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Antibacterial Activity of Unbranded Antiseptic Soap Used In Hand Washing during the Covid-19

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***Abstract*—**Hand washes, if properly done with antiseptic soaps that contain the right ingredients, limit the spread of diseases. Hand wash was recommended as one of the important ways through which the spread of the Corona virus Disease (COVID-19) could be prevented. This research evaluated the Antibacterial activity of unbranded antiseptic soaps used in hand washing during the COVID-19 pandemic in some of the most affected areas of Kano state, Nigeria. Four different samples of unbranded antiseptic soap were used in this analysis and the samples were labeled as A, B, C, D, and Septol was used as a control. Palms and finger tips of students were swabbed before and after washing hands with the unbranded antiseptic soap samples. Four bacterial genera were isolated. These include *Escherichia coli*, *Staphylococcus aureus*, *Pseudomonas aeruginosa*, and *Staphylococcus epidermidis*. The bacterial load formed after incubation period was used to estimate the percentage reduction in bacterial load. All the samples showed some levels of inhibition against bacterial load. However, the highest efficacy was recorded in sample C (97%), followed by samples D (70%). Sample A had 42% while the lowest percentage was recorded in sample B (35%). It could, therefore, be concluded that some of the unbranded antiseptic soap produced in the study areas were effective in hand washing.

***Keywords*—**Handwash, antibacterial effect, Covid-19, Pandemic, Unbranded, Antiseptic Soap

I. INTRODUCTION

Soap can be plain soap or antiseptic soap, (also known as medicated soap). Antimicrobial soap is a soap containing certain substances added to the soap base which kills or inhibits the growth of pathogenic microorganisms [1]. Antibacterial soaps can either be bactericidal or bacteriostatic. Unbranded antiseptic soaps are those produced locally using certain chemicals or plants which have been used to treat skin infections. Good antiseptic soap should be gentle on the skin, be able to form lather and eliminate or kill pathogenic microorganisms [2]. The antiseptic soap should have good ingredients which can kill pathogens without damaging the body tissues. Plain soap destroys the envelope of enveloped viruses such as the COVID-19 due its ability to dissolve the surface membrane thereby killing the virus [3].

Hand's hygiene is the process of eliminating microorganisms or any other harmful substances from one's hand using soap and water. It also refers to killing or inhibiting the growth of pathogenic microorganisms that contaminate hands through sanitizing or hand washing [4]. Removal of microbial flora by washing hands with antimicrobial soaps and water or by rubbing hands with alcohol-based sanitizer is called hand's hygiene. It is an important way used in preventing spread of disease by limiting transmission and improving personal hygiene. It is recognized in clinical and non-clinical environments as a crucial method in preventing the transmission of disease-causing microorganisms [5]. Hand wash is recommended especially after contact with outside environment. Drying of hands using a towel/tissue paper after washing is also important as moist hands are more easily re-contaminated than dry hands [6].

Pathogenic microorganisms from contaminated hands can be transferred to inanimate objects like remotes, door handles, surfaces, children's toys, and to another person's hand. Removing these pathogens through handwashing helps prevent several diseases such as; cholera as well as skin and eye infections [7]. Human's Hands play role in spreading coronavirus disease (COVID-19) which is transmitted through droplets and by direct with infected person or contaminated objects. Several research reports during the COVID-19 pandemic revealed that hand hygiene is one of the most effective means used to reduce the spread of pathogens including the COVID-19 virus and prevent infections [8]. Conducting hand hygiene at the right time, using the right technique, with ABHR or soap, water, and disposable/clean towels is critical.

In addition, handwashing removes germs through mechanical action [9].This research was aimed at assessing the antibacterial activities of unbranded antiseptic soaps used in handwashing during the COVID-19 pandemic in some of the most affected areas in Kano State, Nigeria.

II. RELATED WORK

Imarenezor *et al.,* [10] published a report on the effect of antiseptic soaps on a bacterium isolated from wound. According to [11] some opportunistic bacteria such as *Staphylococcus aureus* infect persons with weak immunity causing high morbidity and other health-related complications. Chaudhari [1] reported that "medicated soap has germicidal substances in addition to ordinary soap base to increase their antibacterial activity".

Obi, [12] researched on the efficacy of some antiseptic soaps on microbes that infect humans. People have been using soaps for a long time. Washing hands with soap and water improves personal hygiene. Bacteria are ubiquitous found on plants, surfaces, body, etc. [13]. "Handwashing is the act of cleaning the hands with water or another liquid, with or without the use of the soap or other detergents, to ensure proper hand hygiene". To assess the efficacy of different hand washes, Oranusi *et al*; [14] conducted research on some bacteria using different dilutions.

III. METHODOLOGY

Samples Collection
Swab sticks were purchased from pharmaceutical shops while four unbranded antiseptic soaps were obtained from local markets in the study area and labeled as A, B, C, D and Septol which serves as. All samples were analyzed in Microbiology Laboratory of Federal College of Agricultural Produce Technology, Kano, Nigeria for analysis.

Study Area
This study was conducted in Tarauni and Gwale local government areas of Kano State, Nigeria.

Hand Swabs
Palms and fingertips of National Diploma II students of Science Laboratory Technology were swabbed aseptically before the students washed their hands with unbranded antiseptic soap samples and after they washed their hands with unbranded antiseptic soaps samples.

Microbiological Analysis
Media Preparation
All the media used in this research were prepared by following the instructions stated on the containers. The media were heated gently on a heating mantle and autoclaved at 121^{o}C for 15 minutes. Stains used in Gram staining and other reagents were also prepared using the standard microbiological procedure as described by Cheesbrough [15].

Bacterial Load
The swabs were inoculated in a freshly prepared nutrients agar and labeled accordingly. The inoculated Petri dishes were incubated at 37^{o}C for 24 hours. Digital colony counter was used to count the numbers of colonies formed after the incubation period. Percentage reduction in bacterial load was calculated using the number of colonies formed before washing hands with soap samples and those formed after hand wash.

Identification of Bacterial Isolates
The different colonies formed were further inoculated on freshly prepared agar using the streak method to obtain a pure culture. Gram staining technique and some biochemical tests were used to identify bacterial isolates.

IV. RESULTS AND DISCUSSION

40 swabs (20 before and 20 after handwash) were collected from 20 students after proper orientation on how to wash hands. After hand washing with unbranded antiseptic soaps, sample C was the most effective against the total bacterial load with a percentage reduction of 97%, followed by D (70%). Both samples A and B showed less than 50% percent reduction with 42% and 35% respectively (Figure 1). The mean number of colonies formed before and after hand wash was used to estimate the mean percentage reduction in bacterial load as shown in Table 1.

Morphological and biochemical characteristics of the bacterial isolates indicate that *Staphylococcus aureus* and *Staphylococcus epidermidis* (Gram-positive) and *Escherichia coli* and *Pseudomonas aeruginosa* (Gram-negative) were isolated (Table 2).

Table 1: Mean Percentage reduction of bacterial load after handwash

Samples	Bacterial count before handwash	Bacterial count after handwash	Percentage Reduction (%)
A	24	13	42
B	94	61	35
C	76	2	97
D	30	9	70
Control	154	11	93

Table 2: Morphological and biochemical characteristics of bacterial isolates

S/NO	Shape	GR	Cat	Citrate	Co	Gas	H_2S	MR	Ox	VP	Urease	NR	Indole	Isolates
1	Rod	-	+	-	-	+	-	+	-	-	-	+	+	*Escherichia coli*
2	Cocci	+	+	-	-	+	+	-	-	+	+	+	-	*Staphylococcus epidermidis*
3	Cocci	+	+	+	+	-	+	+	-	+	+	+	-	*Staphylococcus aureus*
4	Rod	-	+	+	-	+	-	-	+	-	-	+	-	*Pseudomonas aeruginosa*

Keys: GR = Gram Reaction, Cat = Catalase Test, Co = Coagulase Test, MR = Methyl Red Test, Ox = Oxidase Test, VP = Voges-ProsKauer Test, NR = Nitrate Reduction, + = Positive, - = Negative.

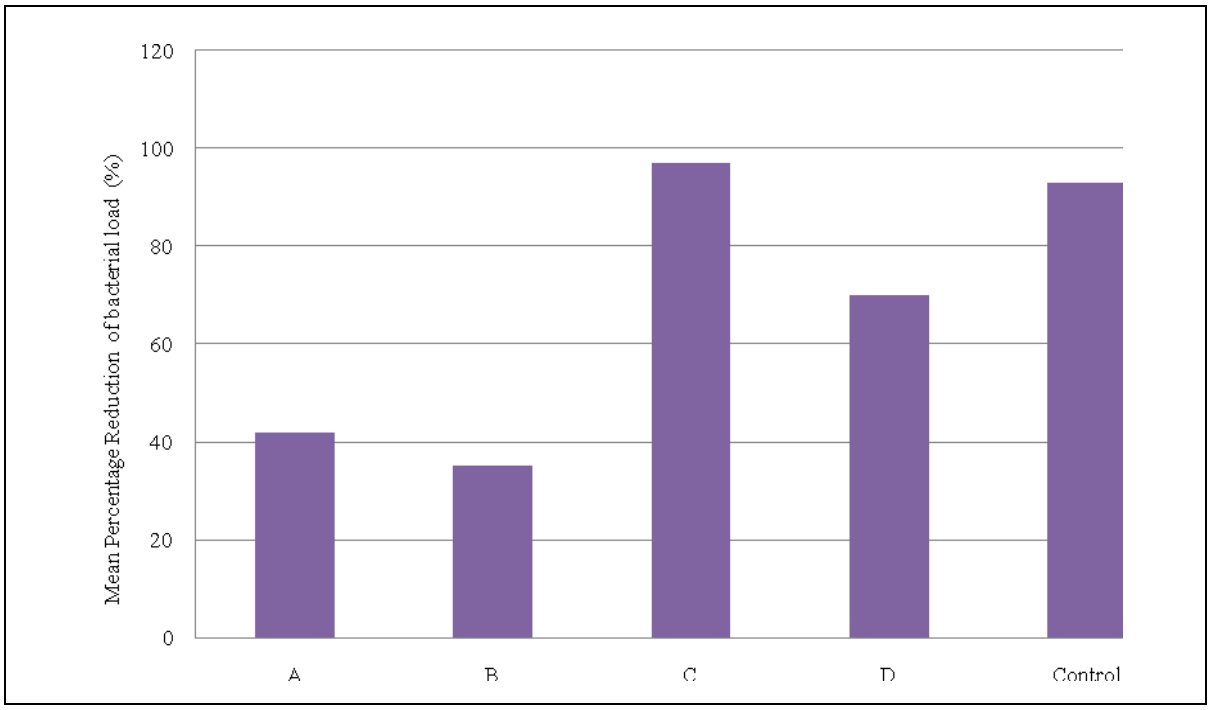

Figure 1: Percentage reduction against soap samples

Discussion

In most developing countries like Nigeria, the Coronavirus Pandemic (COVID-19) was fuelled by poor access to basic health care facilities, inadequate health personnel, and personal hygiene. The best way in dealing with any disease is to point out the sensitive point to destroy the weakest link in the chain [16]. Hand's hygiene is the best way to reduce the risk of spreading pathogens [17]. The results of this study revealed that all the unbranded antiseptic soaps decreased bacterial load from the hands of the students to a certain level. Samples C (97%) and D (70%) showed the highest percentage reduction which are within the acceptable ranges as reported by Osborne and Grube [18] who stated that good antiseptic soaps should be able to eliminate between 60% to 80% of microorganisms from human's skin. However, samples A (42%) and B (35%) showed low inhibitory activity. This is probably due to the absence of certain active ingredients in samples A and B that were incorporated in samples C and D. Many researchers reported the beneficial impact of hand wash; Harika *et al.,* [19] reported a 58% reduction in bacterial load after hand wash, Ray *et al*., [20] revealed a decrease in colony count in 60% of samples, and 56% reduction in bacterial load was reported by Tambekar [21]. Similarly, Hassan *et al*., [22] reported up to 72% reduction in bacterial load after hand sanitization.

It was also discovered from this research that students' hands harbor *Pseudomonas aeruginosa, Staphylococcus aureus, Escherichia coli,* and *Staphylococcus epidermidis.* These bacterial genera belong to two major groups of bacteria such as Gram-positive and Gram-negative. Similar findings revealed that bacteria (such as *Pseudomonas aeruginosa* and *Staphylococcus aureus*) from other sources are transmitted to human skin. Some of these bacteria are pathogenic in nature [23-24]. Varsha [25] isolated similar bacteria while studying the efficacy of medicated soaps and plants-based soaps against pathogenic microbes isolated from human's skin. [26] Revealed that soap produced locally using seeds oil from plant inhibited

the growth of bacteria. *Escherichia coli* and *Staphylococcus aureus* were isolated from the hands of workers in food industry [27].

V. CONCLUSION AND FUTURE SCOPE

Out of the four samples evaluated, only two were effective in reducing the bacterial load of hands to the desired efficacy. This indicates that some of the unbranded antiseptic soaps do not contain the right ingredients at the proper concentration. This study, therefore, concluded that some of the unbranded antiseptic soaps used in washing hands during the COVID-19 in some of the most affected areas of Kano State, Nigeria are effective in decreasing the bacterial load of the hands. However, it is recommended that the local soap producers should follow standard guidelines stated by the appropriate bodies during production, after production, the soaps should be taken to the quality control laboratories for efficacy tests, and the unbranded antiseptic soaps producers should be trained on how to modernize and standardize their products.

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REFERENCES

[1] V.M. Chaudhari, "Studies on antimicrobial activity of antiseptic soaps and herbal soaps against selected human pathogens,"*Journal of Scientific Innovative Research,* Vol. **5**, No.**6**, pp.**201- 204, 2016**.

[2] B.T. Getradeghana, "Evaluation of African traditional soap," *Global Journal of Pure and Applied Science*, Vol. **6,** pp.**174-179**, **2000**.

[3] E.E. Sickbert-Bennett, L.M. DiBiase, T.M. Shade Willis, E.S. Wolak, D.J. Weber, W.A. Rutala, "Reducing Health Care Associated Infections by Implementing a Novel all Hands on Deck Approach for Hand Hygiene Compliance," *American Journal of Infection Control*, Vol. **44,** pp.**13-16, 2015**.

[4] D. Pires, H. Soule, F. Bellissimo-Rodriues, A. Gayet-Ageron, D. Pittet, "Hand Hygiene with Alcohol-based Hand Rub: How Long is long enough?" *Journal of infection Control and Epidemiology*, Vol. **38**, No.**5**, **2017**.

[5] R. Babeluk, S. Jutz, S. Mertlitz, J. Matiasek, C. Klaus, "Hand Hygiene--Evaluation of Three Disinfectants Hand Sanitizers in a Community Setting," *PLOS ONE*, Vol. **9**, No.**11**, **2014**.

[6] C. Huang, W. Ma, and S. Stack, "The Hygienic Efficacy of Different Hand-drying Methods: a Review of the Evidence." *Mayo Clinic proceedings*, Vol. **87**, No.**8**, pp**791–798**, **2012.**

[7] J. K. RI, "The Hygienic of Different Hand Drying Methods": A Review of the Evidence, *Mayo Clinic Proceedings*, Vol. **81,** No.**8,** pp.**791-798, 2008**.

[8] P. Prajapati, H. Desai, and C. Chandarana, "Hand sanitizers as a Preventive Measure in COVID-19 Pandemic, its Characteristics, and Harmful Effects: a Review," *Journal of Egyptian Public Health Association*, Vol. **97**, No.**6, 2022**.

[9] J.M. Marc Bonten, "Controlling Transmission of Antibiotic-Resistant Bacteria in ICU Settings," Infectious Diseases (Fourth Edition), ELSEVIER, pp.**693-697**, **2017.**

[10] E.P.K. Imarenezor, F.U. Ebuara, O.A. Abhadionmhen, S.T.C. Brown, D. Apine², K. Isaac., "Antibacterial Activity of Some Selected Medicated Soap on *Staphylococcus aureus* from Wound Infections," *Global Scientific Journal*, Vol. **8**, No.**9**, **2020**.

[11] M. Ikegbunam, R. Metuh, L. Anagu, and N. Nsikak, "Antimicrobial Activity of Some Cleaning Products against Selected Bacteria," *International Resources Journal Pharmaceutical and Applied Sciences*, Vol. **3**, No.**4**, pp.**133-135, 2013.**

[12] C.N. OBI, "Antibacterial Activities of Some Medicated Soaps on Selected Human Pathogens," *American Journal of Microbiological Research,* Vol. **2**, No.**6**, pp.**178-181**, **2014**.

[13] S.A. Johnson, P.A. Goddard, C. Ilife, B. Timmens, et al, "Comparative Susceptibility of Resident and Transient Hand Bacteria to

[14] Para-chlorometa-xylenol and Triclosan," *Journal of Applied Microbiology*, Vol. **93**, pp.**336-344**, **2002**.

[15] U. S. Oranusi, V.A.Akande, and S.O.Dahunsi, "Assessment of Microbial Quality and Antibacterial Activity of Commonly used Hand Washes," *Journal of Biological and Chemical Research,* Vol. **30,** No.**2,** pp.**570-580**, **2013.**

[16] M. Cheesbrough, "District Laboratory Practice in Tropical Countries", Part 2, 2nd edition. CAMBRIDGE UNIVERSITY PRESS, **New York**, pp.**65-67, 2006.**

[17] K. Park, "Textbook of Preventive and Social Medicine," 23rd edition, BHANOT Publishers, **India**, p.**153**, **2015**.

[18] E. Larson, "Skin Hygiene and Infection Prevention: More of the Same or Different Approaches?" *Clinical Infectious Disease*, Vol. **29,** No.**5**, pp.**1287-1294**, **1999**.

[19] R.C. Osborne, and J. Grube, "Hand Disinfection in Dental Practice," *Journal of Clinical Preview*, Vol. **4,** pp**.11-15**, **1982.**

[20] Harika, L. M. Swarajya, F. Amatullah, K. T. Sandeep, "A Knowledge, Attitude and Practice Study on Hand Hygiene and Antibiotic Susceptibility Pattern in Isolates of Pathogens from Hands in School Children," *International Journal of Community Medicine and Public Health*,Vol. **7,** No.**5,** pp.**1743-1747**, **2020**.

[21] S.K. Ray, R. Amarchand, J. Srikanth, and K.K. Majumdar, "A Study on the Prevalence of Bacteria in the Hands of Children and their Perception on Handwashing in Two Schools of Bangalore and Kolkata," *Indian Journal of Public Health*, Vol. **55**, No.**4,** pp.**293-297**, **2011**.

[22] D.H. Tambekar, and S.D. Shirsat, "Role of Handwashing and Factors for Reducing Transmission of Enteric Infections among Students of Amaravati District," *Science Res Report*, Vol. **3**, No.**2,** pp.**175-182**, **2013.**

[23] S. Hassan, H.Y. Isma'il, and M.M. Bala, "Efficacy of Hand Sanitizers Produced by Some Tertiary Institutions during the COVID-19 Pandemic in Kano State, Nigeria,*"In the Proceedings of the 2021NILEST International Conference on Innovative and Sustainable Development of Nigeria's Economy Through Leather Science, Technology, and Arts Amidst COVID-19 Pandemic*, Zaria Chapter, Kaduna, **Nigeria**, pp.**21**, **2021**.

[24] A.C. Fluit, F.J. Schmits, and J. Verhoef, "Frequency and Isolation of Pathogens from Bloodstream Nosocomial Pneumonia, Skin and Soft Tissue, and Urinary European," *Journal of Microbial Infection*, Vol. **20** pp.**188-191**, **2001.**

[25] S. Higaki, T. Kitagawa, M. Kagoura, M. Morohashi, and T. Yamagishi ,"Predominant *Staphylococcus aureus* isolated from various Skin Disease," *Journal of International Medical Research*, Vol. **28**, pp **87-190**, **2000**.

[26] M.C. Varsha, "Studies on Antimicrobial Activity of Antiseptic Soaps and Herbal Soaps against Selected Human Pathogens," *Journal of Scientific and Innovative Research*, Vol. **5**, No.**6**, pp.**201-204**, **2016.**

[27] A.A. Warra1, H.Y. Tanko, N. Salisu, K. Isah, A.O. Adedara, "Antibacterial Activities of Soaps Prepared from Selected Plant Oils," *International Journal of Scientific Research in Biological Sciences*, Vol. **7**, No.**4**, pp.**51-56**, **2020**.

[28] O.G.E. Jasper, J.O. Emmanuel, A.S. Eno-Obong, U.N. Ikechukwu, C.S. Adamu, "Assessment of Microbial Safety of Bread Production Process in Some Selected Bakeries in Lafia Metropolis, Nasarawa State, Nigeria," *International Journal of Scientific Research in Biological Sciences*, Vol. **9**, No.**1**, pp.**01-10, 2022.**

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