Understanding Media and Consumer Perspective on Artificial Sweeteners

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Abstract—Ongoing controversies related to the health effects of artificial sweeteners have posed questions in the mind of consumers about its safety. It is inevitable to stop what is projected by the media which has indeed blurred lines of scientific truth to misconception. Artificial sweeteners may be associated with long-term weight gain and increased risk of obesity, diabetes, high blood pressure and heart disease. Even after acceptability by the FSSAI, EU, JECFA, and CODEX, fears in the minds of consumers persist. Researches have claimed its safety, while a few disagreeing have caused distress in consumers. Positive and negative views of media can project artificial sweeteners as a great human invention or wipe out altogether as a warning label. This systematic research examines the current literature on consumption of artificial sweeteners and its projected health benefits.

1. INTRODUCTION

Sweet is an intrinsic indication for sensation from birth. Humans are highly dependent on the sensory system to perceive the pleasure experienced by sweetness. Table sugar (sucrose) is considered as a disaster for diabetes and increasing waistline. However, removal of sugar from our diets is almost unimaginable. Rather than settling, an alternative termed as 'artificial sweetener' was discovered, which contained virtually no calories or very less calories compared to natural sugars. They are synthetic intense sugar substitutes derived from substances with a higher degree of sweetness per gram as compared to caloric sweetness. In India, FSSAI has approved five artificial sweeteners, namely acesulfame potassium (Ace K), aspartame, saccharin, sucralose and stevia along with sugar alcohols like maltitol, xylitol, isomat, sorbitol and erythritol, which have evolved as popular home products for baking and cooking and are widely used in processed foods and beverages. Their smart can help in reducing added sugar from diets, thereby reducing and lowering the calorie intake. This further supports in modest weight, reduction in fat mass and weight circumference with beneficial effect on post prandial glucose and insulin in healthy as well as diabetic individual ^[1]. Safety of artificial sweeteners is one of the most criticized topics. Heavy criticism by the media sources like online blogs, social media, articles and E-news has created panacea for people with diabetes and obesity. Artificial sweeteners are still considered as a causative factor of acute and chronic health problems like cancer, obesity, headache, diabetes, infertility, malabsorption, Congenital heart disease and addiction^[2]. In India, there has not been much research on native population groups to know contraries related to them. The objective of the study is to understand media perception on artificial sweeteners and analyzing their projection.

Ace K is 200 times sweeter than sucrose, 2/3 as saccharin, 1/3 as aspartame and about as sweet as aspartame. In carbonated drinks, it is always used in conjugation with another sweetener to remove the after bitter taste [3]. It is used in food products like soft drinks (300ppm), traditional sweets (500 ppm), frozen desserts, chocolate (500 ppm), chewing gum, jam^[4] .FSSAI has marked Ace K safe for consumption and is non- toxic and non-carcinogenic but media is another story all together. Some article claims it doesn't raise blood sugar or insulin spikes ^[3]. Also, it may help with weight loss. It is often liked with toxicities like nausea, headache, mental confusion, depression, and effect on thyroid, loss of appetite, premature delivery and further affecting sugar preference of babies ^[4]. Mukherjee and Chakrabarti (1997) found it to be genotoxic to rats but on further studies found it safe for human ^[5]. Aspartame is a low calorie and high intensity sweetener which is 180-200 times as sweet as natural sweetener. Over the years, Rumor of its spreading cancer, tumor and neurological disorder has been dismissed but still the false misconception prevails [6]. Also, it is associated with acute side effects such as nausea, vomiting, headache especially migraine and dry mouth ^{[7].} Mukhopadhyay et al, established aspartame association with significant increase up to 2.5-4.2 fold in chromosomal aberration. Long term consumption of aspartame can cause hepatocellular injury (study on rats), alter the hepatic antioxidant balance and also alter behavior in rats but the issue is debatable. According to a study by EFSA, it doesn't harm brain, nervous system or affect the behavior or cognitive function in adult ^[8-10]. Aspartame present in beverage cans stored at high temperature at the pH less than 6 can break into metabolic deketopiperqzine, which is CNS carcinogen and us under active research ^[11]. What media

portray about aspartame is different than what research says. It may be negatively publicized but some cite that it has no risk to developing fetus from exposure to phenylalanine to current acceptable exposure ^[12]. Also it has positive effect on diabetes and weight loss ^[13]. Consumption with amino acid can stimulate free radicals which lead to cell death and when consumed in excess cab cause death of egg and sleek by 90% leading to infertility problem ^[14]. Sucralose also known as 4,1,6-trichorogalactosucrase is 600 times sweeter than sucrose. Sucralose is used as a replacement for in combination with other artificial or natural sweetener like aspartame, ace K etc. It is five step patented process where 3 chlorine molecules are added to sugar molecule. Sucralose doesn't have any bitter and after taste ^[15]. FSSAI has permitted it to be used in carbonated drinks, bakery products, and breakfast cereals ^[8]. Sucralose is one of the few sweeteners with positive response from media with no toxicity or carcinogenic effect posed on reproductive and neurological risk to human ^[16]. It had shown appreciable little or no effect on blood sugar which strictly depends on the individual and the consumption one intake ^[17]. Sucralose has no calorie and with no calories it can help in effective weight loss, lowering the risk of heart disease and diabetes [18, 19]. There are still concerns related to GMO with sucralose combination with dextrose and malt dextrose ^[20]. It is claimed that some laboratory changes in sugar molecule structure prevent it from being absorbed by the body so that it is eliminated through urine and feces ^[21]. Also the body doesn't recognize sucralose as sugar (3 chlorine atoms) instead it goes undigested through digestive system without affecting blood sugar which hereby published it as safe for diabetes, weight loss, and pregnant, lactating people ^[22]. There is always the other side of media claiming that sucralose can potentially harm the beneficial bacteria in gut ^[23]. When exposed to heat the chemical compounds may experience toxic breakdowns, but the studies claiming are next to none. Positively ace k, sucralose doesn't readily react to heat or melt which doesn't lessen the sweet taste, allowing it to be used as best sweetener with one of the least havoc around the market ^[24]. Stevia is a zero caloric natural herb containing steviol glycoside which is 10-15 times sweeter than sucrose. Our body does not metabolize sweet glycosides because of which stevia remains zero calorie. Also, sweet glycoside in stevia does not break down in heat which makes it excellent sweetener for cooking and baking ^[25]. It also significantly improves nutritional status of diabetic patients and lowers elevated blood pressure. Stevia is used from centuries and till now no possible studies have shown any side effects other than mild headache ^[26]. But the benefits of stevia has made it the most popular sweetener among the masses and be the best alternative to resort natural alternatives like honey, maple syrup. It is said that the limit use can be beneficial in hypertensive, improve blood pressure, type 2 diabetes mellitus, doesn't cause a spike in insulin which may also improve glucose intolerance, weight management, might be just fit for those trying to lessen sugar intake and is Safe for pregnant, children, and lactating woman^[27]. But there are articles claiming that it may not be safe during lactation or for children below age of 2 years. Stevia has shown minimal effect on blood glucose and some derived compound has even shown a therapeutic blood glucose lowering effect ^{[28].} However diabetic effect remains inconclusive at present. Stevia is known for its safe alternative and may be best fit for diabetes and weight management. Saccharin safety is less controversial and uncertain than aspartame and sucralose. Only minus indicators if exceeded are that it can trigger allergic reaction in some cases. It belongs to class sulfonamides or those who are sensitive to sulfa based drugs may experience a reaction with headache or breathing problem.

2. METHODOLOGY

Data was collected from both the primary and secondary sources. Collection of primary data was carried out by perceiving the views of consumer through filling up a structured questionnaire and interview. Secondary data was collected by information from easily reachable media sources like E-blogs, E-news, and social media resources. The information gathered and discussed upon is presented with the help of figures.

3. RESULTS AND DISCUSSION

The study resulted in an idea on how consumers perceive artificial sweeteners. All the respondents in the age group of 19 to 30 years had tasted artificial sweetener once in their life time whether in the form of soft drinks or cakes. 72.55% were found to be skipping artificial sweetener in day to day (Figure 1). However, 13.73% was sure about its usage. It was only 13.73% who were unsure of using artificial sweetener in every day routine. It was revealed that consumers were not in favor in consuming artificial sweeteners. They seemed to be very health conscious in matter of consuming anything "artificial".

Further study showed that most respondents were aware about saccharin followed by aspartame and sucralose (Figure 2). Study highlights that respondents were little aware about stevia, the media's most hyped sweetener. It was reviewed that respondents were barely aware about neotame and the sugar alcohols like xylitol, maltitol. When survey was conducted on the statement that what respondents use artificial sweeter for, it was inferred from figure 3 that coffee, tea, baking, cooking and least for the purposes of gym, weight loss and compacting diabetes but majority were only okay if they were consuming artificial sweeteners outside instead of using it in home cooking (Figure 4).

Aspartame, saccharin are the main substitute in diet and sugar free products. Two very famous products are coke zero and Pepsi diet. Regarding the opinion of the respondent on consuming sugar free or diet labeled products, it was found through figure 5 that rarely respondents use diet or sugar free label products. It was concluded that no respondent used artificial sweetener daily but was fine using it 2-4 times or once a week. In similarity, respondent never consuming it was very high to rarely consuming it. The main objective of sugar free and diet products is to reduce calories or to reduce the insulin spike in blood. As per above conclusion, 37.69% rarely consumed sugar free and diet along with respondents consuming it twice or once a week but predominately in table ---- it is highlighted in figure 6 that 88.46% respondents refuse to consuming it in order to reduce weight. Only few handfuls agreed of consuming it for weight loss purposes. Regarding the opinion of respondents on whether they prefer artificial sweetener or natural sweetener, it was inferred in figure 7 that 0% respondents prefer artificial sweeteners over artificial sweeteners whether in form of honey, corn syrup or maple syrup. Artificial sweeteners are said to have some acute or chronic side effects.



Figure 1: Use of artificial sweetener in everyday routine



Figure 2: Awareness about individual artificial sweeteners







Figure 4: Awareness of artificial sweeteners



Figure 5: Consumption of sugar free and diet label product



Figure 6: Use of artificial sweetener for the purpose of weight loss

The observation from table—indicates that some of the respondents agreed that they have faced some health conditions in past due to artificial sweeteners like headache, fatigue, dizziness, blurred eye. The main reasons why artificial sweeteners are negatively portrayed in media are diabetes and obesity. Regarding the opinion of the respondents, it was clearly highlighted that only 1-3% faced high glucose sugar and high blood pressure







Figure 8: experience of health conditions due to artificial sweeteners.

4. CONCLUSION

'The effects artificial sweeteners might cause when permissible limit is exceeded' has been replaced by 'don't use artificial sweeteners, it may harm your health'. Indian household are no where near the permissible limit. Most consumers prefer all together stoping the use of sugar in cooking rather than consuming artificial sweeteners for the purposes of diabetes and weight loss. One possible argument is the word 'artificial' associated with 'artificial sweetener'. 'Artificial' automatically generates the idea of anything man made and chemically processed and hence harmful to the body. Many online sources express artificil sweeteners as plaque for human consumption. Other sources like online blogs and articles have based their positive or negative views more on resarches. For the purpose of diabetes and weight loss, newspaper and television focus is more on white sugar and natural sugars. In the case of consumer aceptablility, consumers are not aware much about advantages and disadvantages of artificial sweetenersMedia is the most appropriate souce for the consumer awareness. It is observed that still consumers maintain their distance from artificial sweeteners. Slowly and gradually artificial sweeteners are making their place in the Indian market.

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