



Potato Chips

A ready-to-munch option, but know your brands well

True, potato chips are not an ideal snack and in fact fall in the 'junk food' category. But when it comes to crispy, crunchy deliciousness, many will vouch that potato chips hardly have competition. They satisfy our cravings for salty, crunchy or fatty foods. And they are convenient – there is nothing simpler and quicker than munching snacks straight out of a pack. Positioned as a 'cool' munch by marketers/advertisers, potato chips are perhaps one of the most visible instant-snack items and also among the fastest-moving packaged snacks in any grocery, supermarket or departmental store. This despite warnings from the experts about regular potato chips not being healthy (no, the 'potato' as a prefix does not make it healthy) – they are deep-fried and contain saturated fats, artificial flavours and other unhealthy elements. So, exactly how bad or unhealthy are they? While no one can deny that they provide instant energy to the body, there is no ignoring the cons either. The Indian Standard has spelled out various requirements for potato chips and snack food covering quality, safety and acceptability aspects. At *Consumer Voice*, we selected 12 widely consumed brands in this category and held them up against essential parameters. We also checked them on the validity of their own claims. As you will read in the report produced below, some brands clearly failed to meet the requirements on some basic quality parameters.

A Consumer Voice Report

We tested 10 brands of potato chips/wafers (plain, salted) and two brands of potato crisps (made of dried potatoes and other ingredients) on various quality and acceptability parameters. As per our standard procedure, we undertook market research to identify the popular and regular-selling brands across the country. All brands, except Opera and Kakaji, claim to be proprietary food – this means there are no specific specifications for them under the Food Safety and Standards Regulations. The grading of the brands has been adopted based on International Grade Scale.

The key parameters for which the 12 brands were tested included fat content, protein content, trans fat, quality of extracted oil, rancidity and organoleptic

The testing was conducted as per requirements specified in the relevant Indian Standard, IS: 12575:2010. There are no product-specific requirements for potato chips in FSS Regulations.

qualities. Potato chips and other snack foods are expected to have a pleasant taste as well as give instant energy to the body, and are therefore expected to be rich in flavour and taste and high on energy value. At the same time, the fat content should be as low as possible. Microbiological safety being a major health-related parameter, we also conducted tests for coliform count and yeast and mould. The testing was conducted at an NABL-accredited laboratory.

Grazing, Snacking, Multiple Eating, etc.

Have you heard of the term ‘grazing’? Well, it refers to eating outside of the regular meals/meal schedules, and is intended to fill in the nutritional ‘gaps’ that may occur during the day. The rationale given for grazing is that it keeps you from getting too hungry and then overeating. The problem, though, is that many people ignore the bit about eating only a little. Not just that, they are snacking not on healthy foods but mostly on chocolate, crisps and other calorie-laden products.

The point to remember is that between-meal bites can work to your advantage if you make the right choices.



Key Findings

- Based on the overall test findings, Uncle Chipps and Pringles are the top performers among potato chips/wafers and potato crisps, respectively.
- The value-for-money brand is Balaji.
- Pringles is the top performer in the sensory panel tests as well.
- Salt percentage was lowest in Uncle Chipps and highest in Opera.
- Dietary fibre was highest in Haldiram’s and lowest in Kettle Studio.
- Moisture content in three brands – Opera, Kakaji and Kaleva – was higher than the limit specified by Indian Standard.
- Trans fat was not detected in any of the tested brands.
- Protein and energy values in most of the brands were found lower than the claimed values.
- Fat and peroxide values were found to be on the higher side in Kakaji and Kaleva.
- All the tested brands were found to be within the acceptable limits for yeast and mould and coliform count.

Comparative Test

BRANDS

Rank	Total Score out of 100 (Rounded off)	Brand	Claim	Net Weight (gm)
Potato Chips/Wafers				
1	87	Uncle Chipps*	Potato chips	60 gm (50 gm + 10 gm extra) (20% extra)
2	86	Haldiram's*	Potato chips	200
2	86	Balaji*	Potato wafers	45
2	86	Lay's*	Potato chips	95
2	86	Parle's*	Potato chips	85
3	85	Diamond*	Potato chips	40
3	85	Bingo*	Potato chips	60
4	83	Kettle Studio*	Potato chips	47
5	75	Kaleva*	Aloo wafers	140
6	73	Kakaji	Aloo wafers	140
Potato Crisps				
1	88	Pringles*	Potato crisps	110
2	78	Opera	Potato crisps	60

*Proprietary food

Score Rating: >90: very good*****, 71-90: good****, 51-70: fair***, 31-50: poor**, up to 30: very poor*

CV RECOMMENDATIONS | TOP PERFORMERS

Potato Chips/Wafers

Uncle Chipps

Potato Crisps

Pringles

VALUE FOR MONEY

Balaji



TESTED

	MRP (Rs)	Cost per 10 gm (Rs)	Best before	Manufactured/Marketed by
	20	3.33	Four months	Pepsico India Holdings Pvt. Ltd
	60	3.0	Four months	Haldiram Snacks Pvt. Ltd
	10	2.22	Three months	Balaji Wafers Pvt. Ltd
	35	3.68	Five months	Pepsico India Holdings Pvt. Ltd
	30	3.53	180 days	Parle Biscuits Pvt. Ltd
	10	2.50	Five months	Prataap Snacks Pvt. Ltd
	20	3.33	Four months	ITC Ltd
	40	8.51	Six months	Excelus Brands LLP
	60	4.28	Three months	Kaleva
	60	4.28	Three months	Vishwanath & Co. (Regd)
	99	9.0	12 months	Kellogg India Pvt. Ltd
	60	10	Nine months	Cremica Food Industries Ltd



Comparative Test

TEST RESULTS

FOR PHYSICO-CHEMICAL PARAMETERS

Protein | Fat (on dry basis) | Energy Value | Moisture | Acid-Insoluble Ash (on dry basis) | Acid Value of Extracted Fat | Peroxide Value | Salt | Dietary Fibre | Rancidity | Trans Fat | Saturated Fat | Polyunsaturated Fat | Monounsaturated Fat | Carbohydrates | Mineral Oil

◆ Protein

Protein is an essential nutrient. It plays an important role in cellular maintenance, growth and functioning of the human body.

Indian Standard has not specified any requirement for protein content in potato chips and snack food. However, it is expected to be present in potato chips and snack food as derived from fresh potatoes (containing protein) and cereals that also contain protein.

- The highest amount of protein was found in Kettle Studio (6.69 gm/100 gm) and the lowest in Kakaji (6.13 gm/100 gm).
- Protein value in most of the brands was found to be lower than the claimed value.

◆ Fat (on dry basis)

All deep-fried food products contain certain amounts of fat. The fat component adds richness of flavour and contributes to a smooth texture. As per Indian Standard, fat content of potato chips and snack food should not be more than 35 per cent by mass. As a matter of fact, it should be as low as possible.

- Two brands, Kakaji and Kaleva, had fat content higher than the specified limit of 35 per cent. It may be noted that six brands – Lay's, Uncle Chipps, Bingo, Parle's, Kakaji and Kaleva – claimed to contain fat higher than the specified limit. Fat content in the rest of the brands was found within the maximum permissible limit.

◆ Energy Value

Energy value is the amount of calories which our body obtains from food. While there is no requirement prescribed in Indian Standard, energy value is expected to be higher in potato chips and snack food.

- In most of the brands, energy value was found to be less than the claimed value.
- Energy value was highest in Bingo (545.73 kcal/100 gm), followed by Balaji (544.5 kcal/100 gm), Kettle



Studio (543.72 kcal/100 gm) and Uncle Chipps (542.5 kcal/100 gm).

◆ Moisture

Moisture generally refers to the presence of water in a product. A product with less amount of moisture is better as it translates into a longer shelf life. As per Indian Standard, moisture content in potato chips shall not be more than two per cent by mass.

- *Three brands – Opera, Kakaji and Kaleva – had moisture content exceeding the specified limit.*
- *The lowest moisture content was in Parle's (1.29 per cent), followed by Haldiram's (1.45 per cent) and Uncle Chipps (1.51 per cent).*

◆ Acid-Insoluble Ash (on dry basis)

Acid-insoluble ash indicates the presence of impurities like sand, dirt and dust in food. It is expected to be minimum in potato chips and snack food. As per Indian Standard, acid-insoluble ash should not be more than 0.15 per cent by mass.

- *Acid-insoluble ash was found within the specified limits. It was lowest in Uncle Chipps (0.02 per cent) and highest in Diamond (0.09 per cent).*

◆ Acid Value of Extracted Fat

Acid value of a packaged product is related to its shelf life. As per Indian Standard, it should not be more than two.

- *All brands met the requirement for this parameter.*

◆ Peroxide Value

Peroxide value is used as a measurement of the extent to which rancidity reactions have occurred during storage. As per Indian Standard, it should not be more than 10.

- *Peroxide value in Kakaji and Kaleva was found higher than the specified limit. All other brands passed the test. Peroxide value was lowest in Uncle Chipps.*

◆ Salt

Salt is an essential mineral commonly used for seasoning as well as food preservation. Salt also inhibits the growth of bacteria in a food item. As per WHO, the daily requirement for salt intake in the average diet is a maximum 5 grams.

Salt content is expected to be low in potato chips and snack food. As per Indian Standard, salt should



not be more than 2.5 per cent by mass in potato chips.

- *Salt was found within the maximum limit specified in Indian Standard. It was lowest in Uncle Chipps (0.23 per cent), which, as stated earlier, is good for consumers. Salt was found highest in Opera (1.76 per cent).*

◆ Dietary Fibre

Dietary fibre has many health benefits. It can reduce one's risk for heart disease, diabetes and some cancers, and also help in weight control. Fibre is important for digestive health too. Although Indian Standard has not specified any requirement for dietary fibre, it is expected to be as high as possible in potato chips and snack food.

- *Dietary fibre was highest in Haldiram's (4.40 gm/100 gm), which, as stated earlier, is good for consumers. It was lowest in Kettle Studio (4.04 gm/100 gm).*

◆ Rancidity (in Product and in Extracted Oil)

Rancidity is the chemical decomposition of fats, oils and other lipids. When these processes occur in food, undesirable odours and flavours can result. Rancidity can also detract from the nutritional value of the food.

- *All brands were free from rancidity.*

◆ Trans Fat

Trans fat is considered to be the worst type of dietary fat. Just like saturated fats, these also raise the

Comparative Test

level of 'bad' cholesterol in our blood. It should be as low as possible in potato chips and snack food.

- *Trans fat was not detected in any of the brands.*

◆ Saturated Fat

Saturated fat is a 'bad' fat found in relatively high amounts in many meat and dairy products, including cream milk, cheese, butter and cream.

- *Highest amount of saturated fat was found in Kakaji (15.96 gm/100 gm). It was lowest in Lay's (12.52 gm/100 gm) – this is good for consumers.*

◆ Polyunsaturated Fat

Oils that contain polyunsaturated fats are typically liquid at room temperature but start to turn solid when chilled. Olive oil is an example of a type of oil that contains polyunsaturated fats. Polyunsaturated fats can help reduce bad cholesterol levels in your blood and this, in turn, can lower your risk of heart disease and stroke.

- *Highest amount of polyunsaturated fat was found in Pringles (10.26 gm/100 gm) – this is good for consumers. It was lowest in Haldiram's (8.41 gm/100 gm).*

◆ Monounsaturated Fat

Monounsaturated fat is one of the healthy fats, along with polyunsaturated fat. Monounsaturated fats are found in plant foods, such as nuts, avocados and vegetable oils. Eating moderate amounts of monounsaturated (and polyunsaturated) fats in place of saturated and trans fats can benefit your health.

- *Highest amount of monounsaturated fat was found in Kakaji (10.55 gm/100 gm). It was lowest in Lay's (9.11 gm/100 gm).*

◆ Carbohydrates

Carbohydrates are the sugars, starches and fibres found in fruits, grains and vegetables and milk products. Carbohydrates are a source of energy. They are one of the basic food groups and are important

PHYSICOCHEMICAL

Parameter ↓	% Weightage	Potato Chips/Wafers				
		Uncle Chipps	Haldiram's	Balaji	Lay's	
Protein	12	9.29	9.67	9.32	9.22	
Fat (on dry basis)	8	6.42	6.73	5.99	6.85	
Energy value	6	4.20	4.08	4.29	4.08	
Moisture	5	3.98	4.10	3.94	3.88	
Acid-insoluble ash (on dry basis)	5	5.0	4.85	4.10	4.70	
Acid value of extracted fat	5	4.8	4.9	4.50	4.60	
Peroxide value	5	4.97	4.76	4.75	4.77	
Salt	5	4.97	4.12	4.61	4.07	
Dietary fibre	5	4.25	4.40	4.42	4.20	
Rancidity	4	4	4	4	4	
Trans fat	3	3	3	3	3	
Saturated fat	3	2.55	2.49	2.52	2.69	
Polyunsaturated fat	3	2.61	2.46	2.62	2.72	
Monounsaturated fat	3	2.59	2.60	2.65	2.56	
Carbohydrates	3	2.76	2.77	2.66	2.85	
Mineral oil	2	2	2	2	2	

to a healthy life. No requirement for carbohydrates in potato chips and snack food has been specified in Indian Standard.

- Carbohydrates amount was highest in Lay's (57.36 gm/100 gm) and lowest in Kakaji (49.73 gm/100 gm).

◆ Mineral Oil in Extracted Fat/Oil

A mineral oil is any of various colorless, odourless, light mixtures of alkanes from a non-vegetable (mineral) source.

- All brands were free from presence of mineral oil in extracted fat/oil.



SCORES

							Potato Crisps	
	Parle's	Diamond	Bingo	Kettle Studio	Kaleva	Kakaji	Pringles	Opera
	9.59	9.40	9.43	9.61	9.25	9.21	9.27	9.39
	6.66	6.77	6.07	6.25	4.40	4.17	6.66	4.93
	4.11	4.0	4.35	4.25	3.76	3.52	4.02	3.88
	4.42	3.12	3.26	3.24	1.25	1.0	3.34	2.20
	4.40	3.95	4.25	4.40	4.55	4.85	4.55	4.10
	4.7	4.60	4.50	4.60	4.65	4.75	4.7	4.55
	4.73	4.83	4.82	4.85	1.5	1.5	4.76	3.55
	4.23	4.48	4.02	4.11	4.06	3.99	4.16	3.49
	4.09	4.3	4.31	4.04	4.37	4.11	4.31	4.33
	4	4	4	4	4	4	4	4
	3	3	3	3	3	3	3	3
	2.58	2.59	2.44	2.45	2.40	2.28	2.68	2.34
	2.58	2.57	2.50	2.49	2.73	2.62	2.73	2.57
	2.61	2.60	2.65	2.64	2.76	2.78	2.57	2.73
	2.75	2.76	2.70	2.70	2.34	2.16	2.75	2.51
	2	2	2	2	2	2	2	2

Comparative Test

FOR MICROBIOLOGICAL ACTIVITY (TOTAL PLATE COUNT, YEAST AND MOULD)

Microbiological contamination is a very serious issue for food products. For potato chips, wafers and crisps, we conducted tests for yeast and mould as well as coliform count. These microorganisms are responsible for many food-borne diseases. Due to improper or poor hygienic condition during the manufacturing process, microorganisms may occur in the finished product.

The national standards have not prescribed any limit for microbial contamination in potato chips and snack food.

- Yeast and mould was less than 10 cfu/100 gm in all the brands.
- Coliform count was also less than 10 cfu/100 gm in all the brands.

FOR SENSORY ATTRIBUTES

Sensory panel tests were conducted in a test lab under the guidance and supervision of trained experts. The following parameters were judged and rated by the panellists: colour and appearance, texture, flavour, crispness, taste, saltiness, oiliness and overall acceptability.

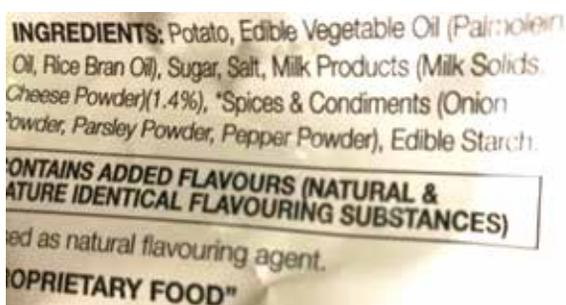
So, the potato chips shall have an attractive light to golden yellow colour without brown spots, crisp texture, and pleasant taste and odour. Salt and other seasoning shall be added to taste. The chips shall be of thickness between 1.0 mm and 2.5 mm, free from blisters, excessive brown pigmentation and wet centres. The chips shall not be excessively greasy and shall be free from rancidity, and other objectionable odour and taste. Snack food should also have attractive texture and pleasant flavour and taste. These should be free from insects, insect residues, rodent hair and excreta, and fungal infestation.

- Pringles was the most liked brand among panellists, and was followed by Bingo, Balaji and Diamond.
- Kakaji was the least favoured among all tested brands.

Brand	Score out of 12
Pringles	11.5
Bingo	10
Balaji	10
Diamond	10
Lay's	9.2
Uncle Chipps	9.2
Haldiram's	9.0
Parle's	8.7
Kettle Studio	8.2
Opera	7.5
Kaleva	7.5
Kakaji	7.0

FOR GENERAL QUALITIES

◆ Marking/Labeling



Parameter ↓	% Weightage	Potato Chips/Wafers			
		Uncle Chipps	Haldiram's	Balaji	Lay's
Marking	2	1.8	2	2	1.8
Packing	2	1.5	1.5	1.5	1.5
Net weight	2	2	2	2	2

Dear readers: We are open to hearing your suggestions on products and services that you believe should be reviewed/tested by Team Consumer Voice. You may write to editorial@consumer-voice.org

The following details shall be marked on each pack:

- (a) Name of the material and trademark if any
 - (b) Name and address of manufacturer
 - (c) Batch or code number
 - (d) Net quantity
 - (e) Date of manufacture
 - (f) List of ingredients
 - (g) Nutritional information
 - (h) Permitted additives
 - (i) MRP
 - (j) The 'best before' date
 - (k) Green dot denoting vegetarian status
 - (l) Standard mark if any
 - (m) FSSAI license number
 - (n) Customer-care details
- All brands had the necessary information on their packs. It may, however, be noted that Lay's, Uncle Chipps and Kakaji did not provide storage instructions.

Net Weight

The weight of the product is measured and compared with the declared values on the pack. The net weight should be within the tolerance limit permitted in Legal Metrology Rules.

Net weight of all the tested brands was found as claimed and they scored equally well on this parameter.

Packing

Potato chips and snack food should be packed in flexible thermoplastic films of multilayer or monolayer construction, or their laminates with paper and/or aluminium foil so as to provide high resistance to the passage of oxygen, light and water vapour, as also to produce an effective heat seal. The airtight sealing shall be done with or without nitrogen flushing to retain the contents in a fresh condition.

- All the brands of potato chips and wafers, except for Pringles, were packed in multilayer or monolayer aluminium foil. Pringles was packed in a cylindrical cardboard box.



							Potato Crisps	
	Parle's	Diamond	Bingo	Kettle Studio	Kaleva	Kakaji	Pringles	Opera
	2	2	2	2	2	1.8	2	2
	1.5	1.5	1.5	1.5	1	1	2	1.5
	2	2	2	2	2	2	2	2