

ID - 48

COMPARATIVE ANALYSIS OF CUSTOMER LIKING TOWARDS THE TASTE OF STEVIA AND SUGAR-MADE COOKIES

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Abstract

Stevia, the substitute for sugar contains very less calories. The reason for the growth of interest in using stevia is because it helps people with diabetes in managing their blood sugar levels. The health benefits of stevia are more as the demand for the same as sugar substitute is increasing day by day. A group of 50 respondents participated in blind tasting of sugar-made and stevia-made cookies. The liking of respondents toward stevia –made cookies were examined in comparison to sugar-made cookies. The recorded liking of respondents were analysed statistically using various statistical tools with the help of Minitab '18 software. The results proved that the respondents liked sugar-made cookies more than stevia-made cookies. Further analysis to find out the reason which made sugar-made cookies to taste better was done through qualitative interviews with 20 respondents who participated in the blind tasting. The results of the qualitative interview was analysed in Nvivo software to get a visualization of the interview conducted. The results proved that stevia-made sugar was not liked because it was bitter, hard and leaves the palate cold after tasting, on the other hand, sugar-made cookies were liked by the respondents as the respondents were used with the taste of sugar for years and the cookie made out of sugar seems to be a taste which they are used to, soft, crunchy and mouth melting. In nut shell, the results proved that the awareness of stevia sugar and its health benefits were lesser among the respondents and the paper therefore, suggests more awareness on health benefits of stevia and a lifestyle change for a valid reason, which would further help to maintain a healthy lifestyle. The limitation of the paper being time and budget constraint which therefore involved a smaller sample size and the respondents belong to one city, that is, Bangalore and thus the results cannot be generalized.

Keywords: Stevia, Sensory analysis, Stevia Vs Sugar, Healthier substitute for sugar, Healthy lifestyle

Introduction (Literature Review)

Consuming sugar sweetened items may be one of the cause of obesity [1]. According to [2], there has been a huge diabetic population in the last decade in India. Stevia is the new emerging alternative source of calorie free sweetener having no carbohydrate and fat [3] and it is plant that is grown wildly in Brazil and Paraguay [4][5]. Due to high demand for natural sweeteners the plant is cultivated in different parts of India, namely, Rajasthan, Kerala, Punjab, Orrisa and Maharashtra [2]. World Health Organization has recommended a limit on stevia, that is, not more than 1.8 milligrams per pound per day. Stevia sweeteners help in boosting nutritional quality by cutting down calories [6]. Several studies proved the health

benefits of stevia, [7] states the effect on anti-inflammatory and anti-cancer property of stevia. This might be due to the presence of polyphenol content and antioxidant activity in stevia [8][9]. Stevia has no calories and thus doesn't affect the sugar levels in blood, which makes stevia an option for people who suffer with diabetes [10]. Stevia is proved to help in lowering blood pressure, strengthening the heart and other antimicrobial activities, yet sweetener is the main use of stevia [11]. There is no evidence on effects of using stevia during pregnancy or lactation [12]. The major issue in stevia is its bitter taste and few feel it tastes like cough syrup or a chemical [13]. The measure of 25gm of stevia to the basic recipe was proven to be highly acceptable by diabetics [14]. The taste of stevia was also proven to be accepted and its use can aid in diabetics and for weight loss [15]. As various studies have scientifically proven the health benefits of stevia and stevia being a new taste in the market the acceptability of its taste becomes the big question. With this regards, this paper attempts to understand the customer liking towards stevia-made product in comparison with the sugar-made product. This paper would also analyse the reason for the disliking of the taste of stevia and the tendency of change to a new taste for a good reason, that is, the health benefit of stevia. The justification to this research is that this study would identify the liking of stevia's taste when used in baking in comparison to sugar and would analyse the reason behind the liking or disliking of the taste which would further be helpful to create awareness on a healthy substitute of sugar.

Methodology

The study involved both quantitative and qualitative methods of research. The study examined the liking of customers towards stevia-made cookies in comparison with sugar-made cookies. Two types of cookies were baked and used for sensory analysis, namely, butter cookies and choco-chip cookies. Each type of cookie was made with sugar and stevia. The study involved 50 respondents for the blind tasting of cookies. Each respondent was given 4 cookies each to taste and record their preferences, that is, 1 sugar-made butter cookie, 1 stevia-made butter cookie, 1 sugar-made choco-chip cookie and 1 stevia made choco-chip cookie. A measure of 57 grams and 120 grams of castor sugar was used per butter cookie and choco-chip cookie respectively. The measure of stevia powder was 0.57 grams and 1.2 grams per cookie [14]. The quantitative data of liking of customers were statistically analysed with tools like one-way Anova and t-test using Minitab'18. The qualitative part of the research involved 20 respondents who took part in blind tasting and a qualitative interview was done to get an in-depth understanding of liking or disliking of the taste of cookies in comparison with stevia and sugar-made cookies. The interview data was analysed using Nvivo 12 software to get a visualization of the conducted interviews.

Results and Findings

The respondents who participated in the blind tasting mostly were in the age group of 26 – 35 years as they constituted 40% of the overall respondents (p value = 0.002). The respondents involved in the blind tasting, 62% of them were male and 38% were female respondents (p value = 0.08).

Fifty six percentage (56%) of the respondents stating that they are 'Very Probable' to go for a healthier substitute for sugar, followed by that 36% are 'Somewhat Probable'. The statistical

analysis proves that the taste of stevia-made cookie is being least liked, with 58% of the respondents stating the taste to be ‘Poor’ and only 2% say the taste is ‘Excellent’. This difference among the group has been proved significant with a p value of 0.00 (p value < alpha value). Same way, the customer liking was more toward sugar-made cookies as 44% of the respondents mentioning the taste as ‘Excellent’ and 36% stating ‘Good’. Thus the null hypothesis has been rejected (p value = 0.00). A comparative analysis (t –test) was done between sugar and stevia made butter cookies which rejected the null hypothesis with a p value lesser than alpha value (0.00) and proves a significant difference among the group. The respondents showed more liking toward sugar-made butter cookie when compared with stevia-made butter cookie. 88% of the respondents liked sugar-made butter cookie whereas only 12% liked the taste of stevia –made butter cookie.

The next analysis was done for the choco-chip cookies where the respondents showed a lesser liking toward stevia-made choco-chip cookie as the p value is 0.00 and the null hypothesis being rejected and there exists a significant difference among the group. 61% of the respondents felt the taste of stevia-made cookie is ‘Poor’ and only 12% stated it has ‘Excellent’. However, the sugar –made choco-chip cookie the analysis proves higher liking of consumers toward sugar –made choco-chip cookies with lesser p value of 0.00 proving a significant difference among the group. The. 48% of the respondents felt the cookie’s taste to be ‘Excellent’ and only 1% felt it to be ‘Poor’ in taste. The comparative analysis (t-test) proves a significant difference among the group and thus the null hypothesis is being rejected. The results prove that, the taste sugar-made choco-chip cookie (88%) was more liked by the respondents when compared with stevia-made choco-chip cookies (12%).

Qualitative Analysis

As a part of qualitative analysis of the study, 20 respondents who participated in the blind tasting of cookies were interviewed to understand the reason behind liking or disliking of the taste of sugar-made and stevia-made cookies. Figure 1, illustrates the visualization of the interviews conducted.

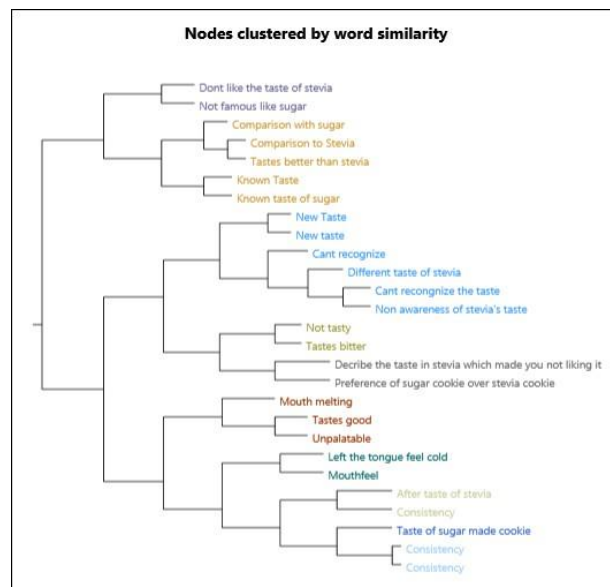


Figure 1. Node Cluster by Word Similarity

According to Figure 1, the visualization of the interviews conducted prove that stevia-made cookies are not liked by the respondents when compared to sugar-made cookies because taste of stevia is new to them and they feel that stevia is not famous like sugar. The known taste of sugar has dominated and thus became a reason for disliking of stevia. Moreover, the taste of sugar was found to be better than stevia. Some of the respondents were not able to recognize the taste of sugar due to lack of awareness of stevia. All the respondents felt that stevia-made cookies were bitter in taste which made the stevia cookies unpalatable. In respect to the aftertaste of stevia-made cookies the respondents stated that the cookie left the tongue feel cold. The respondents also felt that the consistency of stevia-made cookies was not good as it was hard and wasn't crunchy enough. Wherein, the taste of sugar-made cookies was to be more liked by the respondents as they were used with the known taste of sugar, the cookie was soft and crunchy with a good after taste.

Conclusion

In comparison with other studies which focused on analysing the health benefits of stevia and the sensory analysis of stevia, this study focuses in analysing the taste of cookies baked using stevia sugar. The study involved a taste comparison between sugar-made and stevia-made cookies and checked the liking of the respondents. Two types of cookies were used for the research work, namely, butter cookies and choco-chip cookies. The study involved 50 respondents, that is, 31 men and 19 women, who blind tasted the cookies and recorded their feedback. According to the statistically analysed data the taste of the sugar-made cookies were liked more compared to stevia-made cookies in case of both types of cookies. Though the liking towards the taste of stevia make cookies were rated poor, according to Table 3, more than half of the respondents (56%) were 'very probable' in changing to a better sugar substitute for health reasons (p value = 0.00). Moreover, there exists a significant, positive, medium correlation ($r = 0.41$, p value = 0.00) between rate of probability of change and liking of stevia-made butter cookies and a positive, weak correlation with stevia-made choco-chip cookies ($r = 0.14$, p value = 0.00). The correlation proves that more the probability in opting a healthier substitute for sugar, more would be the customer's liking of the taste of stevia-made products. The study involved qualitative interviews conducted with 20 respondents who participated in the blind tasting to understand the reason behind the liking or disliking of the cookies. To get a visualization of the interviews conducted was done with the help of Nvivo software. According to the interview the sugar-made cookies were liked by the respondents because they are familiar with the taste, crunchy consistency of the cookie and a pleasant after taste. The respondents didn't like the taste of stevia-made cookies because it was the taste was bitter, hard, the after taste left the palate chill. The respondents also stated that they weren't aware of the taste of stevia sugar and so few weren't able to recognise the taste. This emphasizes the need for creating awareness about stevia sugar and the health benefits of it to the consumers. As more respondents (56%) are ready to change to a healthier substitute of sugar an awareness [16] to help them to choose stevia sugar which would help in weight loss [17], controlling blood sugar levels [18] and the ailments due to the presence of antioxidant properties and phenolic content in stevia [9]. In nut shell, as the previous studies mentioned about the scientific benefits of stevia, to add on to the literature, this study has analysed the reason behind disliking of the taste of stevia. As more than of the respondents were ready to change to a sugar substitute for health reasons, the results of the study

emphasis in creating awareness among consumers about stevia. The limitation of the study is the small sample size and the study was restricted with the residents of Bangalore due to time and financial constraints. According to the proven results, more respondents are most probable to opt the healthier substitute for sugar and lack of awareness being an obstacle, a future study can be done on blind tasting of stevia-made cookies after 20 minutes conceptual training on the benefits of stevia.

Reference

- [1] S. D. Anton *et al.*, “Effects of stevia , aspartame , and sucrose on food intake , satiety , and postprandial glucose and insulin levels §,” *Appetite*, vol. 55, no. 1, pp. 37–43, 2010.
- [2] S. K. Goyal and R. K. Goyal, “Stevia (Stevia rebaudiana) a bio-sweetener : a review,” vol. 61, no. February, pp. 1–10, 2010.
- [3] S. D. Singh and G. P. Rao, “S t e v i a 9 T h e H e r b a l Sugar of 21 st C e n t u r y,” vol. 7, no. 1, pp. 17–24, 2005.
- [4] B. Prideaux and M. Thompson, “Developing a food and wine segmentation and classifying destinations on the basis of their food and wine sectors,” in *Advances in Hospitality and Leisure*, vol. 5, Emerald Group Publishing Limited, 2009, pp. 163–183.
- [5] N. K. Verma and P. Panda, “A study on Stevia Rebaudiana : A review,” pp. 1–6, 2018.
- [6] A. Boileau, J. C. Fry, and R. Murray, “A new calorie-free sugar substitute from the leaf of the stevia plant arrives in the UK,” pp. 47–50, 2012.
- [7] L. Taylor, “The Healing Power of Natural Herbs. Garden City Park,” 2005.
- [8] A. Usha, “Nutrient composition of cultivated stevia leaves and the influence of polyphenols and plant pigments on sensory and antioxidant properties of leaf extracts,” vol. 47, no. February, pp. 27–33, 2010.
- [9] A. Rao, Galla Narsing; Rao, Pamidighantam Prabhakar; Balaswamy, Karakala ; Satyanarayana, “Antioxidant Activity of Stevia (Stevia rebaudiana L .) Leaf Powder and A Commercial Stevioside Powder,” *J. Food Pharm. Sci.*, vol. 2, pp. 32–38, 2014.
- [10] C. Republic, S. Agriculture, and C. Agriculture, “Determination of Stevioside in Plant Material and Fruit Teas,” pp. 383–388, 2001.
- [11] B. Ahmed, M. Hossain, R. Islam, A. K. Saha, and A. Mandal, “a review on natural sweetener plant – stevia having medicinal and commercial importance izvještaj o biljci stevia , prirodnom zasla đ iva č u , ljekovite i komercijalne važnosti,” pp. 75–92.
- [12] M. Gupta, Reshu; Yadav, Vidushi; Rastogi, “a review on importance of natural sweetener, a zero calorie plant – stevia - having medicinal and commercial importance,” *Int. J. FOOD Nutr. Sci.*, vol. 3, no. 3, 2014.
- [13] C. Hellfritsch, A. Brockho, F. Sta, W. Meyerhof, and T. Hofmann, “Human Psychometric and Taste Receptor Responses to Steviol Glycosides,” 2012.
- [14] V. Agarwal, A. Kochhar, R. Sachdeva, V. Agarwal, A. Kochhar, and R. Sachdeva,

- “Studies on Ethno-Medicine Sensory and Nutritional Evaluation of Sweet Milk Products Prepared Using Stevia Powder for Diabetics Sensory and Nutritional Evaluation of Sweet Milk Products,” vol. 5070, 2017.
- [15] R. Mogra and V. Dashora, “Exploring the Use of Stevia rebaudiana as a Sweetener in Comparison with Other Sweeteners Exploring the Use of Stevia rebaudiana as a Sweetener in Comparison with Other Sweeteners,” vol. 9274, 2017.
- [16] N. H. Kamarulzaman, K. Jamal, and G. Vijayan, “Journal of Food Products Marketing Will Consumers Purchase Stevia as a Sugar Substitute?: An Exploratory Study on Consumer Acceptance Will Consumers Purchase Stevia as a Sugar Substitute?: An Exploratory Study,” no. November 2014, pp. 37–41.
- [17] M. . Sumon, M.H.; Mostofa, M; Jahan, M.S; Kayesh, M.E.H; Haque, “Comparative efficacy of powdered form of stevia (,” vol. 6, pp. 211–215, 2008.
- [18] M. A. A. Gasmalla, “Stevia rebaudiana Bertoni : An alternative Sugar Replacer and Its Application in Food Industry,” 2014.