

Market Survey of Artificial Sweeteners and Artificially Sweetened Products in Hyderabad

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Abstract

The sugar-free/artificially sweetened products have come in great vogue in the past few years and recommended and used by diabetics and obese patients, as they claim to have lesser calories. Since they are very popularly available in the market and equally popularly advertised, this study was focused upon conducting a market survey in the Hyderabad city, on the artificially-sweetened products, in knowing their availability, the various food product categories in which they are available and to assess if the products abide by the FSSAI (Food Safety and Standards Authority of India) regulations for artificial sweeteners. During the survey, the sugar free/artificially sweetened products were found in various supermarkets, hypermarkets, local general stores, pharmacy stores and on online-shopping websites. 50 sugar-free/artificially sweetened product labels were assessed, including the various flavours of each product and were divided into 8 categories. It was found that, maximum number of products did not follow the FSSAI guidelines, ranging from not mentioning the strength of the sweetener used to not following any of the needed labelling regulations. The study also revealed that supplements like Threptin Biscuits and Chyawanprakash (Diabetic variant) and Toothpastes (including the herbal-based toothpaste-brands) and Mouthwashes were also found to contain artificial sweeteners, in them while they are not permitted for use in those products. The mouthwashes may be swallowed and although the toothpastes on usage might not be consumed directly by adults, since children usually tend to swallow them, it can be a cause for concern, as the strength of the sweetener is not mentioned.

Keywords

Artificial sweeteners, FSSAI, Market Survey, Sodium Saccharin, Sugar-free products, Toothpastes.

INTRODUCTION:

We owe the discovery of several artificial sweeteners to a few brave scientists who violated the code of laboratory hygiene and tasted their samples, often inadvertently. Saccharin, the oldest artificial

sweetener, was discovered by Constantine Fahlberg at Johns Hopkins in 1879 while working on coal tar derivatives. For decades after its debut, saccharin remained a specialty product for diabetics on stores' medicinal shelves. ^[1]

A sugar shortage during World War II and shift of esthetics toward favoring a thin figure encouraged women to turn to artificial substitutes as well. Around this time, the wording on diet soda bottles subtly changed from “for use only in people who must limit sugar intake” to “for use in people who desire to limit sugar intake”.^[1]

While people often choose “diet” or “light” products to lose weight, research studies suggest that artificial sweeteners may contribute to weight gain.^[1]

The 4 most common artificial sweeteners used in food industry are: Aspartame, Acesulphame K2, Saccharin and Sucralose.^[2]

There are different sets of regulations for use of artificial sweeteners in different foods as per the FSSAI (Indian regulatory body). According to FOOD SAFETY AND STANDARDS (PACKAGING AND LABELLING) REGULATIONS, 2011, Every package of food which is permitted to contain artificial sweetener mentioned in table given in regulation 3.1.3 (1) of Food Safety and standards (Food Products standards and Food Additive) Regulations, 2011 and an advertisement for such food shall carry specific labels and declarations according to the type of artificial sweetener used in the product.

In light of this, the present study was conducted with the following objectives:

- To check the availability of the various artificial sweeteners in the market.
- To find out the various types of food product categories that contain added artificial sweeteners.
- To find out if the products available, abide by the regulations for labelling of artificial sweeteners, provided by the FSSAI through a market survey.

MATERIALS AND METHODS:

The Market Survey involved finding out the various categories of artificially sweetened products and evaluating the abiding of Labelling Regulations given by the FSSAI by them. 50 sugar-free/artificially sweetened product labels were assessed, including the various flavours of each product.

The products were checked for availability in the market. The sugar free/artificially sweetened products were found in supermarkets, hypermarkets, local general stores and pharmacy stores and on online shopping websites. The products on evaluation were divided into 8 different categories, namely,

1. Biscuits/Cookies and Chocolates.
2. Sweets.
3. Chewing gums.
4. Lozenges.
5. Beverages.
6. Tabletop sweeteners.
7. Supplements
8. Toothpastes and Mouthwashes.

All the labelling regulations given for the products permitted to use artificial sweeteners by the FSSAI were listed down for permissible strengths and detailed labelling requirements. A checklist was then prepared to carry out the Market Survey on the artificial sweeteners as Table-top sweeteners and the other artificially sweetened products, according to the regulations given by the FSSAI. Each product was checked against the list of FSSAI guidelines and scored according to one product abiding the number of applicable guidelines/regulations.

RESULTS:

S.No.	PRODUCT NAME	LIST OF REGULATIONS (FSSAI-2011)															SCORE (Of the applicable points)	
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)		(16)
I. BISCUITS/COOKIES AND CHOCOLATES																		
1.	Diasafe Biscuits	Y	Y	Y	NA	NA	NA	Y	NA	Y	NA	NA	NA	NA	NA	NA	NA	5/5
2.	Unibic Cashew Cookies	Y	Y	Y	NA	NA	NA	Y	NA	N	NA	NA	NA	NA	NA	NA	NA	4/5
3.	Unibic Multigrain Cookies	Y	Y	Y	NA	NA	NA	Y	NA	N	NA	NA	NA	NA	NA	NA	NA	4/5
4.	Unibic Butter Cookies	Y	Y	Y	NA	NA	NA	Y	NA	N	NA	NA	NA	NA	NA	NA	NA	4/5
5.	Tiffany Chocolate-flavoured Cream biscuits	N	N	N	NA	NA	NA	N	NA	N	NA	NA	NA	NA	NA	NA	NA	0/5
6.	Tiffany Orange-flavoured Cream biscuits	N	N	N	NA	NA	NA	N	NA	N	NA	NA	NA	NA	NA	NA	NA	0/5
7.	Tiffany Lemon-flavoured Cream biscuits	N	N	N	NA	NA	NA	N	NA	N	NA	NA	NA	NA	NA	NA	NA	0/5
8.	NutriChoice Oat Cookies	Y	Y	Y	NA	NA	NA	Y	NA	N	NA	NA	NA	NA	NA	NA	NA	4/5
9.	Nestle Coffee-mate cream chocolate	N	N	N	NA	NA	NA	N	NA	N	NA	NA	NA	NA	NA	NA	NA	0/5
10.	Sugarless Bliss Natural Ginger and Cinnamon Cookies	Y	Y	Y	NA	NA	NA	Y	NA	N	NA	NA	NA	NA	NA	NA	NA	4/5
11.	Sugarless Bliss Vanilla Butter Cookies	Y	Y	Y	NA	NA	NA	Y	NA	N	NA	NA	NA	NA	NA	NA	NA	4/5
12.	Sugarless Bliss Natural Fig Cookies	Y	Y	Y	NA	NA	NA	Y	NA	N	NA	NA	NA	NA	NA	NA	NA	4/5
13.	Sugarless Bliss Shortbread-Roasted Almonds	Y	Y	Y	NA	NA	NA	Y	NA	N	NA	NA	NA	NA	NA	NA	NA	4/5
14.	Sugarless Bliss Shortbread-Espresso Chocolate	Y	Y	Y	NA	NA	NA	Y	NA	N	NA	NA	NA	NA	NA	NA	NA	4/5
15.	Sugarless Bliss Shortbread-Natural Butter	Y	Y	Y	NA	NA	NA	Y	NA	N	NA	NA	NA	NA	NA	NA	NA	4/5
II. SWEETS																		
16.	Haldiram Bhujawala Soan Papdi	Y	Y	Y	NA	NA	NA	Y	NA	NA	N	NA	NA	NA	NA	NA	NA	4/5
17.	Haldiram's Desi Ghee Soan Papdi	Y	Y	Y	NA	NA	NA	Y	NA	NA	N	NA	NA	NA	NA	NA	NA	4/5
18.	Sugarless Bliss-SugarFree Gulab Jamun	Y	Y	Y	NA	NA	NA	Y	NA	NA	N	NA	NA	NA	NA	NA	NA	4/5
19.	Sugarless Bliss-SugarFree Rossogulla	Y	Y	Y	NA	NA	NA	Y	NA	NA	N	NA	NA	NA	NA	NA	NA	4/5

III. CHEWING GUMS																
20.	Happydent Complete Spearmint Flavour	Y	Y	Y	NA	NA	Y	NA	NA	NA	NA	N	NA	NA	NA	45
21.	Happydent Peppermint Flavour	Y	Y	Y	NA	NA	Y	NA	NA	NA	NA	N	NA	NA	NA	45
22.	Happydent White	Y	Y	Y	NA	NA	Y	NA	NA	NA	NA	Y	NA	NA	NA	55
23.	Wrigley's Orbit Mixed fruit Flavoured	Y	Y	Y	NA	NA	NA	Y	NA	NA	NA	N	NA	NA	NA	45
24.	Trident Cinnamon flavour gum sticks	N	N	N	NA	NA	NA	N	NA	NA	NA	N	NA	NA	NA	05
IV. LOZENGES																
25.	Smint Strawberry flavoured lozenges	Y	Y	Y	NA	NA	NA	Y	NA	NA	NA	N	NA	NA	NA	45
V. BEVERAGES																
26.	Coca Cola	Y	Y	Y	NA	NA	Y	NA	NA	NA	NA	N	NA	NA	NA	45
27.	Diet Pepsi	Y	Y	Y	NA	NA	Y	NA	NA	NA	NA	N	NA	NA	NA	45
VII. SUPPLEMENTS																
33.	Threptin Lite Whey Protein Supplement	Y	Y	Y	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	NA	44
34.	Dabur Chyawanprakash	N	N	N	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	NA	74
VIII. TOOTHPASTES AND MOUTHWASHES																
36.	Sensodyne Fresh Mint toothpaste	-NA-														
37.	Sensodyne Repair and Protect toothpaste	-NA-														
38.	Colgate Active Salt toothpaste	-NA-														
39.	Colgate Vedhakti toothpaste	-NA-														
40.	Himalaya Sparkling white toothpaste	-NA-														
41.	Himalaya Stain Removal toothpaste	-NA-														
42.	Closeup Everfresh toothpaste	-NA-														
43.	Pepsodent Gumcare toothpaste	-NA-														
44.	Pepsodent Germicare toothpaste	-NA-														
45.	Pepsodent Whitening toothpaste	-NA-														
46.	Pepsodent Lavang and Salt toothpaste	-NA-														
47.	Neem active toothpaste	-NA-														
48.	Meswak Complete Oral Care toothpaste	-NA-														
49.	Dabur Babool toothpaste	-NA-														
50.	Listerine Cool Mint Mouthwash	-NA-														
*Y-YES; *N-NO; *NA-NOT APPLICABLE;																

DISCUSSION:

Products in the Biscuits/Cookies and Chocolates' category were rated out of 5 for applicable guidelines for that specific category and it was found that 10 out of 15 scored, 4 out of 5 marks. The strength of the sweetener used in the product wasn't found mentioned in these products. Only one Biscuit (Diasafe Biscuits) was found to abide by all the guidelines.

4 other products did not give any declarations needed and scored zero. The next category, which was of the Sugar-free sweets, had four products, all of which scored four out of five, in lacking mentioning the strength of the sweetener used in the product. The third category was of the sugar free chewing gums, that had 5 chewing gums, popularly available in the market. Only one of them scored 5/5 with all the required declarations. One scored zero. And the rest three scored 4/5 as they did not mention the strength of the artificial sweetener which was used. The fourth category of sugar free product was lozenges, which had just one product and scored 4/5 as it did not mention the amount/strength of the sweetener used in it. The artificially sweetened beverages were the fifth category and had two products on the list, both of which, scored 4/5 and had not mentioned the strength of the sweetener used. The next category was of the tabletop sweeteners, widely available in the market in various forms like pellets/drops and powder concentrate. 5 different brands were listed and one of them scored 5/5 and the other two 4/4 as per their respective sweetener applicable points and the

remaining two were scored zero as any needed specific declarations were not found on the product pack.

The last two categories were of the supplements like Threptin Whey Protein Biscuits and Dabur Chyawanprakash (the sugar free variant of Chyawanprash) and Toothpastes and Mouthwashes, all of which are not listed in the permitted products' category to use artificial sweeteners by the FSSAI. Threptin Biscuits scored 4/4 and Dabur Chyawanprakash didn't give needed declarations and scored only one out of four points.

None of the toothpastes/mouthwashes mentioned on their pack that makes aware the consumer of the presence of artificial sweetener in them and Sodium Saccharin was found only when the Ingredients' list was checked through. There were 15 products, and all had Saccharin in them, including the herbal-based toothpastes.

A similar study was conducted in 2014 by Gimba et al., which highlighted the Investigations of Sodium Lauryl Sulphate and Saccharin Concentrations in Brands of Toothpaste. Sodium lauryl sulphate (SLS) and Saccharin (SHN) levels in 10 different toothpaste brands were determined spectrophotometrically. The concentration of SHN in the toothpastes are unacceptable when compared to the daily acceptable intake (ADI) established by regulatory agencies. This implies that these toothpastes could be a potential poison to consumers especially the vulnerable children that have the tendency for uncontrollable intake. [3]

MARKET SURVEY OF ARTIFICIALLY SWEETENED PRODUCTS:







• This cookies contains a mixture of Sucralose / Acesulfame K

• Not recommended for children

• No sugar added in this product

• Polyols / polydextrose may have a laxative effect

CONTAINS ARTIFICIAL SWEETENER & FOR CALORIE CONSCIOUS

***Our product, when taken in moderate quantities are perfectly safe for most diabetics and those who prefer controlled diets. However, Sugarless Biscuits (Shortbread) are intended for use under medical supervision as part of a healthy diet. This product is not intended to cure/treat any disease and should not be used as a substitute for medication or other-regulation drugs.

INGREDIENTS: Wheat Flour, Cow Butter (35%), Almonds (3.4%), Sweeteners (E955[i], E955, E950, Flavouring Agent (E500[i]), Anti-Caking Agents (E500[i], E500[iii]), Salt.

CONTAINS ADDED FLAVOUR(S) (NATURAL, NATURE IDENTICAL & ARTIFICIAL FLAVOURING SUBSTANCES, BUTTER & ROASTED ALMONDS)

(Numbers in brackets as per International Numbering System)

Contains: Milk, Wheat, Gluten. May contain traces of nuts

STORE IN COOL DRY PLACE



• This cookies contains a mixture of Sucralose / Acesulfame K

• Not recommended for children

• No sugar added in this product

• Polyols / polydextrose may have a laxative effect

CONTAINS ARTIFICIAL SWEETENER & FOR CALORIE CONSCIOUS

***Our product, when taken in moderate quantities are perfectly safe for most diabetics and those who prefer controlled diets. However, Sugarless Biscuits (Shortbread) are intended for use under medical supervision as part of a healthy diet. This product is not intended to cure/treat any disease and should not be used as a substitute for medication or other-regulation drugs.

INGREDIENTS: Wheat Flour, Cow Butter (37%), Sweeteners (E955[i], E955, E950), Coffee (1.2%) Flavouring Agent (E500), Anti-Caking Agents (E500[i], E500[iii]), Salt.

CONTAINS PERMITTED SYNTHETIC FOOD COLOUR (E102) & ADDED FLAVOUR(S) (NATURAL, NATURE IDENTICAL & ARTIFICIAL FLAVOURING SUBSTANCES, BUTTER, COFFEE, CHOCOLATE)

(Numbers in brackets as per International Numbering System)

Contains: Milk, Wheat, Gluten. May contain traces of nuts

STORE IN COOL DRY PLACE



• This cookies contains a mixture of Sucralose / Acesulfame K

• Not recommended for children

• No sugar added in this product

• Polyols / polydextrose may have a laxative effect

CONTAINS ARTIFICIAL SWEETENER & FOR CALORIE CONSCIOUS

***Our product, when taken in moderate quantities are perfectly safe for most diabetics and those who prefer controlled diets. However, Sugarless Biscuits (Shortbread) are intended for use under medical supervision as part of a healthy diet. This product is not intended to cure/treat any disease and should not be used as a substitute for medication or other-regulation drugs.

INGREDIENTS: WHEAT FLOUR, COW BUTTER (37%), SWEETENERS (E955[i], E955, E950), COFFEE (1.2%) FLAVOURING AGENT (E500), ANTI-CACKING AGENTS (E500[i], E500[iii]), SALT.

CONTAINS PERMITTED SYNTHETIC FOOD COLOUR (E102) & ADDED FLAVOUR(S) (NATURAL, NATURE IDENTICAL & ARTIFICIAL FLAVOURING SUBSTANCES, BUTTER, COFFEE, CHOCOLATE)

(Numbers in brackets as per International Numbering System)

Contains: Milk, Wheat, Gluten. May contain traces of nuts

STORE IN COOL DRY PLACE

Net Wt. : 200 gm
MSRP Rs. :
(Inclusive of all taxes)

fsai
FSSAI 11512014000915



INGREDIENTS: Sugar, Vegetable Oil, Coloured Oil, Wheat Flour, Soda Ash, Baking Powder, Coloured Flavour, Potassium Bit Phosphate, Coloured Sweetener (Sucralose) (MS 955)

THIS SOAN PAPDI CONTAINS SUCRALOSE NOT RECOMMENDED FOR CHILDREN NO SUGAR ADDED IN THE PRODUCT

THIS SOAN PAPDI CONTAINS ARTIFICIAL SWEETENERS AND FOR CALORIE CONSCIOUS

POLYOLS MAY HAVE LAXATIVE EFFECTS

STORE IN A COOL & DRY PLACE
DO NOT BE KEPT IN THE REFRIGERATOR



INGREDIENTS: Sugar, Clarified Butter (Ghee) (7%), Wheat Flour, Soda Ash, Baking Powder (3%), Coloured Flavour and Artificial sweetener (Sucralose) (MS 955)

THIS SOAN PAPDI CONTAINS SUCRALOSE NOT RECOMMENDED FOR CHILDREN NO SUGAR ADDED IN THE PRODUCT

THIS SOAN PAPDI CONTAINS ARTIFICIAL SWEETENERS AND FOR CALORIE CONSCIOUS

POLYOLS MAY HAVE LAXATIVE EFFECTS

STORE IN A COOL & DRY PLACE



INGREDIENTS: Cow's milk solids, Sweeteners (E-420[i], E955[i], E955, E950) Refined Vegetable Oil, Wheat flour, Baking powder and Water.

• This Gulab Jamun contains a mixture of Sucralose & Acesulfame Potassium

• Not recommended for children

• No sugar added in this product

• Polyols may have a laxative effect

CONTAINS ARTIFICIAL SWEETENER & FOR CALORIE CONSCIOUS



INGREDIENTS: Cow's milk solids, Sweeteners (E-420[i], E955[i], E955, E950) Refined Vegetable Oil, Wheat flour, Baking powder and Water.

• This Rose Gulla contains a mixture of Sucralose & Acesulfame Potassium

• Not recommended for children

• No sugar added in this product

• Polyols may have a laxative effect

CONTAINS ARTIFICIAL SWEETENER & FOR CALORIE CONSCIOUS



CONTAINS ARTIFICIAL SWEETENER AND FOR CALORIE CONSCIOUS

CONTAINS SYNTHETIC FLAVOUR WHICH HELPS REDUCE THE RISK OF TOOTH DECAY

THIS TOOTH PASTE IS NOT RECOMMENDED FOR CHILDREN NO SUGAR ADDED IN THE PRODUCT - NOT FOR PHENTYLETONOLICS

Polyols may have laxative effects



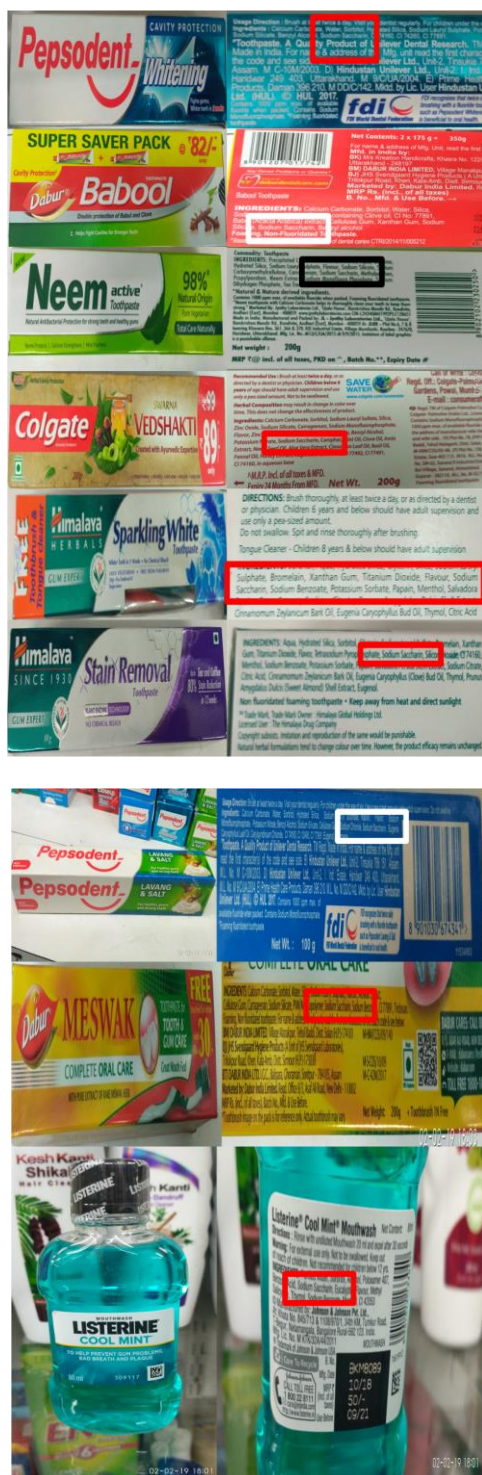
CONTAINS SYNTHETIC FLAVOUR WHICH HELPS REDUCE THE RISK OF TOOTH DECAY

THIS TOOTH PASTE IS NOT RECOMMENDED FOR CHILDREN NO SUGAR ADDED IN THE PRODUCT - NOT FOR PHENTYLETONOLICS

Polyols may have laxative effects







CONCLUSION:

The effects of conscious and also unknown sweetener consumption/intake of sweeteners through various products available in the market by vulnerable groups like children, pregnant women, elderly/old-age people,

adolescents and for people who are not overweight/obese or diabetics, i.e. who do not necessarily would require the usage of artificial sweeteners in their diets are not clearly known and could contribute to health risks.

As not all the products follow the labeling regulations, it can get difficult to keep a check on the Acceptable Daily Intake (ADI) of these sweeteners as they are used in products like biscuits, chocolates, cookies and sweets that are preferred/consumed by all age-groups. Also, the consumer is unaware of the presence of them in products like toothpastes and mouthwashes and the

usage of artificial sweeteners through these products may pose a risk for the consumers. The major finding and the noticeable concern of the survey was the presence of Sodium Saccharin (artificial sweetener) in a lot of popular, including herbal-based toothpaste brands.

CHECK-LIST FOR MARKET SURVEY OF ARTIFICIAL SWEETENERS: [4,5]

S. No.	LIST OF REGULATIONS
1.	Every package of food which is permitted to contain artificial sweetener, shall carry the following label, namely- CONTAINS ARTIFICIAL SWEETENER AND FOR CALORIE CONSCIOUS
2.	The declaration shall be provided along with name or trade name of product and shall be half of the size of the name/trade name.
3.	The declaration may be given in two sentences, but in the same box. Every package of Aspartame (Methyl ester), Acesulfame K, Sucralose and Saccharin Sodium, Neotame marketed as Tabletop Sweetener
4.	shall carry the following label, namely, - Contains..... (name of artificial sweetener) Not recommended for children
5.	Aspartame (Methyl ester), marketed as Tabletop Sweetener shall carry the following label, namely, — “Not for Phenylketonurics” Every package of food which is permitted to contain a mixture of Aspartame (Methyl Ester) and Acesulfame Potassium Sweeteners shall carry the following label, namely, - This (Name of food) contains contains an admixture of Aspartame (Methyl Ester and Acesulfame Potassium. Not recommended for children. (a) *Quantity of sugar added..... gm/100gm, (b) No sugar added in the product. *Not for Phenylketoneurics (if Aspartame is added) (*strike out whatever is not applicable) Every package of food which is permitted to contain a mixture of Acesulfame Potassium and Sucralose sweeteners, shall carry the following label, namely,— This(Name of Food) contains a mixture of Sucralose and
7.	Acesulfame Potassium; Not recommended for children; *(a) Quantity of sugar added.....gm/100gm; *(b) No sugar added in the product; (*Strike out whichever is not applicable) **Bread: Artificial sweeteners (Singly)
8.	1 Aspartame 2200 ppm 2 Acesulphame K 1000 ppm 3 Sucralose 750 ppm max

	**Biscuits:
	Artificial sweeteners (Singly)
9.	1 Aspartame 2200 ppm max
	2 Acesulphame K 1000 ppm max
	3 Sucralose 750 ppm max
	** Sweets (Carbohydrates based and Milk product based): Halwa, Mysore Pak, Boondi Ladoo, Jalebi, Khoya Burfi, Peda, Gulab Jamun, Rasogolla and
10.	Similar milk product based sweets sold by any name:
	Artificial sweeteners (singly)
	1 Aspartame - 200 ppm max
	2 Acesulphame K - 500 ppm max
	3 Saccharin Sodium – 500 ppm max
	4 Sucralose – 750 ppm max
	**Ready-to-Serve Beverages
	Tea/Coffee based:
	Artificial sweeteners (singly)
11.	1 Aspartame - 600 ppm max
	2 Acesulphame K - 600 ppm max
	3 Saccharin Sodium – -
	4 Sucralose – 600 ppm max
	**Chewing gum/ Bubble gum:
	Artificial sweeteners (singly)
12.	1 Aspartame -10,000 ppm max
	2 Acesulphame K – 5,000 ppm max
	3 Saccharin Sodium – 3,000 ppm max
	4 Sucralose - -
	** Sugar based/ Sugar free
	Confectionery:
	Artificial sweeteners (singly)
13.	1 Aspartame -10,000 ppm max
	2 Acesulphame K – 3, 500 ppm max
	3 Saccharin Sodium – 3,000 ppm max
	4 Sucralose - -
	*Synthetic syrup for
	Dispensers:
15.	1 Aspartame -3,000 ppm max
	2 Acesulphame K – 1500 ppm max
	3 Saccharin Sodium – 450 ppm max
	4 Sucralose - -
	*Lozenges:
	1 Aspartame -
16.	2 Acesulphame K -
	3 Saccharin Sodium –
	4 Sucralose – 1500 ppm

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- [4] Compendium Packaging Labelling Regulations- FOOD SAFETY AND STANDARDS (PACKAGING AND LABELLING) REGULATIONS, (2011).
- [5] Appendix A: List of Food Additives, List of Food Additives for use in Foods (Table 2)- FSSAI, (2011).