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Dermatological Evaluation and Efficacy of Rice Water and Essential Oil-Based Skincare Products Among Household Users

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Abstract
The study explored the dermatological evaluation and efficacy of rice water and essential oil-based skincare products among household users in Omoku, which is the headquarters of the Ogba/Ndoni/Egbema Local Government Area of Rivers State. The study was guided by three research questions and one null hypothesis. The specific objectives were dermatological test and effectiveness of skin cream, face cleanser and semi solid soap on treatment of skin diseases like eczema, ringworm and rashes; acceptability level of the produced skincare products of skin cream, face cleanser, and semi solid soap from rice water, coconut oil and other essential oils; and sustainability level of the produced skin products. The study adopted quasi- quasi-experimental research design. The population comprised 11,625 household members in Omoku. The sample size is 390 household members, 78 recruited participants and 10 volunteers for the dermatological test. Mean score was used for the research questions, and the null hypothesis was tested by a t-test at a 0.05 level of significance. Results indicated that the respondents agreed to all the research question items with a cluster mean of 3.63 for an acceptable level and 4.02 for a sustainable level; and the null hypothesis was accepted because the critical value of 1.645 at $p>0.05$ was greater than the t-calculated of -0.234. The study made some recommendations, which include that household members should be trained through workshops to produce household cosmetics to bring in other streams of income, students in secondary and tertiary institutions should be financially and skill-wise empowered to embark on cosmetic production without undue stress, among others.

Keywords: Skin, Products, Effectiveness, Essential Oils, Rice Water

Introduction

Skin is the primary barrier against infections, which plays a vital role in the immunity of an individual. It harbours a microbial habitat that is person-specific and varies considerably across the body surface. Accordingly, Joshi et al. (2019) noted that any disruption in the skin may enable the attack of microorganisms, thereby making it easier for infections. According to Fasola et al. (2020), black soap is mostly used because of its antifungal and physicochemical properties in African communities. Also, Jon and Alina (2021) noted that skin diseases present a major health concern worldwide, and are caused by both intrinsic and extrinsic factors, with no distinctions of either age or ethnicity. Common skin diseases include acne, moles, eczema, psoriasis, fungal infections, and more. To this effect, Henshaw et al. (2018) opined that skin diseases are abundant and diverse, accounting for about one-third of outpatient medical consultations in a Nigeria health facility. Although most dermatological conditions do not result in death, they lead to misery and incapacitation. It has an impact on patients' social, physical and emotional well-being as well as their friends, partners and families (Hay et al., 2014). The impact of skin disease is often overlooked by homemakers, physicians and health policy makers until it becomes overwhelming and widespread. However, most skin diseases can be managed in the home by the utilisation of effective skin care products, and at peripheral health units, cost-effectively and sustainability, leading to significant health gains for both individual patients and public health.

The Sustainable Development Goals (SDGS) set by the United Nations in 2015 (United Nations, 2023) for the well-being of individuals and families aimed that by 2030 there will be environmental sustainability for the protection of the planet through ending poverty, ensuring peace and prosperity. Most important to this discourse is good health and well-being of people, and clean water and sanitation. Therefore, the production of skin care

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products is sustainable in hygiene and access to affordable natural products as well as promoting innovation (United Nations, 2023).

Skincare products play a pivotal role in the treatment of various skin conditions. According to Surber and Kottner (2017) skin care products are categorized into three primary groups namely skin cleansing products, aiding in the removal of dirt and sebum from the skin, such as facial cleansing cream/gel/foam; products designed to soothe and restore the skin including moisturizers, as well as those that strengthen and balance the skin's pH or inhibit microbial growth; and skin protection products acting as barrier against external factors harmful to the skin, such as sunscreens. Additionally, Glaser and Mattox (2013) and Liu (2022) noted that skin care products are integral to maintaining skin health, and among them are creams, soaps and moisturisers. The produced skin care products need thorough evaluation, hence, dermatological examination was conducted to ascertain the effectiveness of the products. Though there are several common tests and procedures such as visual inspection, dermoscopy, wood's lamp examination, skin scraping or biopsy, potassium hydroxide (KOH), patch-testing and palpation (Burkemper, 2015; Lazzarini et al., 2013). However, the homemade products are dermatologically examined by patch testing

According to Rodriguez-Yoldi (2021), nowadays, there is growing interest in the search for novel, effective, safe dermatological preparations containing active ingredients with multiple effects. Hence, the need for essential oils from coconut and essences of lemon, grapes and oranges, as well as shea butter and aloe vera. Plant extracts can exhibit multiple effects such as antibacterial, antioxidant, anti-inflammatory, and anti-ageing activities, due to the abundance of secondary metabolites. Therefore, plant extracts are interesting sources of biologically active compounds that may be used as components of cosmetic and dermatological preparations. Acceptability level of the produced skin cream, face cleanser and semi-solid soap is determined by sensory evaluation. Sensory evaluation is a scientific discipline that applies principles of experimental and statistical analysis and measures human responses to products through senses such as touch, appearance, colour, odour, feel, texture, temperature and others. Sensory analysis or evaluation applies principles of experimental design and statistical analysis to the use of human senses (sight, touch, smell and texture) to evaluate consumer products (Asouzu, 2013; Eze & Njoku, 2018).

Sustainability level of the produced skin cream, face cleanser and semi-solid soap is based on the quality, efficacy, safety and overall performance of the products. Therefore, Lee and Kwon (2022) opined that in the dynamic landscape of skincare products, factors such as formulation stability, ingredient interaction, and packaging integrity play pivotal roles in determining product quality. Accordingly, Ahuja and Singh (2019) noted that incorporating antioxidants such as vitamin E in formulations can enhance stability, particularly under conditions that accelerate oxidative processes. Household members are effective users of skincare products, and they know the implications of dermatological challenges. There is, therefore need to examine the efficacy of skin care products, of skin cream, face cleanser and semi-solid soap in soothing dermatological problems in the home.

Statement of Problem

Skin is an outer protective organ that is prone to infections and diseases, thereby needing a lot of daily care from everybody. In Nigeria, the use of skincare products like cream, lotion, soaps and so on, for treatment and hygiene improvement is widespread. The treatment of the skin with several herbal cosmetics and microbial agents for skin relief is age-long by household members in our various communities. Also, one of the goals of the SDGS is innovation and industry; as such, household production of cosmetics with natural raw materials promotes innovation and sustained economic activity for family living. To examine the efficacy of the products for skin care, there is a need to ascertain the dermatological profile and acceptance by household users in Omoku becomes the focus of the study.

Objectives

The general objective of this study was the dermatological evaluation and efficacy of rice water and essential oil-based skincare products among household users. The specific objectives were ascertained as the:

1. Dermatological test and effectiveness of the skin cream, face cleanser, and semi-solid soap in the treatment of skin diseases like eczema, ringworm and rashes.
2. Acceptability level of the produced skin cream, face cleanser and semi-solid soap produced from rice water, essential oils from coconut, lemons, grapes and oranges.
3. Sustainability level of the produced skin cream, face cleanser and semi-solid soap produced from rice waters and essential oils from coconut, lemons, grape and oranges.

Research Questions

The study was guided by the following research questions.

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1. What is the result of the dermatological test on the produced skin cream, face cleanser and semi-solid soap?
2. What is the acceptability level of the produced skin cream, face cleanser and semi-solid soap?
3. What is the sustainability level of the produced skin cream, face cleanser and semi-solid soap?

Hypothesis: There is no significant difference between male and female household members on the sustainability level of the produced skin cream, face cleanser and semi-solid soap.

Methodology

The research design adopted for the study is quasi quasi-experimental design. Four research questions and one hypothesis were formulated to guide the study. The area of the study is Omoku Town, in the Ogba/Egbema/Ndoni Local Government Area of Rivers State. The population of the study is 200,000 (World Meters, 2024), and a sample size of 390 households was selected using a multistage Sampling Technique. The instrument for data collection was structured questionnaire, which was designed by the researchers and validated by three experts in Home Economics who are professors in the course of study. The instrument has the acceptability parameters of VA = Very acceptable, MA = Moderately Acceptable, A = Acceptable, U = Undecided. The reliability of the instrument was determined using test-retest and a coefficient of reliability obtained using Pearson's Product Moment Correlation Coefficient, obtaining a value of 0.83 and 0.88 for the two instruments, making them reliable. The Data was collected from respondents with the help of two research assistants, using the questionnaire. The data obtained was analysed using descriptive statistics to obtain the results for the research questions, while Analysis of Variance (ANOVA) was used to obtain the results for the hypothesis at a 0.05 level of significance.

Results

The study of examination of the dermatological test and effectiveness of skin cream, face cleanser and semi-solid soap produced from rice water and essential oils was conducted under three research questions.

Research question 1: What is the result of the dermatological test on the produced skin cream, face cleanser and semi-solid soap?

Table 1a: Mean Responses of Recruited Participants on Effectiveness of the Products on Skin Diseases

Products	VE	ME	E	PE	NE	Mean	Remark
Skin cream	25 (125)	20 (80)	18 (54)	12 (24)	3 (3)	3.67	ME
Face cleanser	33 (165)	22 (88)	11 (33)	11 (22)	1 (1)	3.96	ME
Semi-solid soap	23 (115)	22 (88)	16 (48)	15 (30)	2 (2)	3.63	ME
Cluster Mean						3.75	ME

Source: Field Study 2024; N = 78; VE = very effective; ME = moderately effective; E = effective; PE poorly effective; NE not effective; frequency outside parenthesis; rated figure inside parenthesis.

Table 1a shows the responses of the recruited participants who had one skin problem or the other and used the skin care products of the skin cream, face cleanser, and semi-solid soap on the effectiveness of the products, which had mean scores of 3.67, 3.96 and 3.63, respectively with a cluster mean of 3.75. The scores are above the decision mean of 3.00. If the scores are rounded off to a single digit, it would be 4; therefore, the products are considered Moderately Effective.

Table 1b: Result of Dermatological Test on the Skincare Products

Products	Well tolerated f(%)	Not tolerated f(%)	Allergic reaction f(%)	No allergic reaction f(%)
Skin cream	8(80)	2(20)	1(10)	9(90)
Face cleanser	10(100)	-	1(10)	9(90)
Semi solid soap	7(70)	3(30)	2(20)	8(80)

N=10 Volunteers; Source: Rivers State University Teaching Hospital, Port Harcourt (2024); frequency outside parentheses; percentage inside parentheses.

Data in Table 1b shows the dermatological test results conducted on ten volunteers under the watchful eyes of a dermatologist. The researcher was told that patch testing was applied to the volunteers. The skin cream had a percent response of 80% for well tolerated, not tolerated, 20%, allergic reaction, had 10% while 90% for no allergic reaction. The face cleanser had 100% well tolerated, 10% allergic reaction, and 90% no allergic reaction,

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while semi-solid soap had 70% well tolerated and 80% no allergic reaction. Dermatologically, the products are suitable for use.

Research question 2: What is the acceptability level of the produced skin cream, face cleanser and semi-solid soap?

Table 2: Mean and Standard Deviation of all the Respondents on Acceptable Level of the Produced Skin Cream, Face Cleanser and Semi Solid Soap

Products	VA	MA	A	NA	U	Mean	SD	Remark
Skin cream	155 (775)	81 (324)	49 (147)	50 (100)	55 (55)	3.59	4.55	A
Face cleanser	149 (745)	86 (344)	59 (177)	46 (92)	49 (49)	3.61	4.34	A
Semi- solid soap	160 (800)	72 (288)	80 (240)	40 (80)	37 (37)	3.71	5.03	A
Cluster Mean						3.63	4.64	A

Key: N=390: VA=Very Acceptable; MA= Moderately Acceptable; A= Acceptable; NA= Not Acceptable; U= Undecided; Criterion mean = 3.00; Remark of A=Acceptance: Frequency before the parenthesis; Rated value in parenthesis.

Table 2 shows the mean responses of all the respondents on the products to answer the research question on acceptable level of the products namely skin cream, face cleanser and semi-solid soap. The mean responses on skin cream 3.59, face cleanser 3.61 and semi-solid soap 3.17 are above the decision mean of 3.00. The standard deviation measures ranged from 4.34 to 5.03 which imply wider dispersion of the mean scores.

Research question 3: What is the sustainability level of the produced skin cream, face cleanser and semi solid soap?

Table 3: Mean and Standard Deviation on Sustainability Level of Produced Skin Care Products by Men and Women

S/N	Items	Men (N=140)		Women(N=250)		Grand Mean	Decision
		Mean	SD	Mean	SD		
1.	Improving family income by selling the product.	3.12	2.84	3.12	2.07	3.12	Agree
2.	Educating householders on the use of these raw materials.	4.19	4.64	4.58	9.99	4.39	Agree
3.	Introducing it as a skill in secondary and tertiary schools for adolescents to learn.	4.44	6.10	4.68	10.75	4.56	Agree
	Cluster mean	3.92	4.53	4.13	7.60	4.02	Agree

Source: Field study

Table 3 above shows the variables on sustainability level of the produced skin cream, face cleanser and semi solid soap. The grand mean of men respondents had mean scores of 3.12, 4.19 and 4.44 respectively for items 1, 2 and 3 while the women had mean scores of 3.12, 4.58 and 4.68 for items 1, 2, and 3 respectively. The variables were all in agreement responses.

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Ho: There is no significant difference between men and women household members on sustainability level of the produced skin cream, face cleanser and semi solid soap.

Table 4: t-test Analysis of Differences on Sustainability Level of the Produced Skin Cream, Face Cleanser and Semi Solid Soap

Respondents	N	Mean	SD	df	t-cal	t-tab	Remark
Men	140	3.92	4.53	388	-0.234	1.645	NS
Women	250	4.13	7.60				

NS: Not Significant

Table 4 shows that the t-test analysis of men and women on sustainability level of the produced skin cream, face cleanser and semi-solid soap made form rice water and oils from coconut, orange and lemon. The t-calculated value of -0.234 is less than t-critical value of 1.645. This implies that there is no significant difference in the mean responses of men and women on sustainability level of the produced skin cream, face cleanser and semi solid soap.

Discussion

The findings (Table 1) revealed that all the products of skin cream, face cleanser and semi-solid soap were moderately effective which is presented in Table 1a. Further, the dermatological test revealed that the products of skin cream, face cleanser and semi-solid soap had a high percent for well-tolerated and no allergic reaction while not tolerated and allergic reaction had very low percentage score. This is shown in Table 1b, which is dermatologist report of the products. According to Surber and Kettner (2017) skin care products are used for skin cleansing by removal of dirt and Sebum; soothing and restoration of skin moisture; and strengthening and balancing skin pH as well as inhibiting microbial growth.

The acceptability of the skin care products (Table 2) of skin cream, face cleanser and semi solid soap revealed that all the products are acceptable based on the benchmark of 3.00. However, semi solid soap had the highest acceptable level. This is in line with Rodriguez-Yoldi (2021) assertion that there is growing interest in novel, effective and safe dermatological preparations containing active ingredients such as essential oils, aloe vera, grape seed extract and glove.

The study also revealed (Table 3) the sustainability of the skin care products in areas of improving family income by selling the products, educating householders in the uses of the raw materials, and introducing it as a skill course component for adolescents. This is in line with United Nations (2023) assertions that skincare products ensure good health and wellbeing of people which are vital goals in the sustainable development report, access to affordable natural products as well as promoting poverty alleviation

Conclusion

The skincare products of skin cream, face cleanser and semi-solid soap produced from rice water and essential oils had favourable scores in the dermatological test and effectiveness of the products. To ensure sustainability, the products should be made available in the market for the utilisation of household members. There is a need to train adolescents on cosmetic making skills to enable them to generate income innovatively. Also, more creative and health-enriching formulations should be considered for households that need to meet the sustainable development goals of no poverty, zero hunger, good health and wellbeing, sanitation/hygiene and promote innovation.

Recommendations

From the findings of this study, the following recommendations were made.

1. The use of natural plant products for formulation of cosmetic products should be encouraged.
2. Household members should be trained through workshop to produce household cosmetics to bring in other streams of income earning.
3. Students in secondary and tertiary institutions should be financially and skill-wise empowered to embark on cosmetic production without undue stress.
4. Natural fragrance with mild scent should be encourage in the production of skin care products.

References

Ahuja, K., & Singh, S. (2019). Essential oils market size by application (orange oil, lemon oil, eucalyptus oil, clove oil, peppermint oil, jasmine oil, rosemary oil, corn mint oil, citronella oil, geranium, spearmint oil, lavender oil, tea tree oil, and others) by application (food & beverage, aromatherapy, cosmetic & toiletries,

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pharmaceuticals, cleaning and homecare, animal feed, fragrances and others). *Industry Analysis Report, Regional Outlook, Growth Potential, Competitive Market Share & Forecast, 2019 – 2026* Global Market Insights Inc. https://www.gminsights.com/industry-analysis/essential-oil-market.

Asouzu, A. I. (2013). Development of recipes from local dietary fibre rich foodstuffs for women with obesity challenges in Enugu State, Nigeria. Being a Ph.D Thesis submitted to the Department of Vocational Teacher Education (Home Economics Education), University of Nigeria, Nsukka.

Burkemper, N. M. (2015). Contact dermatitis, patch testing, and allergen avoidance. *Missouri Medicine*, 112(4), 296-300.

Eze, N. M., & Njoku, A. A. (2018). *Food and Nutrition Today: Understanding Nutrition for Students in Tertiary Institutions* Grand Heritage Global Communication.

Fasola, T. R., Aponmade, A. E. &Aponjolosun, B. S. (2020). African black liquid soap: Antifungal and physicochemical properties. Agriculture Environnement et Sciences de L'ingenieur, 18(2), 98-114.

Glaser, D. A., & Mattox, A. R. (2013). *Cosmeceuticals and Cosmetic Practice*, Wiley.

Hay, R. J., John, N. E., & Williams, H. C. (2014). The global burden of skin disease in 2010: An analysis of the prevalence and impact of skin conditions. *Journal of Investigative Dermatology*, 134(6), 1527-1534.

Henshaw, E., Ibekwe, P., Adeyemi, A., Amed, S., Ogedegbe, E., Archibong, J., & Olasode, O. S. (2018). Dermatologic practice review of common skin diseases in Nigeria. *International Journal of Health Sciences Research*, 8(1), 235-248.

Jon, J. & Alina, S. (2021). Common skin diseases and conditions. *Medical News Today*, https://www.medicalnewstoday.com.

Joshi, P., Joshi, S., Rajani, U., Sewal, R. B., & Semwal, D. K. (2019). Formulation and evaluation of polyherbal cream and lotion to treat psoriasis-induced secondary infections. *Current Clinical Pharmacology* https://14.doi:10.2174/1574884714666191017111218.

Lazzarini, R., Duarte, I., & Ferreira, A. L. (2013). Patch tests. *Anais Brasileiros de Dermatologia*, 88(6), 879-888. https://doi.org/10.1590/abd1806-4841.20132323.

Lee, J., & Kwon, K. H. (2022). Sustainable changes in beauty market trends focused on the perspective of safety in the post-coronavirus disease-19 period. *Journal of Cosmetic Dermatology*, 21(7), 2700-2707 https://doi.org/10-1111/jocd.14493.

Liu, J. K. (2022). National products in cosmetics. *Natural Product Bioprospecting* 12(1), 40 https://doi.org/10.1007/s13659-022-00363-y.

Rodriguez-Yoldi, M. J. (2021). Anti-inflammatory and antioxidant properties of plant extracts. *Antioxidants (Basel)* 10(6), 921. https://doi.org/10.3390/antiox10060921.

Surber, C. & Kottner, J. (2017). Skin care products: what do they promise? what do they deliver? *Journal of Tissue Viability*, 26(1), 29-36.

United Nations (2023). Global sustainable report. Department of Economic and Social Affairs https://sdgs.un.org>goals.

World Meters (2024). Population of Omoku, Nigeria (NG) 2024. *World Meters*, https://www.world-meters.com/population>nigeria.