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ASSESSMENT OF SENSORY ATTRIBUTES AND PREFERENCE PATTERNS OF SIX GINGER BLENDED FRUIT DRINKS AMONG RURAL HOUSEHOLDS IN IMO STATE, NIGERIA

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ABSTRACT

The study assessed the sensory attributes and preference patterns of six ginger blended fruit drinks among rural households in Imo State, Nigeria. It specifically determined the perceived sensory attributes of six selected ginger blended fruit (pineapple, orange, cashew, mango, soursop, watermelon) drinks among rural households and ascertained their preference patterns for the selected ginger flavoured drinks. The multi-staged sampling procedure was employed in the selection of 160 respondents for the study. The respondents were shown how to blend ginger with fruits to produce drinks and guided on how to assess the fruit drinks and record their ratings in the questionnaire. Data were collected and analyzed using descriptive and inferential statistics. The result showed that the respondents perceived all the ginger fruit blends had pleasant sensory attributes ($\bar{x}$ = 6.42) and pineapple ginger blend ($\bar{x}$ = 4.41, ranked 1st) was the most preferred fruit drink, followed by orange ginger blend ($\bar{x}$ = 3.50. ranked 2nd) and cashew ginger blend ($\bar{x}$ = 3.04, ranked 3rd). The result also revealed that there was a significant difference in the perceived sensory attributes of the six ginger blended fruit drinks ($p<0.05$). It is therefore recommended that more awareness on the consumption of ginger blended fruit drinks, the nutritional as well as the medicinal values should be promoted, and entrepreneurs should also be encouraged to produce fruits

Keywords: *Ginger, fruits, sensory attributes*

INTRODUCTION

Fruit juice is a drink made by squeezing or extracting the natural liquid content in fruits. They are examples of non-alcoholic beverages and play a very important role in the diets of people in both developed and developing countries (Mani-Lopez, 2019). These beverages are regarded as after meal drinks or refreshing drinks during the dry season in rural and urban centers. Fruits such as oranges, mangoes, and pineapples have often served as the main raw materials in these beverages. The quality of these beverages is often enhanced by combining several fruits or adding medicinal spices to the drinks to make them more palatable and acceptable. Ginger is one of the spices often used in preparing homemade fruit juices due to the benefits that can be derived from it.

Ginger is a rhizome, botanically called *Zingiber officinale*. It is a spicy medicinal plant that originated somewhere in Asia and has been in use in India and China for a long time (Luna, 2020). Ginger is one of the mandate crops of the National Root Crop Research Institute (NRCRI) Umudike which it has encouraged farmers to produce (Akparanta *et al*, 2015). To add value to ginger and diversify its usage, the Institute has made efforts to develop and promote the production of ginger blended fruit drinks that have high medicinal and nutritional values.

Blending ginger with fruits multiplies the benefit available to users. Fruits are packed with vitamin C, while ginger is an amazing root known for its anti-inflammatory, antibacterial, and antiviral properties. It is also useful in managing bad breath, fighting germs, relieving nausea, soothing/ easing arthritis, soothing sore muscles and relieving pains, curbing cancer growth, regulating blood sugar levels, managing cholesterol and some cardiac-related issues, relieving indigestion and boosting body immunity so as to help protect against diseases (Luna, 2020; Ratini, 2020). In combination, these two powerful ingredients help to boost body metabolism, and at the same time, help control the urge to eat thereby managing weight. With its excellent digestive properties, ginger blended with fruits can help clean the digestive tract, regulate blood sugar and help cope with many health issues.

Most fruit juices in Nigeria are imported (Okeke, 2020) and sometimes not blended to meet desired flavour, nutritional and medicinal values. The rural areas of Nigeria are endowed with lots of fruits and the people often eat the fruits whole without knowing how to add value and diversify their usage.

There are several nutrition-related diseases that people are coping with. In desperate efforts to manage their health challenge, they take to spiced food drinks not only to satisfy thirst and to provide necessary nutrients but also to improve their physical and mental well-being. Ginger blended fruit drinks, play a very important role in this regard. Thus, the production of fruit juices blended with ginger has been encouraged because of its medicinal and nutritional value.

In view of the foregoing, National Root Crop Research Institute (NRCRI) Umudike has made efforts to develop and promote some ginger blended fruit drinks using locally available fruits. The uptake of ginger-blending fruit drink production will further encourage fruit consumption in more diversified and value-added forms. Nevertheless, the ginger blended fruit drinks were developed on-station and are yet to be validated by the rural households in Imo State, who are potential consumers of the fruit blends. Thus this study assessed the sensory attributes of six

ginger blended fruit drinks as well as their preference patterns among the rural households in Imo State.
The specific objectives were to:

i. Determine the perceived sensory attributes of the selected ginger blended fruit drinks among rural households in the Imo state.

ii. Ascertain the preference patterns of the selected ginger flavoured drinks among rural households in the study area.

It was hypothesized that **t**here were no significant differences in the perceived sensory attributes of the six ginger blended fruit drinks among the respondents.

Methodology

A multistage sampling procedure was employed in the selection of respondents for the study. First, two out of the three agricultural zones (Owerri, Orlu, and Okigwe) in the state were selected by random sampling technique. Secondly, two Local Government Areas were selected from each zone by the same random sampling technique. In the third stage, two communities were selected by random sampling techniques from each of the sampled LGAs making it a total of 8 communities. The last stage was a selection of twenty respondents from each sampled community by simple random sampling technique. Thus, a sample size of 160 respondents was selected for the study. At the location of the study, the researcher first demonstrated the processes of blending ginger with six fruits (Pineapple, Orange, Cashew, mango, soursop, and watermelon) to produce the fruit drinks using the procedure developed by the Institute for the Pinegy drink according to Aniedu *et al* (2002). Afterward, the respondents were guided by field assistants on how they would assess the fruit drinks and record their ratings in the questionnaire which was given to them. Data collected were analyzed using appropriate descriptive and inferential statistics
Objective i was measured with a 9point Hedonic type scale as follows: Extremely liked = 9 very much liked = 8 moderately liked = 7; Slightly liked = 6; Neither liked nor disliked = 5; Slightly disliked = 4; Moderately disliked = 3; very much disliked = 2; Extremely disliked = 1. The mean scores of the sensory attributes obtained were re-categorized into three - unpleasant, plain, and pleasant. These were done by dividing the maximum score (9) into the 3 categories. A class interval of 3.00 was obtained and subtracted successively from the maximum score to give class ranges of: 1-3:00; 3.01-6.00 and 6.01-9.00 representing the three categories of the mean scores. Thus, mean scores of the sensory attributes were categorized as unpleasant, plain, and pleasant respectively.

Results and Discussion

Perceived sensory attributes of the six ginger-blended fruit drinks

Presented in Table 1 is the distribution of the respondents according to their rating of the sensory attributes of six ginger blended fruit drinks in the study. The sensory attributes assessed include colour, taste, aroma, mouth feel, after drink taste, and ginger hotness.

Table 1: Distribution of the respondents according to their rating of the sensory attributes of six ginger blended fruit drinks in the study

FRUIT/GINGER BLEND	COLOUR	TASTE	MOUTH FEEL	FLAVOUR	AFTER DRINK TASTE	GINGER HOTNESS	MEAN	RMKS
Pineapple-Ginger	7.96	7.74	7.36	7.89	7.06	6.86	**7.48**	**Pleasant**
Orange - Ginger	7.44	5.61	6.16	6.39	6.21	6.18	**6.33**	**Pleasant**
Cashew - Ginger	6.11	5.87	5.82	6.25	6.00	6.11	**6.03**	**Pleasant**
Mango - Ginger	6.79	6.21	5.96	6.06	5.96	6.08	**6.18**	**Pleasant**
Soursop - Ginger	6.81	6.11	6.33	6.56	6.21	6.37	**6.40**	**Pleasant**
Water Melon - Ginger	7.61	5.84	5.83	5.74	5.54	5.86	**6.07**	**Pleasant**
Grand mean	**7.12**	**6.23**	**6.24**	**6.48**	**6.16**	**6.24**	**6.42**	**Pleasant**

Source: Field data (2020)

Colour

The respondents indicated that the colours of all the ginger-blended fruit drinks were pleasant. However, Pineapple ginger blend ($\bar{x}$ = 7.96) had the most pleasant colour, followed by watermelon-ginger blend ($\bar{x}$ = 7.61) and orange-ginger blends ($\bar{x}$ = 7.44) then Soursop-ginger drink ($\bar{x}$ = 6.81), mango-ginger drink ($\bar{x}$ = 6.79) and cashew-ginger drink ($\bar{x}$ = 6.79). Cashew-ginger drink was the least.

Taste

The taste of pineapple-ginger ($\bar{x}$ = 7.74), mango-ginger ($\bar{x}$ = 6.21) and soursop-ginger ($\bar{x}$ = 6.11) blended fruit drinks were pleasant according to the respondents, while, cashew-ginger ($\bar{x}$ =5.87) watermelon-ginger ($\bar{x}$ =5.84) and orange-ginger ($\bar{x}$ =5.61) fruit drinks were plain. Pineapple-ginger fruit drink had the best taste according to the result.

Mouth feel

The respondents attested that three out of the six ginger blended fruit drinks; pineapple-ginger ($\bar{x}$ = 7.36), orange-ginger ($\bar{x}$ = 6.16), and soursop-ginger ($\bar{x}$ = 6.33) drinks had a pleasant mouth feel, while mango-ginger ($\bar{x}$ = 5.96), watermelon-ginger ($\bar{x}$ = 5.83) and cashew-ginger ($\bar{x}$ = 5.82) drinks had the plain mouth feel. The result showed that pineapple had a most pleasant mouth feel than the other blends

Flavour

The flavours of all ginger blended fruit drinks were pleasant to the respondents except that of the watermelon-ginger ($\bar{x}$ = 5.74) blend. Pineapple-ginger blend had the most pleasant flavour ($\bar{x}$ = 7.89) followed by soursop-ginger ($\bar{x}$ = 6.56) and orange-ginger ($\bar{x}$ = 6.39) blend, then mango-ginger ($\bar{x}$ = 6.06) blend and cashew-ginger ($\bar{x}$ = 6.25) blend

After drink taste

The responses elicited from the respondents on after drink taste of the ginger-blended fruit drinks revealed that the pineapple-ginger blend ($\bar{x}$ = 7.06), orange-ginger blend ($\bar{x}$ = 6.21), soursop-ginger blend ($\bar{x}$ = 6.21) and cashew-ginger blend ($\bar{x}$ = 6.00) drinks were pleasant, while mango-ginger blend ($\bar{x}$ = 5.96) and watermelon-ginger blend ($\bar{x}$ = 5.54) drinks were perceived as plain.

Ginger hotness

The ginger hotness of pineapple ginger blend ($\bar{x}$ = 6.21), soursop ginger blend ($\bar{x}$ = 6.21), orange ginger blend ($\bar{x}$ = 6.21), cashew ginger blend ($\bar{x}$ = 6.21), and mango ginger blend ($\bar{x}$ = 6.21) were pleasant. The only exception was the watermelon-ginger blend ($\bar{x}$ = 5.86) which was plain.

Preference rating of the six ginger blended fruit drinks

Presented in Table 2 is the distribution of the respondents according to their preference rating of the six ginger blended fruit drinks in the study. From Table 2, pineapple-ginger blend ($\bar{x}$ = 4.41) was the most preferred ginger fruit blend in the study area and was ranked 1st, followed by the Orange-ginger blend ($\bar{x}$ = 3.50) in the 2nd position. Cashew-ginger blend ($\bar{x}$ = 3.04) was the 3rd most preferred drink while mango-ginger blend ($\bar{x}$ = 2.84) and soursop-ginger blend ($\bar{x}$ = 2.43) were ranked 4th and 5th position on the scale of preference of ginger blended fruit drinks. Watermelon-ginger blend ($\bar{x}$ = 2.42) was the least preferred of all the six ginger-fruit drinks.

Table 2: Distribution of respondents according to their Preference rating of the six ginger blended fruit drinks in the study

Fruit/ginger blend	Colour	Taste	Mouth Feel	Aroma	After-drink Mouth Taste	Ginger Hotness	Mean score	Rank
Pineapple -Ginger	4.86	4.64	4.48	4.35	4.32	3.82	4.41	1st
Orange -Ginger	3.69	3.46	3.38	3.41	3.47	3.60	3.50	2nd
cashew -Ginger	2.97	3.10	3.03	3.16	2.96	3.06	3.04	3rd
Mango -Ginger	2.56	2.84	2.86	2.95	2.79	3.06	2.84	4th
Soursop-Ginger	2.34	2.44	2.32	2.40	2.53	2.56	2.43	5th
Water melon-ginger	2.32	2.20	2.54	2.56	2.60	2.31	2.42	6th

Source: Field survey, 2020

The study also examined the preference rating of the six ginger blended fruit drinks among the respondents in the study area. To ascertain their preferences for the ginger blended fruit drinks, the study elicited their preference choices on the attributes of the ginger blended fruit drinks thus; colour, taste, aroma, after drink mouth taste and ginger hotness. The responses on these attributes of the fruit drinks were further pooled together to get a mean score which represents their overall assessment of the fruit drinks and hence shows their preference for them.

This finding is a result of the palatability and compatibility in a combination of the various nutrients and other attributes of the individual fruits. The use of fruit species, which are often rich in vitamins, minerals, and bioactive compounds, reflects in offering new alternatives of

fresh fruits for consumption and raw materials for the agro-industry, constituting a precious source of food (Oludemi and Akanbi, 2013).

Test of Hypotheses

There were no significant differences in the perceived sensory attributes of the six ginger blended fruit drinks among rural households in Imo States. The information in Table 3 presents the Duncan Multiple Range Test of Analysis of Variance (ANOVA) results for the perceived sensory attributes of the six ginger blended fruit drinks as observed by the respondents in the study area. The sensory attributes of the ginger blended fruit drinks tested for statistical differences are; colour, taste, mouth feel, aroma after drink mouth feel, and ginger hotness.

Table 3: The Duncan Multiple Range Test of ANOVA of the perceived sensory attributes of the six ginger blended fruit drinks

Fruit/Ginger blend	Colour	Taste	Mouth feel	Flavour	After-drink mouth taste	Ginger hotness
Pineapple-Ginger	7.96a	7.74a	7.36a	7.89a	7.06a	6.86a
Orange-Ginger	7.44b	5.61c	6.16b	6.39b	6.21b	6.18b
Cashew-Ginger	6.11d	5.87bc	5.82b	6.25bc	6.00bc	6.11b
Mango-Ginger	6.79c	6.21bc	5.96b	6.06bc	5.96bc	6.08b
Soursop-Ginger	6.81c	6.11b	6.33b	6.56b	6.21b	6.37ab
Water melon-ginger	7.61ab	5.84bc	5.83b	5.74c	5.54c	5.86c
F Ratio	16.147***	13.562***	9.011***	14.413***	6.529***	2.784***
LSD	0.150	0.124	0.286	1.00	0.408	0.096

Source: Calculated from Field data (2020)

The means with the same letter are not significantly different at a 95% confidence interval (P> 0.05).

The results show that respondents' mean rating of the colour of the pineapple-ginger blend was not significantly different from that of watermelon – ginger blend but significantly different from those of other fruit blends. Similarly, their mean rating of the watermelon ginger blend was not significantly different from that of the orange–ginger blend but significantly different from those of mango-ginger, Soursop-ginger, and cashew. Respondents' ratings of colour for the mango-ginger blend and soursop ginger blend were not significantly different but they were significantly different from the rating of colour for the cashew-ginger blend. According to (Shewfelt, 2000), colour and appearance attract the consumer to a product and can help in impulse purchases. At the point of purchase, the consumer uses appearance factors to provide an indication of freshness and flavour quality. The external appearance of whole fruit is used as an indicator of ripeness, although it can be a misleading one.

The mean rating on taste shows there was a significant difference between the taste of Pineapple –ginger blend and the taste of other fruit blends. Tastes of the Soursop ginger blend was significantly different from the taste of orange ginger but not significantly different from the taste of the cashew-ginger blend, mango-ginger blend, and watermelon–ginger blend. There was equally no significant difference between the taste of orange–ginger blend and those of the cashew-ginger, mango-ginger, and watermelon–ginger blends.

There was a significant difference in respondents' mean score rating of the mouth feels of pineapple –ginger blend and those of other fruit blends. However, there were no significant differences in the mean rating of mouthfeel for other ginger blends such as orange, cashew, mango, soursop, and watermelon–ginger blends.

For the flavour, Pineapple-ginger blend was significantly different from the other fruit blends. Orange-ginger and Soursop-ginger blends were not significantly different from the cashew-ginger blend and mango-ginger blend but they were significantly different from the watermelon-ginger blend.

The result of the after-drink mouth taste of the ginger drinks followed a similar trend with their flavour. Pineapple-ginger blend was significantly different from the other ginger fruit blends while the orange-ginger blend and soursop-ginger blends were not significantly different from the cashew-ginger blend and mango-ginger.

In terms of the ginger hotness of the ginger-blended fruit drinks, orange-ginger blend, cashew-ginger blend, and mango-ginger blend had no significant difference in their ginger hotness attribute. However, the pineapple-ginger blend and soursop-ginger blend were not significantly different. Watermelon-ginger blend was statistically different from other ginger-blended fruit drinks.

Generally, these findings are in line with Onyekwelu (2017) who found significant differences in colour, taste, mouth feel, and general acceptability of mixed fruit juice drinks. In view of the observed significant differences occurring among the mean scores of the various perceived sensory attributes, the null hypothesis is thus rejected and the alternative accepted which indicates there are significant differences in the perceived sensory attributes of the six ginger blended fruit drinks among rural households in Imo state.

Conclusion and Recommendations

The study concluded that all the ginger-blended fruit drinks examined had pleasant sensory attributes. The pleasantness in colour, taste, mouthfeel, flavour, after-drink mouth taste, and ginger hotness made the ginger blended drinks acceptable to the people. Pineapple-ginger blend was the most preferred ginger-blended fruit drink followed by orange-ginger blend, cashew-ginger blend, mango-ginger blend, and soursop ginger blend respectively. However, the watermelon-ginger blend was the least preferred in the study area. The study found significant differences in the sensory attributes of the six ginger-blended fruit drinks studied. In their uniqueness, the people still found all the ginger-blended fruit drinks pleasant.

Based on the findings of the study, the following recommendations were made:

1. There should be more awareness campaigns to promote the consumption of ginger, blended with other fruit types with an emphasis on nutritional, health, and entrepreneurial values.
2. Entrepreneurs should look into fruit production - especially those fruits the people preferred - as a way of encouraging innovation and making income also.

References

Akparanta, C.D.; Ugwu, J.N.; Nwawe, C.N.; Utulu, S.N.; Erumwenbibi, B.O. (2015). The Role of National Root Crop Research Institute (NRCRI), Umudike, Abia State in Agricultural Development. International Journal of Research in Agriculture and Forestry 2(5): 28-33

Aniedu, C., Oti, E. and Amambo, L. E. F. (2002). Production of ginger-blended pineapple drinks, "Pinegy"; Implication for youth and rural employment. Nigeria Agricultural Journal. 33. 97-101.

Luna, R. (2020). Top 10 Ginger Juice Recipes. Retrieved on 29/07/2022 from healthyrecipes101.com/ginger-juice-recipe

Mani-Lopez, E.; Rios-Corripio, M.A; Lorenzo-Leal, A.C.; Paulo, E.; Lopez-Malo, A. (2019). Characteristics and uses of novel and conventional preservatives for fruit drinks and beverages. In *Preservatives and preservation approaches in beverages*. 15 31-67

Oludemi, F. D. and Akanbi, C. T. (2013). Chemical, antioxidant, and sensory properties of tomato-watermelon-pineapple blends, and changes in their total antioxidant capacity during storage. *International Journal of Food Science & Technology*, 48(7): 1416-1425.

Onyekwelu, C.N. (2017). Physico-chemical and acceptability of citrus juice from Orange, Tangerine, and Grape blends. Biology 3(1): 43 – 46.

Ratini, M. (2020). Health benefits of ginger. Retrieved on 29/07/2022 from www.webmd.com/diet/ss/slideshow-health-benefits-ginger

Shewfelt, R. L. (2000). Fruit and vegetable quality. In: Fruit and Vegetable Quality: An Integrated View. Shewfelt, R. L. and B. Bruckner (Eds.). Technomic Press, Lancaster PA, 144–157.

Sissons, B. (2019). Top 12 healthful fruits Medically reviewed by Natalie Butler. Retrieved on 29/07/2022 from www.medicalnewstoday.com/articles/324431

Okeke, J. (2020, march, 15.). How imported fruit juices shortchange local manufacturers. *The Nation Newspaper.* Retrieved on 29/07/22 from https://thenationonlineng.net