Comparative Potential Qualitative and Quantitative Phytochemical Evaluation of Neem and Moringa Oleifera Leaf Plants in Ozoro, Delta State, Nigeria

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ABSTRACT

This study was aimed at determining the qualitative and quantitative phytochemicals present in Neem (Azadirachta indica) and Moringa oleifera leaves using standard methods. The result of the analysis reveals the phytochemicals as follows; Alkaloid and glycoside were found to be moderately present while flavonoid and steroid were found to be present whereas saponin was not present in the qualitative analysis of the neem (Azadirachta indica) leaf sample while in that of moringa (oleifera), flavonoid, saponin and steroid were found to be moderately present while alkaloid and glycoside were just present. In the quantitative analysis, Neem (Azadirachta indica) was found to contain 4.00% of saponin while that of moringa (oleifera) was 19.0%, flavonoid was found to contain 2.10% in neem while that of moringa was 11.2%, alkaloid was found to contain 14.5% in neem while that of moringa was 8.00%, glycoside was found to contain 0.27% in neem while that of moringa was 0.18%, steroid was found to contain 0.03% in neem while moringa was found to contain 0.12%. The phytochemicals are present but occurs in different degrees, hence further research and identification of these active ingredients should be carried out through various techniques.

Keywords: Qualitative, Phytochemicals, Biologically, Tropical, Treatment

I. INTRODUCTION

Phytochemicals which simply are the biologically active, naturally occurring chemical compounds found in plants are generally responsible for the protection of plants from disease, damage and equally contributes to the plant’s colour, aroma and flavour. These chemicals which are found in most parts of the plants (roots, stems, leaves, flowers, fruits or seeds) include: alkaloids, saponin, carotenoids, phenols, terpenoids, steroids, tannins, glycosides, flavonoids etc. They are not essential nutrients neither are they required by the human body for sustaining life, but have important potentials to prevent or to fight some common diseases (Mamta et al., 2013). They have been promoted for the prevention and treatment of diabetes, high blood pressure, and macular degeneration (American Cancer Society, 2000).

Neem (Azadirachta indica) and Moringa (moringa oleifera Lam) are types of local medicinal Indian herbs which has turn out to be familiar in the tropical and subtropical countries. Particularly, moringa oleifera is a small native tree to the Sub-Himatayam regions of North West India, which is now indigenous to many regions in Africa, South East Asia, the Pacific and Caribbean Islands and South America. Besides being used daily as vegetable among people of these regions, the moringa is also largely known and used for its health benefits (Ahmad et al., 2014) Among commoners, the moringa oleifera has earned its name as ‘the miracle tree’ due to its amazing healing
abilities for various ailments and even some chronic diseases.

Neem (*Azadirachta indica*) which belongs to the family *Meliaceae*, is believed to have originated from South Asia, but grows largely in India, Pakistan, Bangladesh, Nepal and other tropical and sub-tropical countries of the world (Bokhari and Aslam, 1985; Von Maydell, 1986; Mohammad, 2016). The neem tree is an incredible plant that has been declared as the Tree of the 21st century by the United Nations (Puri, 1999). In India, the neem tree is commonly described as ‘Divine Tree’, ‘Life giving Tree’, ‘Nature’s Drugstore’, ‘Village Pharmacy’ and ‘Panacea for all diseases’ (Sofowora, 1993). This is an indication of its vast usage as medical plant.

The neem tree which was first grown from the seeds in Maiduguri, Borno State, Nigeria was introduced from Ghana in 1928 (NRC, 1992; Nwoekeabia, 1994). The Neem is popularly known as ‘Dongoyaro’ in Nigeria as a whole. It has an extensive deep root system which is responsible for their survival in arid and semi-arid areas of the world (Ramadass and Subramanian, 2018).

For centuries and in many cultures around the globe, the medicinal usage of the Moringa has been to treat problems such as skin infections, anaemia, anxiety, asthma, blackheads, blood impurities, bronchitis, catarrh, chest congestion, cholera and many other illnesses (Khawaja *et al.*, 2010; Hamza, 2010; Singh and Sharma, 2012). *Moringa oleifera* also consists of anti-inflammatory, anti-spasmodic, anti-hypertensive, anti-tumour, anti-oxidant, anti-pyretic, anti-ulcer, anti-epileptic, diuretic, cholesterol lowering, renal, anti-diabetic (Paliwa *et al.*, 2011; Sharma *et al.*, 2012) and hepatoprotective activities (Lai *et al.*, 2010; Huang *et al.*, 2012). It has also been labeled for its great cosmetic value in which in recent years, the Moringa has commonly been found to be used in various health care products including body and hair moisturers and conditioners. It was also discovered that Moringa oil was used in skin ointments ever since the Egyptian times The Moringa was claimed to be ‘the most nutrient-rich plant yet discovered’ (Khawaja *et al.*, 2010).

Essentially, the use of herbal medicine for the treatment of diseases and infections is as old as mankind. The World Health Organization (WHO) supports the use of traditional medicines provided they are proven to be efficacious and safe (WHO, 2000). Moringa and Neem are amongst the foremost useful tropical trees. Hence, this study is aimed at determining the potential qualitative and quantitative phytochemical constituents of Neem (*Azadirachta indica*) and *Moringa oleifera* in Ozoro town.

II. METHODS AND MATERIAL

DESCRIPTION OF STUDY AREA

Ozoro is the Headquarter of the Isoko North Local government Area of Delta state. Ozoro is one of the two administrative units in the Isoko region of Delta State, Southern Nigeria. The main economic activity is food crop farming accompanied by some hunting and the staple food crops include cassava and yams. Women form a large population of the farming population, they also engage in trade of food crops for cash to meet other basic household needs. Ozoro has several primary, secondary and post secondary schools. It lies on longitude $6^\circ 12'58.00"\text{E}$ and latitude $5^\circ 32'18.00"\text{N}$.

SAMPLE COLLECTION AND TREATMENT

Fresh leaf samples of Neem (*Azadirachta indica*) used in this study were collected from the botanical garden in the School of Agriculture, Delta State Polytechnic, Ozoro where it was equally identified by a Botanist while the Moringa oleifera leaf samples were
collected at Hamod Farms Ltd, along Abetere Bush Road, Etevie Quarters, Ozoro. Both leaf samples were separated, washed thoroughly with tap water, shade-dried, homogenized to fine powder using mortar and pestle and stored in air tight bottles separately for the analysis.

**Extraction of plant materials:** 20g of shade-dried powder of each leaf plant sample was used for extraction with 200ml ethanol for 24hours in Soxhlet apparatus. The solvent was removed in rotary evaporator and the crude extracts were dried at room temperature in steady air-current and stored at 4 °C.

**Phytochemical evaluation:** The qualitative phytochemical evaluation of both leaf plant samples for saponin, flavonoids, glycoside, alkaloids and steroids were carried out using the established procedures as described by Harbone, 1973; Trease and Evans, (1983); Edeoga et al., (2005), while the quantitative analysis were by the methods described by Harbone, 1973; Ejikeme et al., 2014; Prashant Twari, 2011 and Krishnaiah et al., 2009 respectively.

### III. RESULTS AND DISCUSSION

#### RESULTS

The result of evaluation of the qualitative and quantitative phytochemical constituents of Neem (*Azadirachta indica*) and Moringa (*oleifera*) are shown in table 1 and 2 respectively below;

**Table 1:** Shows the result of Qualitative analysis of Neem and *Moringa* leaves

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Neem leaves</th>
<th>Moringa leaves</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saponin</td>
<td>-</td>
<td>++</td>
</tr>
<tr>
<td>Flavonoids</td>
<td>+</td>
<td>++</td>
</tr>
<tr>
<td>Glycoside</td>
<td>++</td>
<td>+</td>
</tr>
</tbody>
</table>

**Key:** + = present, ++ = moderately present, - = not present

**Table 2:** Showing the result of Quantitative analysis of Neem and *Moringa* leaves

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Neem leaves (%)</th>
<th>Moringa leaves (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saponin</td>
<td>Nil</td>
<td>19.0</td>
</tr>
<tr>
<td>Flavonoids</td>
<td>2.10</td>
<td>11.2</td>
</tr>
<tr>
<td>Glycosides</td>
<td>0.27</td>
<td>0.18</td>
</tr>
<tr>
<td>Alkanoids</td>
<td>14.5</td>
<td>8.00</td>
</tr>
<tr>
<td>Steroids</td>
<td>0.03</td>
<td>0.12</td>
</tr>
</tbody>
</table>

**DISCUSSION**

The preliminary qualitative phytochemical analysis of Neem (*Azadirachta indica*) and Moringa Oleifera leaf plant extracts using ethanol as showed in table 1 above reveals the presence of saponin, flavonoids, glycoside, alkaloids and steroids, except saponin which is absent in the neem leaf plant extract. Quantitatively in table 2, the saponin content in the Moringa oleifera leaf sample was 19.0%, while the flavonoid content was 2.10 and 11.20, the glycoside content is 0.27 and 0.18, the alkaloid content was 14.5 and 8.00 and the steroid content was 0.03 and 0.12% in neem and Moringa oleifera leaf plant samples respectively. The results in table 2 further shows that moringa oleifera leaf extracts contain in percentage more saponin, flavonoids and steroids while the neem contain more alkaloids and glycosides.

This findings agrees with earlier studies stating that not all phytochemicals are present in all plant parts and that those present occurs in different degrees based on the type of extracting solvent used (Tijjan et al., 2009; Ayinde et al., 2007). According to Rausch et al., (2006), saponins have antioxidant, anti-inflammatory, anti-apoptosis, and immunostimulant
properties which raised speculations that these compounds could positively affect neurodegenerative disorders and delay neural aging. Saponins has been reported to have expectorant action through the stimulation of a reflux of the upper digestive tract. More so, it causes a reduction of blood cholesterol by preventing its re-absorption. Saponins equally have antitumor and antimutagenic activities and can lower the risk of human cancers (David, 1983; Esan, 2014). Quantitively, as found in this study, saponin is adequately present in moringa oleifera but absent in the neem plant.

Flavonoids are known to have antioxidant effect and have been shown to inhibit the initiation, promotion and progression of tumours (Kim et al., 1994). Reduction of coronary heart disease has been reported to be associated with intake of flavonoid. Flavonoid have equally been reported to exert multiple bio,logical property including antimicrobial, cytotoxicity, anti-inflammatory as well as antitumor activities but the best-described property of almost every group of flavonoids is their capacity to act as powerful antioxidants which can protect the human body from free radicals and oxygen species (Mamta et al., 2013). Flavonoids constitute a wide range of substances that play important role in protecting biological systems against the harmful effects of oxidative processes on macromolecules, such as carbohydrates, proteins, lipids and DNA (Atmani et al., 2009). From this study, flavonoid was quantitatively more in moringa oleifera than in the neem plant.

Alkaloids are nitrogen-containing naturally occurring compounds synthesized by a large numbers of organisms, including animals, plants, bacteria and fungi (Mamta et al., 2013). Almost all known alkaloids have a bitter taste. The alkaloid quinine for example is one of the bitterest tasting substances known and is significantly bitter at a (1 x 10⁵) molar concentration (Mishra, 1989). Alkaloids have hypoglycemic activities. El-Mahmad Muhammad Abubakar (2009) revealed the existence of alkaloids, carbohydrates, phystosterols, flavonoids and proteins in ethanoic leaves extracts. The presence of bioactive compounds indicates the medicinal value of plants. Antioxidants and antimicrobial properties of various extracts from many plants have recently been of great interest in both research and in the food industry, because their possible use as natural additives emerged from a growing tendency to replace synthetic antioxidants and antimicrobials with natural ones (Dipali and Vilas, 2013). The result in table 2 shows that alkaloid was quantitatively more in the neem plant than in moringa oleifera plant.

Glycocide are found in plants and are generally used in the treatment of heart related diseases, for example, congestive heart failure and arrhythmia. Glycocide is one of the secondary metabolites in plants used by humans as medicines, flavouring, pigments and recreational drugs (Knowledge Encyclopedia, 2016). Steroids are biologically active organic compounds and are used generally to treat varieties of inflammatory diseases and conditions..Glycocide was quantitatively more in the neem leaf plant than in moringa oleifera plant and the reverse was the case in terms of steroid.

IV. CONCLUSION

Neem and moringa oleifera are widely used in traditional medicines to combat and cure various ailments and are also found to be very rich in secondary metabolites which in turn can be attributed to their curative properties. To exploit these pharmacological properties, further research and identification of these active ingredients should be carried out through various techniques.
V. REFERENCES


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