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RESEARCH ARTICLE

MICROBIOLOGICAL AND PHYTOCHEMICAL ANALYSES OF SOME SELECTED HERBAL MIXTURES SOLD IN NIGERIA

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Abstract

Over the years, medicinal plants have played significant role in traditional medicine practice. The rise in health-related problems, and the search for potential treatments and possible cures has led to the increased patronage of herbal drugs in Nigeria. there is an overwhelming increase in the production and distribution of herbal drugs and the trend has called for concern on the quality of the products been sold in Nigeria. thus, the primary purpose of the present 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 the herbal products possess active phytochemicals, however, the presence of pathogenic organisms were discovered in the herbal drugs.

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Introduction: -

Presently, the use of herbal medicine as a 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 refers to the use of a plant parts which include roots, seeds, barks, flavor or berries for medicinal purposes. The prevalence of herbal medicine use has largely attracted scholastic 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 problems, and the search for potential treatments and possible cures has led the patronage of herbal drugs (Ogunsola & Egbewale, 2018). It has been depended for the treatment of many diseases (Ogbole & Ajaiyeoba, 2010; Okwu & Nnamdi, 2008; Ukwubile et al., 2019).

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

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perceived as cheap and effective than the conventional drugs (O.S. Adeyemi & Owoseni, 2015; Elufioye & Mada, 2018; Josephine Ozioma & Antoinette Nwamaka Chinwe, 2019; Thomford et al., 2015).

The most common herbal mixtures found across Nigeria includes 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 for including detoxification, laxative functions and for treatment of infections. The major active ingredient includes citrus aurantifolia, Mangifera indica, Psidium guajava, caraplobia lutea, rilachialongpediculata, xylopiiaetiopica, and naucleadiderichi.

The demand for these herbal products is on the increase and its prevalence use has been reported (Amaeze et al., 2018; Fakeye et al., 2009). Although, the demand for herbal mixtures is high, research has pointed the harmful effects (Akande-Sholabi et al., 2020; Dadzie et al., 2020; Oreagba et al., 2011). Thus, research suggests for a continuous scientific evaluation of the herbal mixtures commonly sold in the Nigeria's market (Oluyomi et al., 2012; Ezejiofor et al., 2008; Ogbonnia et al., 2010). Nevertheless, there are little or no mechanism available to checkmate the production and bacteriological contents of this herbal medicines being sold all over the Nation. Hence, 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 road side herbal merchants.

Material and Method: -

Collection of Samples

Goko cleanser, Okanga Powder and Deep root herbal mixtures were collected from the local dealers around Kogi 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 & Mbot, 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 x 10 ³	-	4.0 x 10 ³
Goko cleanser	-	-	1.4 x 10 ⁴	-	7.0 x 10 ³
Deep root	7.5 x 10 ³	7.5 x 10 ³	2.0 x 10 ³	3.0 x 10 ³	-

Key: - = No growth Cf/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 results of the phytochemical tests conducted 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 Goko cleanser, the presence of anthraquinones was much higher (+ + +), alkaloids, glycosides, tannins, and flavonoids were present (+) while saponins were absent (-). In 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 (-). Perhaps, the active constituents of herbal mixtures comprise more than more than one plant or active constituents and their therapeutic efficacy is not provided by a single group of compounds (Okunlola et al., 2007). The combination of different plants is important in boosting the therapeutic efficacy of the herbal products. The phytochemical revelation of the herbal products is consistent with previous studies (Agbo & Mbotto, 2012; Okunlola et al., 2007). Most of the phytochemical compounds associated with herbal drugs such as alkaloids, flavonoids, anthraquinones, tannins, saponins, and many others constitutes the secondary metabolites of plants that function to protect against many microorganisms. Alkaloids which are one of the commonly found phytochemicals in plant have been shown to possess antibacterial functions. Flavonoids, glycosides, anthraquinones, tannins, and saponins exhibits a wide range of 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 is normally 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 found to be 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 adversely affect the consumers. 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 study that are widely sold in every area in the Kogi state contains certain phytochemicals that are responsible for the therapeutic effectiveness of the drugs. However, there is a concern on the level of microbial contamination associated with these herbal medicines. The microbial analysis conducted on the selected herbal drugs shows that the products contain varying level of pathogenic organisms capable of undermining the efficacy of the drugs and well-being of the consumers. Due to the high patronage of these products and the concern of substandard herbal drugs, the current study recommends for continuous scientific assessment of the herbal medicines sold in the market. Additionally, adequate precaution in production and storage hygiene should be encouraged. The current study contributes to traditional medicine literature by further affirming the therapeutic efficacy and prevalence of consuming contaminated herbal drugs in Nigeria.

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