending upon the condensing rate of solvent from 5-6 drops per second to 2-3 drops per second, extract for at least 4-16 hrs by setting the thermostat of heating mantles of the apparatus(roughly 8 hrs extraction with a minimum total 250 condensation may be sufficient for complete extraction).

8) Collect back all the solvent for reuse, by removing it from extractor when the level of solvent is well below the siphon, till no solvent is left in the extractor and oil flask..

9) Weigh the flask with contents after removing solvent completely to a constant weight.

Protein Estimation by Kjeldahl method

The kjeldahl method in analytical chemistry is the method for the quantitative determination of nitrogen in chemical substances developed by Johan kjeldahl in 1883.

Method

The method consists of heating substances with sulfuric acid, which decomposes the organic substance by oxidation to liberate the reduced nitrogen as ammonium sulphate. In this step sodium sulphate is added in order to increase the boiling point of the medium.

The solution is then distilled with sodium hydroxide (added in small quantities) which converts the ammonium. X The end of the condenser dipped into a solution of sulfuric acid. The ammonium reacts with the acid and the remainder of the acid is then titrated with a sodium hydroxide solution with a methyl red pH indicator.

Determination of ash content

Ash refers to the inorganic residue remaining after either ignition of complete oxidation of organic matter in foodstuff. The ash obtained is not necessarily of exactly the same composition as the mineral matter present in original food as there may be losses due to volatilization or some interaction between constituents. The ash content of foods can be expressed on either a wet weight or on a dry weight basis.

Procedure

1. Weigh 5-10g of sample into a tared crucible.
2. Ignite the sample on flame to remove organic materials.
3. Place the crucible in muffle furnace.
4. Ignite for 5-6 hours at about 550°.
5. Turn off the muffle furnace and take out crucible temperature drops to 250° or lower.
6. Transfer the crucible to desiccators for cooling. Then weigh and calculate the total ash.

Results

Information displayed on the package

PRODUCT NAME: BINGO-MAD ANGLE, chili dhamaka

Batch no.	AR59
Date of purchase	12 th feb 2020
Place of purchase	Kirti nagar
Cost	Rs. 30
Manufactured on	2 nd jan 2020
Best before	6 months from manufacture
Net weight	130 gm
Manufactured by	ITC, Pune
Ingredients	Rice meal, edible oil, corn meal, gram meal, sugar, salt, spices, added flavor
Nutritional information	Per 100 gm; Energy(kcal) 548 Fat (g) 32.7 Carbohydrate(g) 54.8 Protein (g) 8.6

PRODUCT NAME: UNCLE CHIPS – PLAIN SALTED

Batch no.	AT1A
Date of purchase	12 th january 2020
Place of purchase	Kirti nagar
Cost	Rs. 30
Manufactured by	1 st january 2020
Best before	4 months from manufacture
Net weight	80gm
Manufactured by	Atop foof products, gujarat
Ingredients	Potato, edible veg oil, salt

Nutritional information	Per 100 gm;	
	Energy(kcal)	566
	Fat (g)	37.5
	Carbohydrate(g)	50.2
	Protein (g)	7.0

PRODUCT NAME: LAYS –SPANISH TOMATO TANGO

Batch no.	N115B	
Date of purchase	12 th feb 2020	
Place of purchase	Kirti Nagar	
Cost	Rs.30	
Manufactured on	28 Dec 2019	
Best before	4 months from manufacture	
Net weight	70 gm	
Manufactured by	PepsiCo India (frito lay division), Punjab	
Ingredients	Potatoes, edible oil, sugar, salt, spices, added flavor	
Nutritional information	Per 100 gm;	
	Energy(kcal)	544
	Fat (g)	33
	Carbohydrate(g)	54.7
	Protein (g)	7

PRODUCT NAME: BIKANER NAMKEEN VALA

Batch no.	0309
Date of purchase	12 feb 2020
Place of purchase	Kirti Nagar
Cost	Rs. 13
Manufactured on	10 Aug 2019
Best before	6 months from manufacture

Net weight	50 gm
Manufactured by	Payal food products
Ingredients	Potatoes, edible oil, salt, spices
Nutritional information	Not given

BISCUITS

PRODUCT NAME: BRITANNIA 50-50

Batch no.	13295
Date of purchase	8 th Jan 2020
Place of purchase	Kirti nagar
Cost	Rs.7
Packed on	30 th Oct 2019
Best before	8 months from packaging
Net weight	65g
Manufactured by	Brittannia inds Ltd, Kolkata
Ingredients	Wheat flour, sugar, edible veg oil, invert syrup, rising agents, liquid glucose, improvers ,salt, emulsifier, yeast, dough conditioner, acidity regulators, added flavor

Nutritional information	Per 100 gm;	
	Energy(kcal)	477
	Fat (g)	19.5
	Sat fat	9.5
	MUFA	7.5
	PUFA	1.5
	Carbohydrate(g)	68.5
	Protein (g)	7

PRODUCT NAME: PARLE-G

Batch no.	PN 5	
Date of purchase	20 feb 2020	
Place of purchase	Kirti Nagar	
Cost	Rs.4	
Packed on	May 2019	
Best before	4 months from packaging	
Net weight	82.5g	
Manufactured by	Parle biscuits Ltd, Rudrpur	
Ingredients	Wheat flour, sugar, edible veg oil, invert syrup, sugar, citric acid, leavening agents, salt, milk solids, emulsifiers, dough conditioner, antioxidants	
Nutritional information	Per 100 gm;	
	Energy(kcal)	454
	Fat (g)	13.0
	Carbohydrate(g)	77.7
	Protein (g)	6.5

PRODUCT NAME: PARLE MARIE

Batch no.	SP5 12B
Date of purchase	25 th jan 2020
Place of purchase	Kirti Nagar
Cost	Rs.10
Packed on	july 2019
Best before	6 months from packaging
Net weight	170g
Manufactured by	Srujan foods Ltd, solapur
Ingredients	Wheat flour, sugar, edible veg oil, invert syrup, rising agents, liquid glucose, starch, ,salt, milk solids, emulsifier, dough conditioner, added flavor
Nutritional information	Per 100 gm; Energy(kcal) 441 Fat (g) 10.5 Carbohydrate(g) 78.7 Protein (g) 8

Table showing Moisture content of different brands of chips & Biscuits-

CHIPS-

S.NO.	BRAND	Observed moisture content (%)
1.	LAYS	2.03
2.	BINGO	1.00
3.	UNCLE CHIPS	1.07
5.	BIKANER	2.33

BISCUITS-

S.NO.	BRAND	Observed moisture content (%)
2.	BRITANNIA 50-50	1.50
3.	PARLE-G	4.30
5.	PARLE- MARIE	1.53

Inference

The moisture content of chips and biscuits is very low in order that they will have a crisp eating quality. The ERH of biscuits and chips is also very low and much lower than the relative humidity of most atmospheric conditions. This means that the natural driving force is for water from the atmosphere to condense on exposed product surfaces where it will be absorbed and diffuse through the product. This makes the product soggy and soft, losing its crispness, which is not desirable. Increased moisture content can lead to microbial growth and spoilage of the product.

Moisture content of chips lies in the range of 1- 2.3%, while the moisture content of biscuits was found to lie in the range of 1.2-4.8% Standard moisture content for both the products is 1 % Moisture content of-

Bingo< Uncle Chips< Lays< Bikaner

Britannia 50-50< Parle Marie< Parle-G

Table showing Fat content of different brands of Chips& Biscuits

CHIPS-

S.NO.	BRAND	Observed fat content (%)	Fat content on the label (%)
1.	LAYS	31.03	33.0
2.	BINGO	30.33	32.7
3.	UNCLE CHIPS	34.62	37.5
5.	BIKANER	41.37	Not given

BISCUITS-

S.NO.	BRAND	Observed fat content (%)	Fat content on the label (%)
1.	SUNFEAST	19.97	19.5
2.	BRITANNIA 50-50	22.25	19.5
3.	PARLE-G	12.20	13.0
5.	PARLE- MARIE	11.39	10.5

The observed fat content values of the samples were found to be almost same as the printed values on the labels of the product. Among the chips Bikaner was found to contain the highest fat content and among the biscuits, Britannia 50-50 had the highest fat content. Standard fat content for chips is 30 – 40 %.

Fat content of;

Bikaner> Uncle Chips>Lays> Bingo

50-50> Parle Marie> Parle-G

Result

Weight of the sample taken = 0.5 gm to 1 gm

Normality of alkali used for titration = 0.04708

Blank titer value = 23.2 ml

Table showing Protein content of different brands of Chips & Biscuits

CHIPS-

S.NO.	BRAND	Observed protein content (%)	Protein content given on the label (%)
1.	LAYS	6.870	7.0
2.	BINGO	8.060	8.6
3.	UNCLE CHIPS	7.003	7.0
5.	BIKANER	6.919	Not given

BISCUITS-

S.NO.	BRAND	Observed protein content (%)	Protein content given on the label (%)
2.	BRITANNIA 50-50	7.145	7.0
3.	PARLE-G	6.258	6.5
5.	PARLE- MARIE	7.654	8.0

The observed values of protein content of all the samples were found to be almost same as the protein content values given on the labels. Among the different brands of chips, BINGO was found to have the highest protein content and LAYS contained least amount of protein.

PROTEIN CONTENT of lays < Bikaner < uncle chips < bingo.

Among the different brands of biscuits, PARLE MARIE was found to contain the highest protein content and PARLE-G the least.

PROTEIN CONTENT of Parle-G < Britannia 50-50 < Parle Marie.

Table showing ash content brands of Chips & Biscuits

CHIPS-

S.NO.	BRAND	Observed ash content (%)
1.	LAYS	4.20
2.	BINGO	2.50
3.	UNCLE CHIPS	3.85
5.	BIKANER	1.80

BISCUITS-

S.NO.	BRAND	Observed ash content (%)
2.	BRITANNIA 50-50	1.85
3.	PARLE-G	3.70
5.	PARLE- MARIE	1.39

Among the chips, Lays was found to contain the highest ash content and Bikaner the least. Among the biscuits, Parle-G contains the highest.

CONCLUSION

For the purpose of carrying out survey on the quality of snacks sold in market, different brands of two types of snack foods which are commonly consumed by the masses – CHIPS and BISCUITS were selected and various tests were performed to check their quality.

The brands of chips selected were- Bingo, Lays, Uncle Chips, and Bikaner. The brands of biscuits selected were- Parle-G, Britannia 50-50 and Parle Marie.

Standard moisture content of biscuits and chips is 1-3 % . All the samples were found to have moisture content within the prescribed range except Parle-G and Feasters biscuits.

Moisture content of;

Bingo< Uncle Chips< Lays< Bikaner

Brittania 50-50< Parle Marie< Parle-G

Protein content of snack foods generally lie in the range of 6-8%. The protein content of all the samples was found to be almost equal to the printed value on the label. Among the different brands of chips, BINGO was found to have the highest protein content and LAYS contained least amount of protein.

Protein content of lays< Bikaner < uncle chips< bingo.

Among the different brands of biscuits, PARLE MARIE was found to contain the highest protein content and PARLE-G the least.

Protein content of Parle-G < Britannia 50-50<Parle Marie.

Ash content of the product can be affected by the amount of preservatives added. Among the chips, Lays was found to contain the highest ash content and Bikaner the least. Among the biscuits, Parle-G contains the highest ash content.

Standard fat content for chips is 30 – 40 % . For health reasons, the fat content in snack foods should not be more than the above given range.

Other than Bikaner, no other sample was found to exceed the above given range. The experimental value was found to be approximately equal to the printed value.

Fat content of;

Bikaner> Uncle Chips>Lays> Bingo

50-50>Parle Marie> Parle-G

Sensory evaluation of the samples was performed and it was inferred that quality of the products stored in plastic bottles deteriorated at a slower rate than those stored in polyethylene packs. Chips were stored for 34 days and biscuits for 16 days

Among the chips, BIKANER and among the biscuits, BINGO, among the chips and PARLE-G, among the biscuits were found to retain their sensory qualities for a longer period of time.

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