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RESEARCH ARTICLE

ANALYSIS OF THE BIOACTIVE AND MICROBIOLOGICAL CONTENTS OF HERBAL MIXTURES SOLD IN ANAMBRA STATE, NIGERIA

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Abstract

Over the years, medicinal plants have played a significant role in traditional medicine practice. The ever-increasing health-related difficulties and the search for possible treatments and likely cures have led to the increasing patronage of herbal drugs in Nigeria. There is an overwhelming increase in the production and distribution of herbal medications, and the trend has instigated concern about the quality of the products being sold in Anambra State, Nigeria. Thus, the primary purpose of the current study is to analyze the microbiological and phytochemical constituents of okanga powder, goko cleanser, and deep root herbal mixtures popularly sold in Nigeria. The phytochemical tests conducted on the herbal products revealed that the herbal products contain alkaloids, flavonoids, glycosides, anthraquinones, tannins, and saponins. The result of the microbial count indicates the presence of varying microorganisms such as *S. aureus*, *E. coli*, *Salmonella*, and *Klebsiella* spp in the herbal products. The study concludes that herbal products possess active phytochemicals. However, the presence of pathogenic organisms was discovered in the herbal drugs.

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Introduction:-

Presently, the use of herbal medicine as complementary and alternative medicine in treating ailments is increasing worldwide (el Hajj & Holst, 2020; Huie, 2002; Kennedy et al., 2016; Liu et al., 2016; Mohamad et al., 2019; Rezaeian et al., 2020; Sen & Chakraborty, 2015; Welz et al., 2018). Herbal medicines or phytomedicine, or botanical medicines, refer to plant parts, including roots, seeds, barks, flavor, or berries for medicinal purposes. The prevalence of herbal medicine use has primarily attracted scholarly attention in recent years (Alkhamaiseh & Aljofan, 2020; James et al., 2018; Kaadaaga et al., 2014; Laelago et al., 2016; Nsibirwa et al., 2020; Picking et al., 2011; Posadzki & Ernst, 2013; Rashrash et al., 2017). In Nigeria, the trend is currently receiving attention from the scientific and industrial community (Falodun & Imieje, 2013). The rise in health-related complications and the search for possible treatments and possible cures has led to the patronage of herbal drugs (Ogunsola & Egbewale, 2018). It has been dependent on treating many diseases (Ogbole & Ajaiyeoba, 2010; Okwu & Nnamdi, 2008; Ukwubile et al., 2019).

Over the years, herbal mixtures relating to medicine have received overwhelming patronage from people across the states of Nigeria. Herbal mixtures refer to the combination of various medicinal plant materials including, barks, roots, aqueous extracts, seeds, flowers, and leaves. They are herbal preparations comprising complex mixtures of several medicinal plants (Ndhlala et al., 2011). The use of plant parts for treating diseases is universal and often perceived as

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cheap and more effective than conventional drugs (Adeyemi & Owoseni, 2015; Elufioye & Mada, 2018; Josephine & Antoinette, 2019; Thomford et al., 2015).

The most common herbal mixtures found across Nigeria include Goko cleanser, Yoyo Bitters, Swedish Bitters, Osa herbal mixtures, Osomo, Alomo, Oroki, Okanga Powder, and Deep root, among others. However, this study is concerned with Okanga powder, Deep root herbal mixture, and Goko cleanser. Okanga powder is a popular plant product used for various purposes, including detoxification, laxative functions, and treatment of infections. The primary active ingredient includes citrus aurantifolia, Mangifera indica, psidium guajava, carapobolia lutea, rilachia longepediculata, Xylopia aetiopica, and Nauclea diderichi.

The demand for these herbal products is increasing, and their prevalence use has been reported (Amaeze et al., 2018; Fakeye et al., 2009). Although the demand for herbal mixtures is high, research has pointed out the harmful effects (Akande-Sholabi et al., 2020; Dadzie et al., 2020; Oreagba et al., 2011). Thus, research suggests a continuous scientific evaluation of the herbal mixtures commonly sold in Nigeria's market (Oluyomi et al., 2012; Ezejiofor et al., 2008; Ogbonnia et al., 2010). Nevertheless, there is little or no mechanism available to checkmate the production and bacteriological contents of these herbal medicines being sold all over the Nation. Hence, it can pose a threat to human health. The purpose of the current study is to ascertain the microbiological status and phytochemical constituents of some selected herbal products (Okanga powder, Deep root herbal mixture, and Goko cleanser) sold by roadside herbal merchants.

Material and Method:-

Collection of Samples

Goko cleanser, Okanga Powder, and Deep root herbal mixtures were collected from the local dealers around Awka, Anambra State.

Microbiological analysis

The determination of the microbial loads of the selected herbal products was conducted in accordance with the method outlined in (Esimone et al., 2001).

Phytochemical analysis

The phytochemical analysis of okanga powder, deep root herbal mixture, and goko cleanser, including tests for alkaloids, tannins, saponin, anthraquinones, flavonoid, glycosides, was carried out using the procedure outline in (Agbo & Mboto, 2012).

Result:-

Table 1:- Table showing the phytochemical composition of okanga powder, deep root herbal mixture and goko cleanser.

S/No	Chemical Constituents	A	B	C
1.	Alkaloids	++	+	++
2.	Glycosides	-	+	++
3.	Saponins	-	-	-
4	Tannins	++	+	-
5	Flavonoids	+	+	++
8.	Anthraquinones	+	+++	+++

Key: += present, ++ = moderately present, +++ = highly present, - = absent. A = okanga powder, B = goko cleanser, C = deep root

Table 2:- Table showing the microbial content of okanga powder, goko cleanser and deep root herbal mixtures.

Product	Viable count (cfu/ml or g)			
	S. aureus	E.coli	Salmonella	Klebsiella spp
Okanga powder	-	1.0×10^3	-	4.0×10^3
Goko cleanser	-	1.4×10^4	-	7.0×10^3
Deep root	7.5×10^3	2.0×10^3	3.0×10^3	-

Key: - = No growth CfU/ml = Colony forming unit per ml

Discussion:-

The current study was aimed to analyze the microbiological and phytochemical constituents of some selected herbal mixtures sold in Nigeria. The phytochemical tests revealed that the herbal products contain alkaloids, flavonoids, glycosides, anthraquinones, tannins, and saponins. The result showed that in okanga powder, alkaloids and tannins were moderately present (+ +), flavonoids and anthraquinones were present (+), while saponins glycosides were absent (-). In the goko cleanser, the presence of anthraquinones was much higher (+ + +), alkaloids, glycosides, tannins, and flavonoids were present (+) while saponins were absent (-). In the deep root, herbal mixture, the presence of anthraquinones was also very high (+ + +), alkaloids, glycosides, and flavonoids were moderately present (+ +), while saponins and tannins were absent (-). Indeed, the active constituents of herbal mixtures comprise more than one plant or active component, and their therapeutic efficacy is not guaranteed by a single group of compounds (Okunlola et al., 2007). The combination of different plants is essential in boosting the therapeutic efficacy of herbal products. The phytochemical revelation of the herbal products is consistent with previous studies (Agbo & Mboto, 2012; Okunlola et al., 2007). Most of the phytochemical compounds associated with herbal drugs such as alkaloids, flavonoids, anthraquinones, tannins, saponins, and many others constitute the secondary metabolites of plants that function to protect against many microorganisms. Alkaloids, one of the commonly found phytochemicals in the plant, have been shown to possess antibacterial functions. Flavonoids, glycosides, anthraquinones, tannins, and saponins exhibit various biological activities such as antioxidant, antimicrobial, antioxidants, and antibacterial properties.

Furthermore, the result of the microbial count indicates the presence of varying microorganisms such as *S. aureus*, *E. coli*, *Salmonella*, and *Klebsiella* spp in the herbal products ranging from 1.0×10^3 to 1.4×10^4 . All the herbal products were contaminated with *E. coli* which is implicated in intestinal sickness typically caused by unhygienic situations. Okanga powder and goko cleanser are free of *S. aureus* and *Salmonella* but are contaminated with *Klebsiella* spp. Deep root herbal mixture is contaminated with *S. aureus*, *E. coli*, and *Salmonella* and is free from *Klebsiella* spp. The presence of pathogenic organisms in herbal medicine products can lower or inactivate the therapeutic efficacy of the products and has the potential to affect the consumers adversely. The presence of the microorganisms indicates a high level of exposure and carelessness at any production level (Brooks et al., 2004). All the isolated organisms in the study have been linked with health concerns. Nevertheless, these pathogenic organisms may find their way into the herbal mixtures due to inadequate hygienic practices and insufficient decontamination and materials.

Conclusion:-

The result of the study indicates that the herbal mixtures under investigation that are widely sold in every area in the Anambra state contain certain phytochemicals responsible for the therapeutic effectiveness of the drugs. However, there is a concern about microbial contamination associated with these herbal medicines. The microbial analysis conducted on the selected herbal drugs shows that the products contain a varying level of pathogenic organisms capable of undermining the drugs' efficacy and the consumers' well-being. Due to the high patronage of these products and the concern of substandard herbal medicines, the current study recommends continuous scientific assessment of the herbal products sold in the market. Additionally, adequate precaution in production and storage hygiene should be encouraged. The present study contributes to traditional medicine literature by affirming the therapeutic efficacy and prevalence of consuming harmful herbal drugs in Nigeria.

References:-

1. Adeyemi, O. S., Fambegebe, M., Daniyan, O. R., & Nwajei, I. (2012). Yoyo Bitters, a polyherbal formulation, influenced some biochemical parameters in Wistar rats. *Journal of Basic and Clinical Physiology and Pharmacology*, 23(4), 135–138. <https://doi.org/10.1515/jbcpp-2012-0026>
2. Adeyemi, O.S., & Owoseni, M. C. (2015). Polyphenolic content and biochemical evaluation of fijk, alomo, osomo, and oroki herbal mixtures in vitro. *Beni-Suef University Journal of Basic and Applied Sciences*, 4(3), 200–206. <https://doi.org/10.1016/j.bjbas.2015.07.002>
3. Agbo, B. E., & Mboto, C. I. (2012). Phytochemical and antibacterial evaluation of selected locally produced herbal medicines sold in Calabar, Nigeria. *Archives of Applied Science Research*, 4(5).
4. Akande-Sholabi, W., Iluyomade, A., Ilesanmi, O. S., & Adisa, R. (2020). Perception and use of herbal medicines among clients visiting selected community pharmacies in Ibadan, Nigeria. *African Journal of Biomedical Research*, 23(2).
5. Alkhamaiseh, S. I., & Aljofan, M. (2020). Prevalence of use and reported side effects of herbal medicine among adults in Saudi Arabia. *Complementary Therapies in Medicine*, 48. <https://doi.org/10.1016/j.ctim.2019.102255>

6. Amaeze, O. U., Aderemi-Williams, R. I., Ayo-Vaughan, M. A., Ogundemuren, D. A., Ogunmola, D. S., & Anyika, E. N. (2018). Herbal medicine use among Type 2 diabetes mellitus patients in Nigeria: understanding the magnitude and predictors of use. *International Journal of Clinical Pharmacy*, 40(3). <https://doi.org/10.1007/s11096-018-0648-2>
7. Brooks, A. A., Asamudo, N. U., & Udoukpo, F. C. (2004). Microbiological and physicochemical analysis of soymilk and soy flour sold in Uyo metropolis, Nigeria. *Global Journal of Pure and Applied Sciences*, 9(4). <https://doi.org/10.4314/gjpas.v9i4.16052>
8. Dadzie, I., Avorgbedo, S. A., Appiah-Openg, R., & Cudjoe, O. (2020). Cytotoxic and antioxidant effects of antimalarial herbal mixtures. *International Journal of Microbiology*, 2020. <https://doi.org/10.1155/2020/8645691>
9. el Hajj, M., & Holst, L. (2020). Herbal medicine use during pregnancy: A literature review with a particular focus on Sub-Saharan Africa. In *Frontiers in Pharmacology* (Vol. 11). <https://doi.org/10.3389/fphar.2020.00866>
10. Elufioye, T. O., & Mada, O. O. (2018). GC- MS, FTIR, UV Analysis and in vitro Antioxidant Activity of a Nigeria Poly Herbal Mixture: Pax Herbal Bitters. *Free Radicals and Antioxidants*, 8(2). <https://doi.org/10.5530/fra.2018.2.12>
11. Esimone, C. O., Chah, K., & Ikejide, S. C. (2001). Microbiological quality of herbal preparations marketed in southeast Nigeria. *Journal of Nature Remedy*, 2(1), 42–48.
12. Ezejiofor, N. A., Maduagwunan, Onyiaorah, V. I., Hussaini, D. C., & Orisakwe, O. E. (2008). Multiple organ toxicity of a Nigerian herbal supplement (U & D sweet-bitter) in male Albino rats. *Pakistan Journal of Pharmaceutical Sciences*, 21(4).
13. Fakeye, T. O., Adisa, R., & Musa, I. E. (2009). Attitude and use of herbal medicines among pregnant women in Nigeria. *BMC Complementary and Alternative Medicine*, 9. <https://doi.org/10.1186/1472-6882-9-53>
14. Falodun, A., & Imieje, V. (2013). Herbal medicine in Nigeria: Holistic overview. *Nigerian Journal of Science and Environment*, 12(1).
15. Huie, C. W. (2002). A review of modern sample-preparation techniques for the extraction and analysis of medicinal plants. In *Analytical and Bioanalytical Chemistry* (Vol. 373, Issues 1–2). <https://doi.org/10.1007/s00216-002-1265-3>
16. James, P. B., Taidy-Leigh, L., Bah, A. J., Kanu, J. S., Kangbai, J. B., & Sevalie, S. (2018). Prevalence and correlates of herbal medicine use among women seeking care for infertility in Freetown, Sierra Leone. *Evidence-Based Complementary and Alternative Medicine*, 2018. <https://doi.org/10.1155/2018/9493807>
17. Josephine Ozioma, E.-O., & Antoinette Nwamaka Chinwe, O. (2019). Herbal medicines in African traditional medicine. In *Herbal Medicine*. <https://doi.org/10.5772/intechopen.80348>
18. Kaadaaga, H. F., Ajeani, J., Ononge, S., Alele, P. E., Nakasujja, N., Manabe, Y. C., & Kakaire, O. (2014). Prevalence and factors associated with herbal medicine among women attending an infertility clinic in Uganda. *BMC Complementary and Alternative Medicine*, 14. <https://doi.org/10.1186/1472-6882-14-27>
19. Kennedy, D. A., Lupattelli, A., Koren, G., & Nordeng, H. (2016). Safety classification of herbal medicines used in pregnancy in a multinational study. *BMC Complementary and Alternative Medicine*, 16(1). <https://doi.org/10.1186/s12906-016-1079-z>
20. Laelago, T., Yohannes, T., & Lemango, F. (2016). Prevalence of herbal medicine use and associated factors among pregnant women attending antenatal care at public health facilities in Hossana Town, Southern Ethiopia: Facility-based cross-sectional study. *Archives of Public Health*, 74(1). <https://doi.org/10.1186/S13690-016-0118-Z>
21. Liu, C., Fan, H., Li, Y., & Xiao, X. (2016). Research Advances on Hepatotoxicity of Herbal Medicines in China. In *BioMed Research International* (Vol. 2016). <https://doi.org/10.1155/2016/7150391>
22. Mohamad, T. A. S. T., Islahudin, F., Jasamai, M., & Jamal, J. A. (2019). Preference, perception, and predictors of herbal medicine use among Malay women in Malaysia. *Patient Preference and Adherence*, 13. <https://doi.org/10.2147/PPA.S227780>
23. Ndhlala, A. R., Stafford, G. I., Finnie, J. F., & van Staden, J. (2011). Commercial herbal preparations in KwaZulu-Natal, South Africa: The urban face of traditional medicine. In *South African Journal of Botany* (Vol. 77, Issue 4). <https://doi.org/10.1016/j.sajb.2011.09.002>
24. Nsibirwa, S., Anguzu, G., Kamukama, S., Ocama, P., & Nankya-Mutyoba, J. (2020). Herbal medicine use among patients with viral and non-viral hepatitis in Uganda: Prevalence, patterns and related factors. *BMC Complementary Medicine and Therapies*, 20(1). <https://doi.org/10.1186/s12906-020-02959-8>
25. Ogbole, O. O., & Ajaiyeoba, E. O. (2010). Traditional management of tuberculosis in the Ogun State of Nigeria: The practice and ethnobotanical survey. *African Journal of Traditional, Complementary and Alternative Medicines*, 7(1). <https://doi.org/10.4314/ajtcam.v7i1.57270>

26. Ogbonnia, S., Mbaka, G., Igbokwe, N., Anyika, E., Alli, P., & Nwakakwa, N. (2010). Antimicrobial evaluation, acute and sub chronic toxicity studies of Leone Bitters, a Nigerian polyherbal formulation, in rodents. *Agriculture and Biology Journal of North America*. <https://doi.org/10.5251/abjna.2010.1.3.366.376>
27. Ogunsola, O. K., & Egbewale, S. O. (2018). Factors influencing the use of herbs and combination with orthodox medicine for healthcare management in Ibadan, Nigeria. *World News of Natural Sciences*, 17(February).
28. Okunlola, A., Adewoyin, B. A., & Odeku, O. A. (2007). Evaluation of pharmaceutical and microbial qualities of some herbal medicinal products in south-western Nigeria. *Tropical Journal of Pharmaceutical Research*, 6(1). <https://doi.org/10.4314/tjpr.v6i1.14644>
29. Okwu, D. E., & Nnamdi, F. U. (2008). Trends in ethnomedical practices among the Ikwano people of southeastern Nigeria. *Journal of Medicinal and Aromatic Plant Sciences*, 30(2).
30. Oreagba, I. A., Oshikoya, K. A., & Amachree, M. (2011). Herbal medicine use among urban residents in Lagos, Nigeria. *BMC Complementary and Alternative Medicine*, 11. <https://doi.org/10.1186/1472-6882-11-117>
31. Picking, D., Younger, N., Mitchell, S., & Delgoda, R. (2011). The prevalence of herbal medicine home use and concomitant use with pharmaceutical medicines in Jamaica. *Journal of Ethnopharmacology*, 137(1). <https://doi.org/10.1016/j.jep.2011.05.025>
32. Posadzki, P., & Ernst, E. (2013). Prevalence of herbal medicine use by UK patients/consumers: A systematic review of surveys. *Focus on Alternative and Complementary Therapies* (Vol. 18, Issue 1). <https://doi.org/10.1111/fct.12006>
33. Rashrash, M., Schommer, J. C., & Brown, L. M. (2017). Prevalence and predictors of herbal medicine use among adults in the United States. *Journal of Patient Experience*, 4(3). <https://doi.org/10.1177/2374373517706612>
34. Rezaeian, J., Talebi, F., & Foroutan, R. A. (2020). Ranking the success factors to improve safety and growth of medicinal artichoke plant using fuzzy analytic hierarchy process. *Food Science and Engineering*. <https://doi.org/10.37256/fse.122020113>
35. Sen, S., & Chakraborty, R. (2015). Toward the integration and advancement of herbal medicine: a focus on traditional Indian medicine. *Botanics: Targets and Therapy*. <https://doi.org/10.2147/btat.s66308>
36. Thomford, N. E., Dzobo, K., Chopera, D., Wonkam, A., Skelton, M., Blackhurst, D., Chirikure, S., & Dandara, C. (2015). Pharmacogenomics implications of using herbal medicinal plants on African populations in health transition. *Pharmaceuticals*, 8(3). <https://doi.org/10.3390/ph8030637>
37. Ukwubile, C. A., Ahmed, A., Katsayal, U. A., Ya'u, J., & Mejida, S. (2019). GC–MS analysis of bioactive compounds from *Melastomastrum capitatum* (Vahl) Fern. Leaf methanol extract: An anticancer plant. *Scientific African*, 3. <https://doi.org/10.1016/j.sciaf.2019.e00059>
38. Welz, A. N., Emberger-Klein, A., & Menrad, K. (2018). Why people use herbal medicine: Insights from a focus-group study in Germany. *BMC Complementary and Alternative Medicine*, 18(1). <https://doi.org/10.1186/s12906-018-2160-6>