JHER Vol. 26 No. 1 September 2019, pp. 129-137

Sensory Evaluation and Acceptability of Hand Sanitizer produced from Local Raw Materials –Garlic (*Allium Sativum*), Aloe Vera (*Aloe Barbadensis Miller*) and Ethyl Alcohol

Ezeoguine, J .A
Home Economics Department
Federal College of Education (Technical)
Akoka, Lagos State
&
Ezema, P.N.; Nnubia, U.E
Home Science Department,
Michael Okpara University of Agriculture,
Umudike, Abia State

Abstract

This study focused on sensory evaluation and general acceptability of hand sanitizer (verabeny) produced from local raw materials – garlic and aloe vera with 30% ethyl alcohol. Verabeny hand sanitizer was produced and compared with two other types of commercial alcohol – based (60% - 70%) hand sanitizer's purchase from local market. Sensory attributes studies included: colour, texture, and odour. General acceptability was also compared. A 5-point hedonic rating scale was used for data collection. The panel of judges was drawn from a group of Home Economics students. Data were analyzed using means. The result indicated that verabeny compared well with the two commercial hand sanitizer samples in all sensory attributes except odour.

Keywords: Hand Sanitizer, Garlic, Aloe Vera, Ethyl Alcohol, Sensory, Evaluation

Introduction

Hygiene simply means cleanliness, that is, the observation of good health practices based on rules of general cleanliness. Hygiene is of great importance in the prevention of many kinds of infections and diseases within the household and the environment. Adigbo and Maddah (2011) noted that good personal hygiene is a critical protective measure against food borne illness. It is ironic that people are the cause and victims of food borne illness incidents. It has been observed that at every step in food chain from preparation to consumption, handlers can contaminate food when they contact the environment with their hands, perspiration or breath; they spread bacteria and other micro – organisms. Every unguided cough or sneeze transmits a wave invisible

micro – organisms capable of causing disease. Washing of the hands regularly reduces to the barest minimum the increase of the germs in human hands. Effective washing of hands require the use of soap and good water. This may however not be available at all times; hence hand sanitizer becomes a veritable alternative for cleaning hands when soap and water are not available.

Productions of local hand sanitizer will ensure prevention of diseases and infections but unfortunately observations and studies have revealed that most of the hand sanitizers used in the country are imported and as such they are very expensive to buy. The production of local hand sanitizer will involve using locally produced agricultural materials such as ethyl alcohol, garlic and aloe vera to generate the necessary anti-biotic effects for tackling the spread of diseases. The hand sanitizer produced with locally available materials will be cheaper, effective and available, and would enable families to prevent the spread of diseases and infection for healthy living and would aid in income generating by family members who may wish to engage in the production of hand sanitizer. The issue on the use of alcohol-based hand sanitizer have centered mainly on product flammability and ingestion, both unintentional by young children and intentional by individuals seeking to abuse alcohol. The use of alcohol-based hand will be reduced if other non-alcohol-based hand sanitizer is available. The question now is what is this hand sanitizer?

Hand sanitizer is a liquid substance that is applied by rubbing it on hands to kill germs. Hand sanitizers are basically made up of ethyl alcohol, isopropyl (isopropanol), n-propanol or povidone-iodine and other inactive additives such as tricosan, sodium lauryl, ether sulphate, aqua, sodium chloride, citric acid, cocamide, diethanolamine, colour preservative, propylene glycol and essential oil of plants and fragrances (Center for Disease Control and Prevention, 2016). Hand sanitizers can be prepared in many forms such as gel, foam and liquid solutions. Generally hand sanitizers are grouped into, alcohol-based and non-alcohol-based. Alcohol-based hand sanitizers are those hand sanitizers that have about 60 – 70% alcohol as the active ingredient (Sherwood 2013 & Rogers 2015).The non-alcoholic-based hand sanitizer can be produced using local agricultural materials - garlic, aloe vera and 30% ethyl alcohol for extracting garlic and aloe vera gel. This can be used with other inactive additives such as treated water, carbopol, triethanolamine, glycerine, frangrance, and colouring for producing locally made hand sanitizer aloe–vera, garlic extracts and alcohol can kill micro organisms by denaturing their proteins and dissolving their lipids and so were all effective against bacteria, fungi and viruses.

Garlic is one of the earliest documented plants used by human for the treatment of diseases and

maintenance of health **(**Natural Health Publications 2010). It is a bulbous plant cultivated for its compound. It is used in food preservative; it forms part of the daily diet with raw meat. her Saini (2016) observed that the best garlic varieties is the sulphur-containing compound, Allicin, found in fresh, crushed or chewed garlic has anti-bacterial and anti-fungal properties and some startling claims mention that it may help prevent some forms of cancer.

Aloe Vera plant has been known and used for centuries for its health, beauty, medicinal and skin care properties. Aloe Vera contains over 200 biologically active, naturally-occurring constituents including polysaccharides, vitamins, enzymes, amino acids and minerals that promote nutrient absorption, digestive health, a healthy immune system and a reduction of nitrates (Yeh, Eisenberg, and Philips 2003 and National Institute of Health 2015). Today, the Aloe Vera plant is used for various purposes in dermatology. Ethyl alcohol, garlic and Aloe Vera have high anti microbial properties known to kill or denature germ in our body environment. Some studies have been carried out on hand sanitizers produced from local materials. For instance, Ezeoguine & Mbah (2017) evaluated the effectiveness of hand sanitizers produced from local raw materials in denaturing six test organisms. In a similar study, hand sanitizer was produced from garlic, aloe vera and 30% ethyl alcohol for family use and chemical its analysis was carried out (Ezeoguine & Ezema, 2018). It was discovered, among others, that the latter hand sanitizer possessed antiseptic properties. There remained, however, the need to find out the extent of acceptability of this product in terms of colour, texture, odour and general acceptability necessitated this research also production is not complete until the goods produced reach the final consumer. The hand sanitizer produced will not be valuable if consumers' acceptability of the new product is not ascertained.

The Purpose of the Study

The general purpose of this study was to establish the acceptability of hand sanitizer produced from local agricultural materials using garlic, aloe vera and 30% alcohol. Specifically the study determined:

Acceptability of hand sanitizer in terms of: texture; colour; odour and; general acceptability and two alcohols based Nigerian used hand sanitizers.

Methodology

Design of the Study: This study was based on an experimental study which produced a hand sanitizer called verabeny (Specimen A), made from garlic, aloe vera and 30% ethyl alcohol (Ezeoguine & Ezema 2018). This present study was an organoleptic evaluation that compared the sensory attributes of Verabeny (A) with those of other two commercially purchased alcohol-based nabd-sanitizers (B&C) 60 – 70% alcohol contents.

Area of Study: This study was carried out in Michael Okpara University of

Agriculture (MOUA) Umudike, Abia State.

Population for the Study: The population for this study comprised all 1130 students in the College of Applied Food Science and Tourism, (CAFST) Michael Okpara University of Agriculture, Umudike in Abia State.

Sampling (Panel) for the Study: The college is made up of four departments. Representative samples of 119 students were purposively selected from the college to form the panel for the study. Selection was based on students past experiences with hand sanitizer.

Instruments for Data Collection: A hedonic rating scale was the instrument for data collection. It was designed to assess the sensory attributes – colour, texture, odour, and general acceptability – of specimens A, B & C, each on a 5-point scale. The instrument was validated by two Biochemists and three Home Economics lecturers.

Data Collection Techniques: Panel members were sitted comfortably in one of th laboratories in the Department of Home Economics, MOUA. They were thoroughly briefed by the researchers on thepurpose of the study and the hedonic instrument. They were then requested to apply the specimens (A, B & C) on their hands, one after the other and make their entries as appropriate. They were instructed to wash their hands and dry them thoroughly, then wait for 30 mins before application of the next specimen. A total of 119 copies of the instrument were distributed but only 113 were properly completed and retrieved.

***Methods of Data Analysis*:** The data generated were analyzed with frequency count, percentages, mean and standard deviation. The items were based on a 5 point; the acceptable mean score was 3.00. Thus mean ratings of 3.00 and above was considered as agreed, while items with mean ratings below 3.00 was considered as disagreed. The colour, odour, texture and general acceptability were evaluated using the three score sheet. See appendix: For a sample of the score sheet labeled "A" representing the locally made hand sanitizer.

Findings of the study

Table 1: Mean Ratings of Sensory Perception of the Colour of Three Specimens hand sanitizers A (Verabeny), B & C.

Type	Very Pleasing	Slightly Pleasing	Acceptable	Slightly Acceptable	Off Colour	Mean	ST. DEV.
A (Verabeny)	70(61.9)	16(14.2)	16(14.2)	8(7.1)	3(2.7)	4.23	1.119
"B"	82(72.6)	3(2.7)	20(17.7)	3(2.7)	5(4.4)	4.36	1.138
"C"	25(22.1)	48(42.5)	33(29.2)	7(6.2)	0(0.0)	3.81	0.854

Percentages in parenthesis, Bench Mark Mean = 3.00, Benchmark Percentage = 50%

Table 1 shows that 61.9 percent of the panelists agree that the colour of A (Verabeny) with mean score of 4.23 while 72.6% and 22.1% indicated so for B and C respectively.

Table 2: Mean Ratings of Sensory Perception of Odour of hand sanitizers A, B, & C.

Brands of Hand Sanitizers	Very Pleasing	Slightly Pleasing	Acceptable	Slightly Acceptable	Off Odour	Mean	ST. DEV.
A(Verabeny)	10(8.9)	21(18.6)	12(10.6)	34(30.1)	36(31.9)	2.40	1.325
"B"	55(48.7)	30(26.5)	16(14.2)	11(9.7)	1(0.9)	4.12	1.046
"C"	28(24.8)	32(28.3)	47(41.6)	6(5.3)	0(0.0)	3.73	0.899

Percentages in parenthesis, Bench Mark Mean = 3.00, Benchmark Percentage = 50%

Table 2 shows that only 8.9% of the panelists perceived the odour of A (Verabeny) as very pleasing, while 48.7% and 24.8% indicated so for B and C. A higher percentage of panelists (31.9%) perceived A (Verabeny) as "off odour".

Table 3: Mean Ratings of Sensory Perception of Texture of Hand Sanitizer A, B, & C.

TYPE	Dry	Smooth	Soft	Coarse	Sticking	Mean	ST. DEV.
A(Verabeny)	14(12.4)	57(50.4)	30(26.5)	7(6.2)	5(4.4)	3.59	0.935
"B"	26(23.0)	67(59.3)	17(15.0)	1(0.9)	2(1.8)	4.00	0.759
"C"	30(26.5)	50(44.2)	32(28.3)	1(0.9)	0(0.0)	4.05	0.800

Percentages in parenthesis, *Bench Mark Mean = 3.00, Benchmark Percentage = 50%*

Table 3 shows that A (Verabeny) has the lowest percentage rating for texture (12.4%). Specimens B and C, however have higher ratings of 23.0% and 26.5% respectively. The three specimens A, B, and C have high "smooth" ratings of 50.4%, 59.3% and 44.2% respectively.

Table 4: Mean Ratings of Sensory Perception of General Acceptability of Hand Sanitizers A, B, & C.

Type	Very Good and Pleasing	Good and Acceptable	Acceptable	Slightly Acceptable	Not Acceptable	Mean	ST. DEV.
A (Verabeny)	13(11.5)	28(24.8)	35(31.0)	34(30.1)	3(2.7)	3.09	1.032
"B"	59(52.2)	41(36.3)	10(8.8)	3 (2.7)	0(0.0)	4.38	0.761
"C"	38(33.6)	44(38.9)	30(26.5)	1(0.9)	0(0.0)	4.05	0.800

Percentages in parenthesis, Bench Mark Mean = 3.00, Benchmark Percentage = 50%

Table 4 shows that A (Verabeny) obtained the lowest rating for "very good and pleasing" (11.5%), while B and C obtained 52.2% and 33.6% respectively. Only 2.7% indicated that A (Verabeny was "Not acceptable".

Discussion of finding

The study shows the acceptability level of the hand sanitizer produced from local raw materials in terms of colour, texture, odour and general acceptability and the two alcohol based hand sanitizer represented by

"B" and "C"., Table 1a above shows the sensory perception of colour by respondents about the locally produced hand Sanitizer and the alcohol-based.It shows that 61.9% of the students agreed that the colour of Verabeny is very pleasing; Dettol has 72.6% while So.-safe has 22.1%. Those that signified very pleasing, slightly pleasing and acceptable on the colours are above the 50.0% benchmark for acceptance. The mean ratings of each of the types are also above the 3.00 benchmark for the acceptance of a statement. This is a confirmation of the result found from the frequency and percentages analyses. Table1b above shows the sensory perception of odour by respondents about locally produced hand sanitizer and the alcohol-based. Majority of the respondents disagreed that the odour of the hand sanitizers produced from local materials is pleasing. That is, those that signified very pleasing, slightly pleasing and acceptable on the odour of the locally produced (Verabeny) hand sanitizer is below the 50.0% benchmark for acceptance. This shows the addition of those that are in support of the colour of Verabeny product are 38.1% This is further established by the mean ratings of the opinion of the respondents which is only 2.40 which is below the 3.00 bench mark.. On the other hand, those that signified very pleasing, slightly pleasing and acceptable on the odour of the two brands of alcohol-based hand sanitizers used are above the 50.0% benchmark for acceptance.The addition of the respondents that signified very pleasing and acceptable for Dettol is 89.4% while it is 53.1% for So-Safe. This is buttressed by the mean ratings of each of the alcohol-based hand sanitizers which are 4.12 and 3.73 for Dettol and So-safe respectively which are above the 3.00 benchmark for the acceptance of the respondent's statement. Conclusively, the odour of the alcohol-based hand sanitizer is pleasing while that of the locally produced is not. Table 1c above shows the respondent's sensory perception of the texture of tested locally produced and alcohol based hand sanitizers. It shows that locally produced hand sanitizer which is Verabeny, a mean of 3.59 which is above the mean benchmark of 3.00. This is evidenced by the fact that 50.4% of the respondents observed that it has smooth texture while the respondents rank it 26.5% in terms of its softness. On the other hand, Dettol was ranked best in terms of smoothness while So-safe the least. Also in terms of softness So-safe was ranked highest followed by Verabeny and Dettol with 28.3%, 26.5% and 15.0% respectively. The table also shows that the degree of coarseness was relatively high for Verabeny as indicated by the respondents while it was negligible for Dettol and So-safe. Table 1d above shows the general acceptability of locally produced hand sanitizer and the alcohol-based. Majority of the students generally accepted that both the locally produced and alcohol-based are very good and pleasing, good and acceptable and acceptable.Those that signified very good and pleasing, good and acceptable and acceptable are above

the 50.0% benchmark for acceptance for the three brands. The mean ratings of each of the three brands of hand sanitizers are also above the 3.00 benchmark for the acceptance of the opinion statement presented to them.The evidence of this is a mean acceptance of 4.38, 4.05 and 3.09 for Dettol, So-safe and Verabeny respectively. This also shows that the order of acceptance is in favour of Dettol, So-safe and Verabeny the least.

Conclusion

From the findings of the study, hand sanitizer was produced from local raw materials using garlic, aloe vera and 30% ethyl alcohol for extracting garlic juice and aloe vera gel. The hand sanitizer produced was evaluated in terms of colour, texture, odour and general acceptability and was compared with the two alcohol based Nigerian used hand sanitizer, the findings revealed that Verabenny hand was acceptable in terms of colour, texture and the general acceptability while the odour of Verabenny was not acceptable by the majority of the respondents. The poor acceptance of the odour of Verabenny hand sanitizer could be attributed to the offensive odour of garlic, and this may be enhanced by the addition of more fragrance in the production process.

Recommendations

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

- The findings of this study should be made available to individuals, families, future learners, researchers, consumers in all works of life through organizing seminars and workshop at the local and state government levels to educate the public on the importance of producing and using hand sanitizer made from local raw materials.
- The manufacturers of hand sanitizer should continually engage in more research to update themselves on other ways of improving their products.
- The government should encourage the unemployed graduates by providing soft loans to enable them to engage in small scale production of hand sanitizer using our local raw materials instead of relying heavily on the importation of foreign products.

References

Adedokun, J.A (2013). *Advance Research and Statistics.* Lagos: New Hope Educational Publishers.

Adigbo, E.C. and Maddah, C.K. (2011). A complete course in food and nutrition: Ghana: Kwadwoan publishing

Bazerrman, M.H (2001). Consumer Research for Development of a Guide for Visual Assessment of the Quality of Clothing Textile Productions. ISSN: 378 -5254. Tyaskit Vir Gesineklgie en Verbrukkwneter sknappe, vol. 31, 2503 summers, Journal of Consumer Research 27 (4).499 -504. Retrieved from www –document URL: http://web2..infotrach. London. Galegr.

Burgess, A.B. (2014). What is development. Retrieved from: *www. hubcym.org image user/Hub/ what is development, on 26/2/2017.*

Center for Disease Control and Prevention (2016). Hand Sanitizer. Retrieved from: *https://www.cdc/gov/hand washing/show-me- the science –hand-sanitizer html, on 21/2/2015.*

Chriswaterguy, C.W.B. & Joshua M. P. (2012). Ethanol-based. Retrieved from: *http://www.appropedia.org/Ethanol-basedd_hand_sanitizer hand sanitizer on 12/5/2017.*

Ezeoguine, J.A (2015). Developing students' skill in the production of homemade cosmetics and household disinfectant for sustainable economic development in Nigeria. Nigeria *Journal of Home Economics(Nig JHEC) 5(1):63 -71*

Ezeoguine, J.A (2018). Production of hand sanitizer using garlic (allium stativum), aloe -vera (aloe Barbadensis milier) and ethyl alcohol for family use. Unpublished Ph.D dissertation – Umudike: College of Applied Food Science and Tourism Michael Okpara University of Agriculture Umudike.

Food, Drug and Administration (2014). What is Aloe vera? .Retrieved from www.medical.news today com / articles on 14/5/2015.

Gall, M.D, Gall, J.P, Borg, W.R (2007). *Education Research an Introduction*. Boston: Pearson Educational Inc

Jordan, A. (2015). Juicing with garlic -7 uses of garlic juice and ways to make: Retrieved from: *blogs.natural news.com/juicing –garlic -7- uses of garlic –juice –ways- make* on 14/5/2015.

National Health Publication (2010). Garlic history. Retrieved from: *www allcifacta. Com/garlic/ history, on 20/2/2017.*

National Institute of Health (2015). Aloe Vera: A short review. . Retrieved from: *www. Wikihow. Com. Make – Gel – Alcohol Hand sanitizer, on 23/2/2017.*

Saini S, (2016) 7 surprising Health benefits of garlic. Retrieved from:*food. ndv.com/food/ drinks/ power house- of-medicine- and- flavour – suprising health – benefits -of –*

Sherwood, C. (2013). How alcohol kills bacteria .Retrieved from. *www. livestrong.com /article/ 88193 – hand sanitizer- kill bacteria on 18/12/16.*

Singh, V.B & Singh, K (2008). *Spices.* New Delhi: New Age International Publishers Limited

Ukwe, U.C (2008. Improving environmental education through rural development and home economics education. Journal of Home Economics Research Vol. (9) 43 -52

William, K.H & Thomas, S.M (2014) Research and Development. Retrieved from https://www.britannica.com/topic/research-and-development

World Health Organization (2009). Hand Hygiene: why, how & when. Retrieved from: who. Int. gpsc/5may/ hand – hygiene –why –how – and – when brochure pdf15/ 11/2015

Yeh G.Y; Eisenberg D.M; Kaptchuk T.J, & Phillips R.S. (2003) Systematic review of herbs and dietary supplements for glycemic control in diabetes. *Diabetes Care; 26:1277–94.*

SCORE SHEET FOR SPECIMEN A

Colour		
Very pleasing		5
Slightly pleasing		4
Acceptable	3	
Slightly acceptable		2
Off colour	1	

Texture:		
Dry		5
Smooth	4	
Soft	3	
Coarse		2
Sticking	1	

Odour:	
Very pleasing	5
Slightly pleasing	4
Acceptable	3
Slightly acceptable	2
Not acceptable	1

General Acceptability:	
Very good and pleasing	5
Good and acceptable	4
Acceptable	3
Slightly acceptable	2
Not acceptable	