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Clinical Studies of Three Herbal Soaps in the Management of Superficial Fungal Infections

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ABSTRACT

Superficial fungal infections could be worrisome in hot tropical climates; there is the need to develop affordable treatment option to stem the menace. We report the clearance effects of three (3) locally prepared herbal soaps (A, B and C) on superficial fungal infections in this study. Palm Kernel Oil (PKO) and Sodium Hydroxide (NaOH) were used to constitute the soap base. A total of 67 subjects with pronounced superficial skin lesions were recruited, prepared herbal soaps were administered randomly on the subjects, monitored for four consecutive weeks and levels of lesion clearance monitored and recorded. Microscopic examination of the skin peels reveals the presence of Cryptococcus and Epidermophyton species. Results showed that the herbal soaps completely cleared the skin lesions without visible edge in the order A (61.1%), B (52.9%), C (31.6%) and Control (0.0%). Skin infections were found to be associated with socio-economic status of the subjects and were common among the young adults. Comparative statistical analysis of the means, using paired sample student t-test showed significant differences in the herbal soaps except between A and B 0.544 ($p \leq 0.05$). The 3% w/w concentration of soap A was found to have better prospect among the three tested herbal soaps. Cultivation of *Senna alata* was recommended for sustainable commercial production of soap A in a resource-limiting setting like Nigeria.

Key words: Herbal soaps, superficial fungal infection, medicinal plants, *Tinea versicolor*, *Senna alata*

INTRODUCTION

Skin infections have been observed to occur frequently in warm humid climates and common in adolescent and young adult males (El-Said, 2001; Kevin, 2008). Dermatophytes are among the most prevalent infection-causatives in the world (Bakheshwain *et al*., 2011) and millions of dollars are expended annually in their treatment (Brooks *et al*., 2004). They can be persistent and worrisome though not debilitating or life-threatening. Skin diseases however, constitute a significant problem all over the world (Van Hees and Naafs, 2001). Studies have shown that skin infection is a global phenomenon (Enemuor and Amedu, 2009). *Tinea versicolor* is a relatively common skin infection caused by the fungus *Pityrosporum ovale* and associated with pigmentary changes on the skin. *Epidemophyton flocussum* and *Tinea corporis* infect the skin and nails (Sanuth and Efuntoye, 2010). The skin protects the body against pathogens and it serves as interface with the environment. Invasion of pathogenic micro-organisms on the skin leads to skin diseases. Fungi are of special significance in tropical environments; this is because of the

enhancement of their growth by the high temperature and high humidity conditions which are prevalent in these regions (Darmstadt, 2000). According to Buonanotte (2008), 20% of the population globally has ringworm or other type of fungal condition at any given time. Skin infections and infestations have been found to be common in late teens and young adults worldwide and are prevalent among the poor than the rich (Ebrahimzadeh, 2009). In a survey of prevalence skin disorder in Ibadan and Ile-Ife, Nigeria, fungal infections of *T. capitis* and *T. versicolor* were found to be most common (Odueko *et al*., 2001; Ogunbiyi *et al*., 2005). In sub-Saharan Africa, modern health care delivery is usually not affordable due to low per capita income and its non availability in the rural areas. As a result of cultural alignment and inability to afford cost of treatment offered by orthodox medical practitioners, the lower strata of the population in developing countries rely heavily on traditional medicine (Okpuzor *et al*., 2008). Man has used plants to treat common skin infections for centuries and the healing potential of plants was well accepted before microbes were discovered (Rios and Recios, 2005). Many plants and herbs have been found to be effective in the treatment of skin diseases (Sati and Joshi, 2011). Large percentage of the world's human population, especially in developing countries, depends on traditional medicine based on medicinal and aromatic plants (WHO, 2002). Globally the efficacy of herbal medicine is gradually being recognized and accepted (Adodo, 2006). In Nigeria, local soaps (popularly known as black soap) have been used as medium of administration for topical medicaments in the treatment of skin infections and related diseases (Omobuwajo *et al*., 2011). Local soaps are usually produced from the ash obtained from husks of cocoa pods (*Theobroma cacao*) and palm kernel oil (i.e., PKO from *Elaeis guinnense*) (Moody *et al*., 2004). This study was embarked upon to develop an affordable cheap drug from locally available plant materials for the treatment of skin infections among the rural populations of the developing tropical regions.

MATERIALS AND METHODS

Soap preparations

Soap A: Fresh leaves of *Senna alata* (L.) Roxb (Caesalpinaceae-UHI-13918) were collected from Ile-Ife. The leaves were oven dried at 30°C and subsequently powdered. The powdered leaf was incorporated into the soap consisting of caustic soda (NaOH) and Palm Kernel Oil (PKO) to make 3.0% w/w strength. The herbal soap mixture was similarly poured and allowed to solidify and then cut into stable 6×3×2 cm soap tablets of 65 gm each (labeled soap A).

Soap B: Fresh stem barks of *Erythrophleum guineense* G. Don (Leguminosae/Fabaceae-UHI-15096) and *Pterocarpus osun* Craib (Leguminosae/Papilionoideae-UHI-16067), root of *Aristolochia ringens* Vahl. (Aristolochiaceae-UHI-16305), seeds of *Piper guineense* Schum and Thonn. (Piperaceae-UHI-263) and *Aframomum melegueta* K. schum (Zingiberaceae-UHI-13296) were purchased and dried at 30°C and powdered subsequently. The powdered plant material mixture was incorporated into the soap consisting of caustic soda (NaOH) and Palm Kernel Oil (PKO) to make 5% w/w strength. The herbal soap mixture was similarly poured and allowed to solidify and then cut into stable 6×3×2 cm soap tablets of 65 gm each (labeled soap B).

Soap C: Dry seeds of Aframomum melegueta K. schum (Zingiberaceae-UHI-13296), *Pipers guineense* Schum and Thonn. (Piperaceae-UHI-263) and dry fruits of *Xylopia aethiopica*

(Dunal) A. Rich (Annonaceae-UHI-14625) were obtained from a local herb market in Ile-Ife, Nigeria in March 2008. The plant materials were oven dried at 30°C and subsequently powdered. Powdered plant materials were then infused into coconut oil for one week and then filtered using Whatman No. 1 filter paper. An appropriate quantity of the filtrate (drug), enough to make 5% w/w strength was added to the NaOH-PKO soap base. The herbal-soap mixture was poured and allowed to solidify and then cut into stable 6×3×2 cm soap tablets of 65 gm each (labeled soap C).

Control soap: The control soap consists of ordinary soda-based soap tablets. No plant drug was incorporated in the control/placebo.

Plant materials: All the plant materials were identified and authenticated at University herbarium of Department of Botany, Obafemi Awolowo University, Ile-Ife, Nigeria before use. Voucher numbers were obtained for the plant specimens.

Clinical procedures: The study was carried out at the Ilesa Prison, Osun state, Nigeria between April and May 2009. An earlier visit to the prison confirmed the occurrence of different skin lesion cases and a variety of skin infections among the prison inmates. The cooperation and willingness of the inmates and their supervisors was tentatively ensured prior to the administration of the informed consent forms at the commencement of the study. The investigation was a follow up on a similar study conducted previously in which 1.5% w/w soap A was used. Open and comparative trial exercise to assess the general potential efficacy and safe concentration of different herbal soaps in the treatment of various types of skin eruptions available among the prison inmates was investigated. The inmate's participation was made optional and voluntary. Ethical clearance from Obafemi Awolowo University Teaching Hospital Complex (OAUTHC), Ile-Ife ethical committee was obtained before the study. A total of sixty seven (67) prison inmates were recruited as subjects for the study. They were randomly distributed into four (4) groups viz: 18 (3% w/w soap A), 19 (soap C), 17 (soap B) and 13 (Control soap). Each subject was undressed and his skin was physically examined in good light noting the presence of any infection. Subjects with obvious skin infections were recruited and samples collected as skin peels from the edges of the observed lesions on the skin. Subjects were diagnosed by a Physician in the team, clerked and the soaps administered with detailed instruction on the usage. The soap was used for bathing the whole body and the lather rubbed onto the skin lesion twice daily for four (4) consecutive weeks. No other treatment/medication for the lesion was allowed throughout the period of investigation. Microscopic investigations of the samples were carried out at the laboratories of Department of Paediatrics and Child Health, Obafemi Awolowo University, Ile-Ife, Nigeria where the causative organisms were identified accordingly. The subjects were examined and monitored on weekly basis for four (4) consecutive weeks to assess the effectiveness of the herbal soaps.

Simple percentages and Paired sample t-test (SPSS) were used to analyze the data obtained from the observations.

RESULTS

The age distribution of the subjects recruited for the study show that the inmates with skin lesions were mainly middle aged people between 21-30 years (73.1%) and 31-40 years (23.9%) (Table 1) representing a sum of 97.0% of the study population while only 3% aged above 40 years.

Previous studies have shown that skin infections are common in children, young and middle-aged people (Nanda *et al*., 1988). The educational background of the subjects in Table 2 reveals that only 13.4% had tertiary education while the higher percentages were fairly educated both at secondary (53.7%) and primary (26.9%) school levels, 6% have no formal education. Skin diseases have been observed to be prevalent among the people with low socioeconomic factors (Odueko *et al*., 2001), this is reflected in the educational status of subjects.

Out of the 67 subjects diagnosed by the physician prior to treatment, *T. versicolor* was 59.7%, *T. corporis* 14.9%, Scabies 14.9% and Acne 10.5% (Table 3). *Tinea* species have been implicated to be responsible for substantial percentage of skin infections in the tropics with *T. versicolor* prevailing as reflected in the study. Microscopic examination confirmed *Cryptococcus* (53.7%) and *Epidermophyton* (9.0%) as the causative organisms expressed in Table 4. Dermatophytes have been implicated among the most prevalent skin infections in the world (Brooks *et al*., 2004). Results obtained after four weeks of treatment with the herbal soaps (A, B and C) showed that the soaps effectively cleared 61.1, 52.9 and 31.6% of the fungal infections, respectively (Fig. 1). The control soap did not show any effective clearance on the skin lesions. Paired sample student t-test (SPSS16.0) showed significant differences between the means of all the soaps (Table 5), only the means of soaps A and B have no significant differences 0.544 ($p \leq 0.05$).

Table 1: Age distribution of subjects treated with different soaps

	Soap A		Soap B		Soap C		Control		
Age (Years)	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Total %
10-20	-	-	-	-	-	-	-	-	-
21-30	14	77.8	14	82.8	14	73.7	07	53.9	73.1
31-40	04	22.2	03	17.6	05	26.3	04	30.8	23.9
41-50	-	-	-	-	-	-	02	15.4	3.0
Total	18	100	17	100	19	100	13	100	100

Table 2: Educational background of subjects treated with different soaps

	Soap A		Soap B		Soap C		Control		
Educational level	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Total %
No formal education	02	11.1	01	5.9	01	5.3	-	-	6.0
Primary school	03	16.7	05	29.4	03	15.8	07	53.9	26.9
Secondary school	09	50.0	08	47.1	13	68.4	06	46.2	53.7
Tertiary school	04	22.2	03	17.6	02	10.5	-	-	13.4
Total	18	100.0	17	100.0	19	100.0	13	100	100.0

Table 3: Clinical diagnosis of subjects prior to treatment

	Soap A		Soap B		Soap C		Control		
Diagnosis	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Total %
T. versicolor	10	55.6	11	64.7	12	63.2	07	53.9	59.7
Scabies	03	16.7	04	23.5	-	-	03	23.1	14.9
T. corporis	04	22.2	02	11.8	02	10.5	02	15.4	14.9
Acne/Bump	01	5.6	-	-	05	26.3	01	7.7	10.5
Total	18	100	17	100	19	100	13	100	100

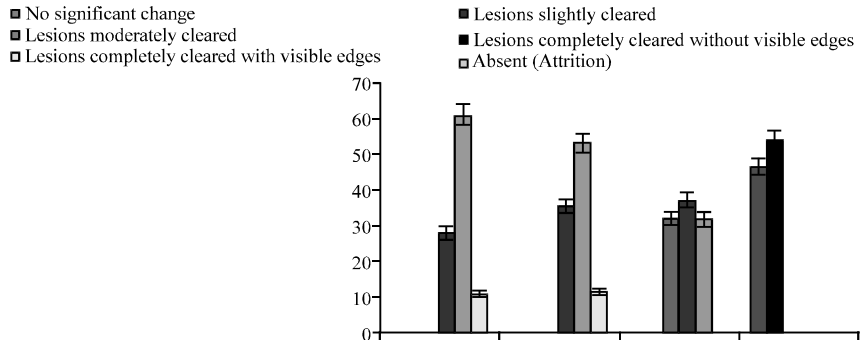
Table 4: Microscopic examination of skin peel samples from the treated subjects

	Soap A		Soap B		Soap C		Control		
Organism observed	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Total %
Epidermophyton floccusum	02	11.1	-	-	02	10.5	02	15.4	9.0
Cryptococcus spp.	12	66.7	13	76.5	05	26.3	06	46.2	53.7
Nil	04	22.2	04	23.5	12	63.2	05	38.5	37.3
Total	18	100	17	100	19	100	13	100	100

Table 5: Comparative effects of 3 herbal soaps on superficial skin infections using paired samples students t-test ($p \leq 0.05$)

Pair	Herbal soaps	t	df	Sig. (2-tailed)
1	Soap A-soap C	3.389	17	0.003 (Sig.)
2	Soap A-soap B	.620	15	0.544 (Not Sig.)
3	Soap A-control	18.917	12	0.000 (Sig.)
4	Soap C-soap B	-3.105	15	0.007 (Sig.)
5	Soap C-control	8.716	12	0.000 (Sig.)
6	Soap B-control	10.668	11	0.000 (Sig.)

The paired sample student t-test revealed significant differences in all the pairs except between soaps A and B = 0.544 ($p \leq 0.05$)



	Soap A	Soap B	Soap C	Control
No significant change	0	0		46.2
Lesions slightly cleared	0	0	0	53.8
Lesions moderately cleared	0	0	31.6	0
Lesions completely cleared with visible edges	27.8	35.3	36.8	0
Lesions completely cleared without visible edges	61.1	52.9	31.6	0
Absent (Attrition)	11.1	11.8	0	0

Fig. 1: Effect of herbal soaps on superficial fungal infections in 4 weeks (%)

DISCUSSION

Skin diseases are common in Nigeria and predominantly affect individuals in the highly productive age group as reflected in Table 1; this is similar to the findings of Onayemi *et al.* (2005) in the north-western Nigeria and Nwankwo *et al.* (2009) in the south-eastern Nigeria. It also corroborates the result of Ponnighaus *et al.* (1996) in Malawi. This group of people is favourably disposed to crime; hence, they constitute higher percentage of the inmates. People with poor socio-economic status indexed by low educational status among others are also vulnerable to skin diseases (Sanuth and Efuntoye, 2010). Level of individual education is an index of his/her

socio-economic status. Table 2 indicate that subjects with lower level of education are mostly infected with skin infections. This is similar to a study in Iraq where people of low level educated parents are more susceptible to fungal skin infections (Fathi and Al-Samarai, 2000). Improved educational policy that will dispose the teeming population in the rural and urban areas to good education is important to stem the spread of skin infections as recommended by Onayemi *et al.* (2005). The clinical diagnosis of the skin infections (Table 3), *Tinea versicolor* (59.7%) and *Corporis* (14.9%) were confirmed by the microscopic investigations in the laboratory (Table 4), revealing the presence of Cryptococcus and Epidermophyton which spread easily among the subjects. This study supports the findings of Nanda *et al.* (1988) that *T. versicolor* is a common skin disorder among adults. The characteristic hot humid weather condition of tropical region, overcrowding of the prison cells, inadequate/poor personal hygiene and sharing of personal effects by the inmates and malnutrition also predispose the inmates to superficial fungal infections (Ogunledun *et al.*, 2010). The skin lesions on the subjects were completely cleared with the edges no longer visible within four weeks of herbal soap treatment as seen in Fig. 1 for A (61.1%), B (52.9%), C (31.6%) and Control (0%). Both A and B soaps demonstrated good activity against superficial fungal infections on the skin, confirming the folkloric uses of the plant components as antifungal agents.

Leaves of *Senna alata* at 1.5%w/w of local soap has been found to clear 47.06% of the subjects infected with *T. versicolor* (Oladele *et al.*, 2010). A substantial improvement of 61.1% clearance was observed with increased concentration (3%w/w) of *S. alata* leaves in this present study. *E. guineense* stem bark, used in the preparation of soap B, is claimed for the treatment of skin infections throughout the dry zones of West Africa (Arbonnier, 2004; Burkill, 1985) which is supported by the findings from this study (52.9% clearance, Fig. 1). Some of the alkaloids in the stem bark of *E. guineense* have been implicated for this antimicrobial activity by other workers Manfouo *et al.* (2005) and Ngounou *et al.* (2005) while the seed oil has also been reported as a broad spectrum antifungal agent against dermatophytes (Adedotun *et al.*, 2006). Ethanolic extract of *P. guineense* seeds (used in soaps B and C) have shown significant antifungal effect on filamentous fungi (Ngane *et al.*, 2003) while monoacylglycerols made from coconut oil have demonstrated antifungal activity against *Aspergilus niger* DMF 0801. The seed extract of *A. melegueta* showed some antimicrobial activity by inhibiting the growth of *E. coli* and *Salmonella* spp. at concentration of 50 mg mL^{-1} (Doherty *et al.*, 2010). Leaves and stem bark of *P. osun* are medicinally useful for superficial skin infections such as eczema (Gill, 1992) while the extracts from stem bark showed significant antimicrobial activities due to different classes of isolated chemical compounds (Ebi and Ofodile, 2000).

Comparative statistical analysis of the herbal soaps (Table 5) in clearing superficial fungal infections was carried out using paired sample student t-test of SPSS16.0 (2007); it showed significant differences between the means of all the soaps except the means of A and B soaps that have no significant differences 0.544 ($p \leq 0.05$). Lack of significant differences between A and B soaps showed that they possess higher clearance effect over soap C and the control in the treatment of superficial fungal infections. However, the efficacy of A and B soaps are similar statistically. The only advantage soap A has over soap B is that it contains only one (1) plant material against five (5) for soap B which will reduce production cost as well as difficulties in collection and conservation while ensuring sustainable supply. *Senna alata* is a perennial shrub that grows easily from seed and stem cuttings. It is easily cultivated in plantations with a short rotation age compared to *E. guineense* tree with long gestation period. Only leaves are harvested from *Senna alata* which

supports surer sustainability than the stem barks *E. guineense* and *P. osun* which may not be sustainable when harvested for commercial production. Cultivation of important medicinal plants such as *S. alata* is required for sustainable supply (Malik *et al*., 2011) to prevent overexploitation.

CONCLUSION

Results from the study showed that herbal soaps A and B, sourced from locally available materials, have great potentials for treating superficial fungal infections common in the hot humid regions of sub Saharan West Africa. Cultivation of these important and frequently used medicinal plants is required for sustainable supply. Economic studies of the conservation of plants used for the herbal preparations are also required in order to tap the potentials offered by these plants.

REFERENCES

Adedotun, A.A., E.L. Aya and O.O. Dabiri, 2006. The composition and antifungal properties of the *E. suaveolens* seeds and oil. Life Sci., 3: 61-64.

Adodo, A., 2006. Herbs for Healing: Receiving God's Healing Through Nature. Revised Edn., PAX Publications, Nigeria.

Arbonnier, M., 2004. Trees, Shrubs and Lianas of West African Dry Zones. 1st Edn., CIRAD, Margraf Publishers GMBH MNHN, USA., ISBN: 2876145790, pp: 1-574.

Bakheshwain, S., N. El-Khizzi, A.M. Al-Rasheed, A. Al-Ajlan and S. Parvez, 2011. Isolation of opportunistic fungi from dermatophytic samples. Asian J. Dermatol., 3: 13-19.

Brooks, G.F., J.S. Butel and S.A. Morse, 2004. Jawetz, Melnickand Adelberg's Medical Microbiology. 23 Edn., McGraw Hill, USA.

Buonanotte, F., 2008. Treating ringworm and other fungal conditions. http://www.associatedcontent.com/article/725971/treating_ringworm_and_other_fungal.html?cat=68

Burkill, H.M., 1985. The Useful Plants of Tropical West Africa. Vol. 1, Families A.D., Royal Botanic Gardens Kew, pp: 604.

Darmstadt, G.L., 2000. Cutaneous Fungal Infection. In: Nelson Textbook of Paediatrics, Behrman, R.E. (Ed.). 16th Edn., W.B. Saunders Publisher, Philadelphia, PA., USA., pp: 2036.

Doherty, V.F., O.O. Olaniran and U.C. Olaniran, 2010. Antimicrobial activities of *Aframomum melegueta* (Alligator pepper). Int. J. Biol., 2: 126-131.

Ebi, G.C. and S.I. Ofodile, 2000. Antimicrobial activity of *Pterocarpus* stems. Fitoterapia, 71: 433-435.

Ebrahimzadeh, A., 2009. A survey on pityriasis versicolor in the university students in Southeast of Iran. Asian J. Dermatol., 1: 1-5.

El-Said, I.H.M., 2001. Mycological and physiological studies on fungi, isolated from skin diseases. Pak. J. Biol. Sci., 4: 1432-1436.

Enemuor, S.C. and A.S. Amedu, 2009. Prevalence of superficial mycoses in primary school children in Anyigba, Kogi State, Nigeria. Afr. J. Microbiol. Res., 3: 062-065.

Fathi, H.I. and A.G.M. Al-Samarai, 2000. Prevalence of *Tinea capitis* among schoolchildren in Iraq. Eastern Mediterranean Health J., 6: 128-137.

Gill, L.S., 1992. Ethnomedical Uses of Plants in Nigeria. Uniben Press, University of Benin, Nigeria, pp: 212.

Kevin, B., 2008. Medical Encyclopedia. Drug Information Online. Drugs.com. http://www.drugs.com/medical_encyclopedia.html.

Malik, A.R. , M.A.A. Siddique, P.A. Sofi and J.S. Butola, 2011. Ethnomedicinal practices and conservation status of medicinal plants of North Kashmir Himalayas. Res. J. Med. Plant, 5: 515-530.

Manfouo, R.N., F.N. Ngounou, B.T. Ngadjui and B.L. Sondengam, 2005. Erythrosuavine, a new diterpenic alkaloid from *E. suaveolens* (Guil. and Per) Brenan. Bull. Chem. Soc. Ethi., 19: 69-74.

Moody, J.O., O.A. Adebiyi and B.A. Adeniyi, 2004. Do *Aloe vera* and *Ageratum conyzoides* enhance the anti-microbial activity of traditional medicinal soft soaps (Osedudu). J. Ethnopharmacol., 92: 57-60.

Nanda, A., S. Kaur, O.N. Bhakoo, I. Kaur and C. Vaishnari, 1988. *Pityriasis* (tinea) *versicolor* in infancy. Pediatr. Dermatol., 5: 260-262.

Ngane, A.N., L. Biyiti, P. Bouchet, A. Nkengfack and P.H. Amvam Zollo, 2003. Antifungal activity of *Piper guineense* of Cameroon. Fitoterapia, 74: 464-468.

Ngounou, F.N., R.N. Manfouo, L.A. Tapondjou, D. Lontsi and V. Kuete *et al*., 2005. Antimicrobial diterpenoid alkaloids from *Erythrophleum suaveolens* (Guill and Perr) Brenan. Bull. Chem. Soc. Eth., 19: 221-226.

Nwankwo, O.B., N.A. Amadi, S.K., M.U. Chukwuocha, A.E. Nwoke, C.N. Oguejiofor and O. Uchechukwu, 2009. Common skin infections among secondary school students in Mbaise, Imo State, Nigeria: Proxy predictor of environmental hygiene standards. The Social Sci., 4: 223-228.

Odueko, O.M., O. Onayemi and G.A. Oyedeji, 2001. A Prevalence survey of skin diseases in Nigerian Children. Nig. J. Med., 10: 64-67.

Ogunbiyi, A.O., E. Owoaje and A. Ndahi, 2005. Pediatric Dermatology. Blackwell Publishing, Nigeria, pp: 6-10.

Ogunledun, A., H.I. Effedua, A.A. Ambali, F.A. Oluwole, P. McLoone, A.A. Salako and K.S. Oritogun, 2010. Incidence of *Malassezia fungemia* and *Bacteremia* in School Children with *Pityriasis versicolor* in Ogun State, Nigeria. Academic Arena, 2: 1-5.

Okpuzor, J., O. Adebesin, H. Ogbunugafor and I. Amadi, 2008. The potential of medicinal plants in sickle cell disease control: A review. Int. J. Biomed. Health Sci., 4: 47-55.

Oladele, A.T., B.A. Dairo, A.A. Elujoba and A.O. Oyelami, 2010. Management of superficial fungal infections with *Senna alata* (Alata) soap: A preliminary report. Afr. J. Pharm. Pharmacol., 4: 098-103.

Omobuwajo, O.R., A. Abdu, O.A. Igbeneghu, I.O. Agboola and G.O. Alade, 2011. Preliminary investigation of a herbal soap incorporating *Cassia alata* (L.) roxb leaves and *Ageratum conyzoides* Linn. whole plant powders. Continental J. Pharm. Sci., 5: 1-10.

Onayemi, O., S.A. Isezuo and C.H. Njoku, 2005. Prevalence of different skin conditions in an outpatients setting in North-Western Nigeria. Int. J. Dermatol., 44: 7-11.

Ponnighaus, J.M., P.E. Fine and J. Saul, 1996. The epidemiology of *Pityriasis versicolor* in Malawi, Africa. Mycoses, 39: 467-470.

Rios, J.L. and M.C. Recios, 2005. Medicinal plants and antimicrobial activity. J. Ethnopharmacol., 100: 80-84.

Sanuth, H.A. and M.O. Efuntoye, 2010. Distribution and microbiological characterization of dermatophytes infection among Primary School Children in Ago Iwoye, Ogun State, Nigeria. Res., 2: 95-99.

Sati, S.C. and S. Joshi, 2011. Aspects of antifungal potential of ethnobotanically known medicinal plants. Res. J. Med. Plant, 5: 377-391.

Van Hees, C. and B. Naafs, 2001. Common skin Diseases in Africa: An Illustrated Guide. Stichting Troderma van Hees Publishers, Africa.

WHO, 2002. WHO Traditional Medicine Strategy 2002-2005. World Health Organization, Geneva, pp: 74.