

Efficacy of Castor Oil in the Control of Throat, Skin and Enteric Bacteria

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Abstract. The potential of using castor oil as an antibacterial agent was investigated on three species of bacteria chiefly responsible for throat, skin and enteric infections. *Staphylococcus aureus* was used as the test organism for skin bacteria, the throat bacteria used was *Streptococcus viridans*, while for enteric bacteria, *Shigella dysenteriae* was used. Castor oil was extracted by cold pressing of seed kernels. The extract obtained was assayed for antimicrobial activity on the *in-vitro* growth of test organism using direct inoculation, paper disc method. These were soaked in the castor oil for 1 hour. The soaked discs were then placed on prepared plates each containing the test bacteria, the antimicrobial effect of the castor oil was observed by measuring the zone of inhibition of the agent against the test bacteria. The result showed that castor oil is highly effective against all the bacteria species tested; the zone of inhibition measured, showed that *Staphylococcus aureus* is more susceptible to the oil than the other bacteria with a range of 11-13mm while *Streptococcus viridans* had a range of 8-10mm and the least was *Shigella dysenteriae* which had a range of 3-6mm. The result obtained implies that castor oil can be used in the control of wounds, skin infections, throat infections and in the treatment of stomach unrest caused by these bacteria species.

Keywords. Castor oil, bacteria, skin, throat, enteric.

1 Introduction

The castor plant (*ricinus communis*) appears to have originated in eastern Africa, around Ethiopia. It now grows throughout the warm-temperate and tropical regions and flourishes under a variety of Climatic conditions. It can be grown almost anywhere and this is one of castor's greatest virtues (Makhubu, 1998).

The castor bean (also known as the castor seed) contains up to 55 percent oil. Castor oil is extracted from the castor seed, which grows on the castor plant. The glycerides of ricinoleic acid in castor oil are mainly responsible for its purgative effect (Adebayo *et al*: 1983).

Godman and Gilman (1989) said that castor oil has many purposes and is found in many commercial products, including brake fluid, ink, paint, soap and cosmetics. It also has many health benefits. The Food and Drug Administration has classified castor oil as both safe and effective.(FAO, 1985).

The oil is widely used in West Africa sub-regions for a number of medical purposes due to varieties of bioactive compounds present in it (Cupples et al 2004). 89.5 percent of the oil is composed of ricinoleic acid and three percent is composed of oleic acid. Ricinoleic and oleic acid derivatives were studied for their antimicrobial properties and it has been found that these two substances were superior in their activity against several species of bacteria, yeasts and molds when compared to 2,4-Hexadienoic and 10-undecenoic acids, two known antimicrobial agents. This explains why castor oil has been used successfully in treating puncture wounds; even when the patient is experiencing an acute infection at the wound site.

Over the years, investigations on the inhibition of microorganisms by several higher plants and their constituents had been conducted and reported. Many medicinal plants have been found to possess significant antimicrobial value due to their particular constituents. (Pariya & Chakravarthi, 1997; Zaika 1987).

Cowman (1999) stated that the seeds of the plant contain alkaloid ricinine and toxalbumine ricin, used mainly for medicinal purposes, castor plant and its oil is one of the most commonly used oil all over the world.

Castor oil chiefly consists of glycerol or triricinolein and a small quantity of palmitic and stearic acid, unlike some oils, castor oil possesses the remarkable property of mixing with absolute alcohol and glacial acetic acid in all proportions. The glycerides of ricinoleic acid in castor oil are mainly responsible for its purgative effect (Adebajo et al.: 1983).

Castor oil is good for a variety of ailments and conditions as stated by Sofowora (1982), and can be taken internally, as well as applied externally for good results. Castor oil is generally considered safe, one can treat corns on the foot by applying castor oil once or twice daily to the corns, and can treat warts with castor oil in a similar fashion.

Castor oil may also be used to treat ringworm, abscesses, bruises, dry skin, and dermatitis. Apply castor oil to sore muscles and massage for relief. Liasu, M.O. and Ayandele, A.A. (2008).

Castor oil can cure eyes ailments, relieve constipation, clean the system in case of food poisoning and can treat corns, warts, sunburn or bruises by applying the oil to the affected area once or twice daily (Evans, 2005).

Perhaps lesser known, however, are castor oil's uses in agriculture. From eliminating mole and gopher problems to keeping fungus off plants, castor oil's agricultural uses are extremely helpful to those wishing to produce healthy crop (Pradeep *et al.* :2002)

Castor oil has been found to be effective as a fungus deterrent on many types of plants. When the oil is mixed with liquid soap and sprayed directly on the leaves of plants, fungus growth can be impeded. This tends to be effective at preventing mold and other types of common rot as well (Pradeep *et al.*, 2002)

The castor cake is mainly used as a fertilizer. It is unsuitable as an animal feed because of the presence of toxic protein called ricin and toxic allergen often referred to as CBA (castor bean allergen) (Gonzaga *et al.*: 1998). Most use castor oil as a cathartic taken internally to purge the bowels and associate it with a remedy only to be used in emergencies due to its unpleasant taste. Commercial castor oil packs are used for any pain in the abdominal area, whether it was from indigestion, the flu, constipation, or menstrual cramps (Ingri Harkins, 2000).

Medicinal Castor oil is used throughout the world to help women during childbirth. Gonzaga *et al.* (1998) used castor oil-balsam of Peru-trypsin ointment to assist in healing skin. Undecylenic acid derived from natural castor oil has "anti-fungus, anti-bacterial, and anti-virus activity" and is extracted from the unsaturated fatty acid ricinoleic acid (Karlheinz Hill 2000). Undecylenic acid is also used in cosmetics and is the active ingredient in over-the-counter medications for skin infections and relieves itching, burning, and irritation (**Prescott *et al.* (2008)**). Castor oil has been used in skin care products for centuries, and continues to play an important part in the production of soaps and cosmetics. Castor oil and derivatives are used in soaps, creams (tretinoin), shampoos, perfumes, lip gels, lipsticks, hair oil's (increases hair luster), deodorants, lubricants, sunscreens, and many other personal hygiene and beauty products (Wiley Interscience, 2005).

This study is aimed at examining the potential of using Castor oil in the control of throat, skin and enteric Bacteria. In view of the frame work, castor oil is evaluated and screened for its likely antibacterial activity.

1.1 Justification

The importance of this study is to aid those suffering from acute Throat and skin infections in bringing quick relief by the simple application of castor oil in the affected area. This will assist in solving such occurrences before further medication can be sought for from the hospitals.

2 Materials and Methods

2.1 Oil Extraction

The seeds of the castor beans were collected from the National Cereals Research Institute, Badeggi (NCRI) castor experimental research field. The capsules were dried and cracked to remove the seeds, which were eventually sun dried. Castor oil was extracted by cold pressing the seed kernels (Zaika, 1987). The potency of the extracted castor oil was studied at the National Veterinary Research Institute, Vom (NVRI) and Ibrahim Badamosi Babangida (IBB) University Lapai, Nigeria bacteriology laboratory.

The standard method of inoculums preparation by Lawrence (1978) was employed.

The extract obtained was assayed for antimicrobial activity on the *in-vitro* growth of test organism using direct inoculation, paper disc method.

The discs prepared from whatman filter paper were sterilized according to Ochei and Kolhatkar (2000). These were soaked in the castor oil for 1 hour. The soaked discs were then placed on prepared plates each containing the test bacteria, the antimicrobial effect of the castor oil was observed by measuring the zone of inhibition of the agent against the test bacteria (Cheesbrough, 1985).

2.2 Test Organisms

Pure cultures of the test Bacteria were obtained from the NVRI Bacteriology Laboratory stored as slants in McCartney bottles and refrigerated. *Staphylococcus aureus* was used as the test bacteria for skin infections, the enteric bacteria tested was *Shigella dysenteriae*, while *Streptococcus viridans* was the bacteria tested for throat infection. The analyses were all carried out in triplicates and the results tabulated. The Plates were incubated at 22 ± 3 °C for 3-5 days (all in triplicates).

Plates were observed for zone of inhibition around the well and paper disc.

Diameters of clear zone were measured in mm.

3 Results and Discussions

The measured values of inhibition zone diameter (IZD) for studied test organisms are shown in Tables 1 to 3.

Table 1. Mean values of inhibition zone diameter (IZD) for castor oil on *staphylococcus aureus*

| Castor oil | Conc. mg/ml | IZD (mm) |
|------------|-------------|----------|
| 1 | 100 | 12.0±2.0 |
| 2 | “ | 11.0±1.0 |
| 3 | “ | 13.0±0.4 |
| 4 | “ | 11.5±0.1 |
| 5 | “ | 12.0±0.3 |

All analysis were carried out in triplicates (IZD = inhibition zone diameter)

Table 2. Mean values of inhibition zone diameter (IZD) for castor oil on *streptococcus viridians*

| Castor oil | Conc. mg/ml | IZD (mm) |
|------------|-------------|----------|
| 1 | 100 | 8.0±0.6 |
| 2 | “ | 9.5±1.0 |
| 3 | “ | 10.0±0.3 |
| 4 | “ | 9.0±0.1 |
| 5 | “ | 8.5±0.5 |

All analysis were carried out in triplicates (IZD = inhibition zone diameter)

Table 3. Mean values of Inhibition zone diameter (IZD) for castor oil on shigella dysenteriae

| Castor oil | Conc. Mg/ml | IZD(mm) | 1 |
|------------|-------------|----------|---|
| 1 | 100 | 3.00±0.4 | |
| 2 | “ | 4.00±0.1 | |
| 3 | “ | 6.00±0.2 | |
| 4 | “ | 5.00±0.3 | |
| 5 | “ | 4.50±0.2 | |

All analysis were carried out in triplicates (IZD = inhibition zone diameter)

The values of inhibition zone diameter (IZD) presented in Tables 1 to 3 indicate that antimicrobial activities of castor oil against the studied bacteria are in the order:

Staphylococcus aureus > *Streptococcus viridians* > *Shigella dysenteriae*.

Castor oil has shown good activity against *Staphylococcus aureus* – an organism causing skin diseases and also against *Streptococcus viridians* responsible for throat infections. Further, the observed low activity of castor oil against enteric bacteria, *Shigella dysenteriae*, was also reported by Ingri Harkins (2000).

The observed differences in the inhibition zone could be due to the biochemical differences in the target structures in the cell components of bacteria (Lorian, 2000)

This test confirms the efficacy of castor oil on the test organisms thereby implying that castor oil can be used in the treatment of throat, skin and stomach unrest.

Antibacterial activity of castor oil can be attributed to a hydroxyl fatty acid ricinoleate (an ester of ricinoleic acid) present in castor oil. About 90% of castor seed oil contains the unusual hydroxyl fatty acid ricinoleate. Ricinoleic acid inhibits the growth of many viruses, bacteria, yeasts, and molds, like its derivative undecylenic acid. Also, topical application of ricinoleic acid, the main component of castor oil, exerts remarkable analgesic and anti-inflammatory effects. This purgative effect contained in the oil is mostly responsible for the zone of inhibition seen in the growth of all the test bacteria as cited by other investigators (Odugbemi, T. and Abiodun, A., 2008).

The ricin present in Castor seed is a potent cellular poison that can be lethal if inhaled or injected. The observed antimicrobial effect of castor oil may also be due to the presence of ricin and ricinine (an alkaloid of organic acids) present in the castor oil. (Prescott *et al.*, 2008).

4 Conclusion

Antibacterial activity of castor oil has been studied against *Staphylococcus aureus*, *Streptococcus viridans*, and *Shigella dysenteriae* using direct inoculation, paper disc method. Activity of castor oil against the studied bacteria was found to be in the order:

Staphylococcus aureus > *Streptococcus viridians* > *Shigella dysenteriae*. The result obtained implies that castor oil can be used in the control of wounds, skin infections, throat infections and in the treatment of stomach unrest caused by these bacteria species.

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