

Full Length Research Paper

Industries formulating oral antimicrobial suspensions in Nigeria

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Pharmaceutical Companies concerned with the manufacture and trading of the commonest varieties of Oral antimicrobial suspensions in Nigeria were identified. This was prompted by an effort to provide a clue to the current Pharmaceutical Industrial growth of the country. This was achieved through a survey conducted to identify the number, distribution location as well as the product of the industries with the aid of questionnaires distributed to manufacturers (Pharmacists and Sales representatives). Presence of the products was assessed through consultation with whole sales and patent medicine dealers in Kano market one of the main drug distribution foci in Nigeria drug market. A total of 62 functional factories, unevenly distributed in ten states of the federation were identified. There were 26 (41.93%) in Lagos, 12 (19.35%) in Kano five (8.06%) in Enugu. Imo, Kwara and Ogun States had four (6.45%) each. There were three (4.83) in Oyo, Anambra had two (3.23%) but Osun and Niger State haboured one (1.61%) in each case. The industries formulated one or more among Ampicillin, Amoxicillin, Ampiclox, augmentin, Cloxacillin, Choramphenicol, Co-trimazole, Chloroquine erythromycin and metronidazole suspensions presented in various trade names. The study confirmed the proliferation of local Pharmaceutical manufacturing companies capable of producing one or more first choice antimicrobial suspension for use in chemotherapy. This seems as a mark of industrial progress in Nigeria today.

Keywords: Oral antimicrobial suspension, industries, Nigeria.

INTRODUCTION

Oral suspension of antimicrobials as chemotherapeutic agents are one of the most highly prescribed dose forms in the treatment of pediatric infections globally (Bennett and Lawrence, 1989). This is because of their safety, availability, affordability and ease of administration which facilitates compliance by the patients without compromising efficacy of the drugs (British Pharmacopoeia, 1993). Thus it has favoured their continued usage and inclusion in the current Nigerian essential drug list (Kolawole *et al.*, 2001).

The presence of a large market for drugs in Nigeria has provided the required impetus towards the installation of industrial manufacturing facility in the country. Studies documented a preponderance of oral antimicrobial suspensions (Mukhtar, 2007, Kolawole *et al.*, 2001; Erhun *et al.*, 2001).

Over time, some Pharmaceutical manufacturers acquired the right governmental support and sited industries, although still few are in active manufacturing. Capacity utilization was said to be below 30% even though the initial plan was to produce between 50 and 70% of the nations drug needs (Erhun *et al.*, 2001). This makes the country to import about 70% of the drugs. It is however desirable to distinguish the industries based on the types of drugs they formulate. It was also thought that perhaps there were few of such industries capable of formulating oral liquid antimicrobials for pediatric use before 2001 (Oluabunwa, 2002).

In relation to such situation, Rang *et al.* (1995) had since advised that procurement of drugs should be centralized at national level to reinforce the responsibility of Government to make procurement, quality control, stock management and distribution of essential drugs a priority. The creation of a some what centralized purchase funds made manufacturers to identify a large sales volume financed by existing public and private funds (Bernard *et*

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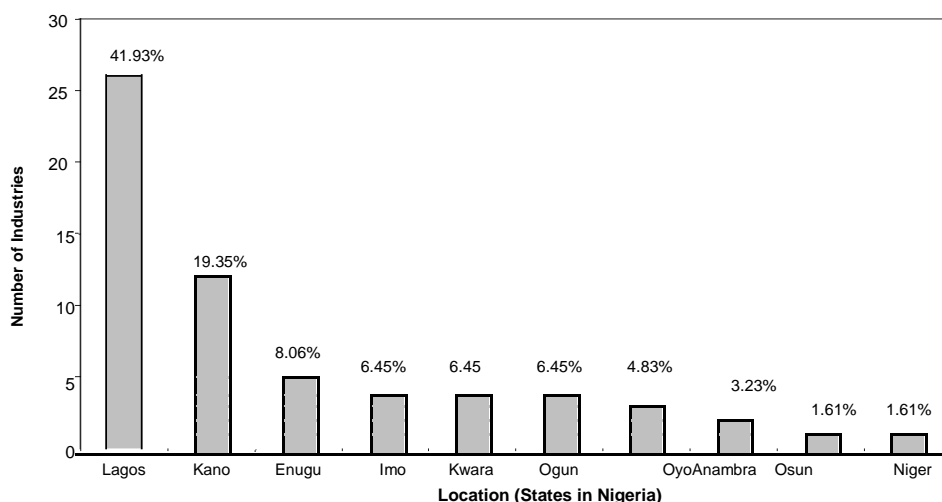


Figure 1. Location and density of industries formulating oral antimicrobial suspensions in Nigeria.

al., 1999).

The above prevailing condition attracted the planting of many factories to tap the available drug market (Erhun, 2000). That development might have been responsible for the emergence of a chaotic state of drug distribution network in Nigeria. This according to Akunyili (2004) consisted of open markets, patent medicine stores, community pharmacies, private and public hospitals, whole sealer, importers exporters, and pharmaceutical manufacturers. The increasing availability of the industries makes it a common scene in Nigeria to see even petty traders who sell kola nut, biscuits, cigarettes and orange among other items in market kiosks, motor parks and road sides selling drugs that range from over the counter to antibiotics.

However, the government of Nigeria is striving well to ensure adherence to the various laws (NAFDAC decree No. 15 of 1993). That regulates and controls the manufacture, sale and distribution of drugs in the country. This is partly the function of the National agency for foods drugs administration and control NAFDAC (Mukhtar, 2006).

Local drug prescribing policy in Nigeria enlisted ampicillin, amoxicillin, Cloxacillin, Chloramphenicol, erythromycin, metronidazole, trimethoprim and sulphamethoxazole as oral liquids, capsules, tablets or parenterals. The list was as contained in the International Compendia (Martindale, 1989; British Pharmacopoeia, 1993). The supplies of such drugs in the country were ensured by both foreign and local pharmaceutical manufactures. That necessitates the need for a compilation of the existing local industries even to ascertain the quality of the products in circulation in addition to gauging the industrial growth of the nation at the contemporary time.

It is therefore the intention of the present work to carry out a survey of Nigerian industries that formulate and

trade oral suspensions of antimicrobial drugs in the country.

MATERIALS AND METHOD

A field survey around the states of the federation was conducted. This was with the aim of collating the industrial growth of Nigeria in terms of oral antimicrobial suspension production. This was achieved through identification of the factories, location and distribution of industries that manufacture oral antimicrobials suspensions in Nigeria. Presence of some available formulations of the drug was confirmed in Abubakar Rimi Market, Kano, one of the reknown drug markets in Nigeria by adopting the method adapted by Kolawole et al. (2001). This was achieved by asking for the makers of the drugs in an attempt to buy it anonymously as any other purchaser. This ensures a shop to shops identification of the products. The representatives of patent medicine dealers association of Nigeria Kano Chapter, the directorate of pharmacy sales and promotion representatives of the companies, the NAFDAC provided supportive evidences. The data was collected within the period of October, 2002 and May, 2005. In addition to the visit of the industries by the researcher, 130 questionnaires were distributed to the production pharmacists or their representatives (Appendix I). The instrument asked respondents on the name and location, NAFDAC Registration as well as the brand(s) of oral antimicrobial suspensions their company produced in Nigeria. When personal contact became difficult, the administration and return of the questionnaires were accomplished with help of research assistants and by mailing (Posting) method described by Bichi (2001). This was to encourage recovery of the questionnaires from the respondents.

RESULT

The study identified 62 manufacturing factories for oral antimicrobial suspensions in Nigeria between October 2002 and May, 2005 (Figure 1). Market survey in Kano confirmed that the products were fully in circulation. Being that they were sold by patent and whole sellers of

Table 1. Manufacturer's confirmation of production of oral antimicrobial suspensions in Nigeria.

Total questionnaire sent	returned	Responding pharmacists	Company representatives	Confirmed Industries	Production strictly in Nigeria (%)	Industry registered by NAFDAC (%)	Ind. Conforms with WHO, PCN and GMP specifications	Drug product accepted by the government of Nigeria (%)	Active promotion by clinic calls	Export to other countries	Ind. Producing only oral liquid antimicrobials	Ind. Produce all forms, oral forms (liquid), tablet and injectables
130	69	19	50	62	100	100	100	100	35 (56.45)	41 (66.13)	(100)	15 (24.19)

WHO - World Health Organization
 GMP - Good Manufacturing Practice
 PCN - Pharmaceutical Council of Nigeria
 NAFDAC - National Agency for Food, Drug Administration and Control

the drug in the market. The production pharmacist and sales representatives gave the backing for this number of industries (Table 1). Consultation with NAFDAC authority and shop to shop surveys confirmed their existence. Assessment of NAFDAC registration number has been used as the final proof of the industries.

Of the one hundred and thirty (130) questionnaires sent to manufacturers, forty, reached production pharmacists out of which nineteen (19) responded and returned. The companies sales and promotion representatives were given 90 of such questionnaire out of that 50 responded and returned. Out of the 69 responses, 62 confirmed the manufacture of oral antimicrobial suspension (Table 1). A 100% of the respondents showed that their product was accepted by the government of Nigeria as it conforms to the pharmaceutical council of Nigeria and Good manufacturing specifications according to World Health Organization. More than half of the industries (66.13%) export their products to other countries. Up to 56.45% were capable of ensuring aggressive promotions of their products through seminars and clinic calls (Table 1).

The industries were unevenly distributed in ten states of the federation (Figure 1). There were 26

(41.93%) in Lagos (Table 2) 12 (19.35%) in Kano (Table 3). Table 4 shows five (8.06%) in Enugu while Imo, Kwara and Ogun States had four (6.45%) each. The number of such industries in Anambra was two (3.23%), but there were three (4.83%) in Oyo state. Osun and Niger States had, only one (1.61%) antimicrobial suspension manufacturing industry each (Table 4).

The companies were operating under NAFDAC's permission being that they were registered. Although outside the scope of this study, it was noted that only few Nigerian manufacturers were observed to engage in the production of adult formulation of the antimicrobial in form of capsule, tablet and parenterals. Reason for such inability may be due to inadequate technologies and facilities or due to prohibitive cost of raw material and erratic power supply (Mukhtar et al., 2006) . Prices were relatively within affordable limits as many of the brands were selling at a range of 30 - 80 naira only and rarely 90 - 150 naira per bottle. There was no drug observed to have been sold at more than 200 naira per bottle (Mukhtar and Oyeyi, 2005a, b). Problem of tariff as well as transportation cost has been minimized since the importation of the finished product has drastically reduced. In fact even the foreign

brands that arrived from India, Pakistan and Malaysia had to lower down their prices to nearly equal those of their Nigerian counterparts perhaps for a favourable competition.

The commonest varieties of the antimicrobial suspensions drugs identified were nine (9) namely ampicillin, amoxicillin, ampiclox, chloramphenicol, chloroquine, cloxacillin, co-trimoxazole, erythromycin and metronidazole (Table 5).

DISCUSSION

The present study suggests that self reliance in terms of production of oral antimicrobial suspensions may likely be realized soon in Nigeria. The establishment of local pharmaceutical industries with specialty in production of oral suspension of antimicrobials at present indicated so. At the time of this compilation, Nigeria could boast of having up to 62 of such factories located in ten states but with highest concentration in Lagos and Kano. Probably that might be one of the reasons for having the sites as the main distribution centers in the country in addition to Onitsha market in Anambra state (Mukhtar, 2006). The local Industries inclined more towards production of oral

Table 2. List of some Nigerian Industries located in Lagos that manufactures one or more antimicrobials at the time of the survey.

S/N	Name of Company	Address	Example of Antimicrobial products
1	Vital pharm.	Lagos	Vitalcillin, Vitaclox, Sympsc caps
2	SKG Pharm. Plot 2, Obs Akran srve	Ikeja. Lagos Welcome house	Primpex
3	Afrab Chem. Ltd	2 Akintola Street, Isolo, Lagos	Chemottrin, Chemquine
4	Chemiron Int.	Plot 12 Block 1B, Metalbox Road, Ikeja Lagos	Chomogyl, Chemachlor Chemoclox,
5	Arco Pharm. Ltd	Holy Peace St. Oguntolu Ijaye Ojoko	Arcopharm, Erythromycin Ampicillin suspension
6	Daily Need Ind.	24 Origiri, Idumota, Lagos	Penicillin ointment
7	Drugfield Pharm. Ltd	48 Akeju St. Shomolu, Sango – Otta, Lagos	Mycolen, Gent. Oil eye drop. Cotrimaxazole, Gentamycin, penicillin
8	Doyin Pharm.	Lagos	Ampicillin syp. Injection. Caps. Apliclox
9	Emzor Pharm. Ltd	Plot 3C block A Aswan Mkt. Road, Isolo, Lagos	Entrim, Emzor, Metronidazole, Amzocillin
10	Food Pharm. Ltd	No. 16 Ijora causeway, Lagos	Faptrimox
11	Gemmi Pharm. Ltd.	Plot. 44 Iganmu Ind. Estate Lagos	Canesten cream, Septran, Daramol
12	May & Baker (M&B) Plc	3/5 Sapara St. Ind. Est. Ikeja Lagos	Flagyl Lab. and Syrup, Cotrimaxazole, Metronidazole
13	Neimeth Intern.	Formally Pfizer, Nigeria Plot. 16 Akanmi Doherty Layout, Oregun, Lagos	Ampiclox, Cotrim, Gentamycin, Penicillin
14	P.Z. Ind. Plc.	Ikeja Lagos	Septin, Chloroquine
15	Moko New Heal Pharm. Ltd.	Km 22 Badagry Exp. Way Ajngbalo Lagos	Moko Erythromycin, Septin
16	Pharma Deko Ltd.	Lagos plot CIS Agbara Ind. Estate	Co-trimaxazole, Chlorampheniol
17	Polfa Nig. Ltd	Plot 9, Trans. Isolo Ind. Est.	Metronidazole
18	Ranmax Lab.	Apapa – Oshodi Expr. Way Isolo, Lagos	Cot-trimaxazole, ampclox, amoxil
19	Kumed Pharm. Ltd	Adelanwa St. Valley Est. Dapemu Ikeja, Lagos	Metronidazole
20	Sterling Prod. Nigeria	51 Town Plann. Way Ilupeju Lagos	
21	Swiss Pharm. Nigeria	5 Dopemu Road, Agege Lagos	Bactrim, under license of P. Hoffman La Roche Ltd Basel, Switzerland
22	Bayer German Pharm. Nigeria Ltd	Plot. 12 Apapa Isolo, Lagos	Ciproxin, Bayer 20g
23	Evans Medical Plc.	32 Lagos – Badagry Exp. Lagos	Co-trin, Metronidazole, Ampicillin
24	Clarion medicals	Coker Rd. Ilupeju Lagos	Co-trim, Chloroquine
25	Therapeutic Lab. Nigeria Ltd	372 Ikorodu Rd. Maryland, Ikeja Lagos (under license from Sterlin Corporation Ltd Jersey British Islet.	Cotrim, Chloroquine, Kiditym
26	Orfema Pharm. Ind. Ltd.	5 Atilade Adebowale St. Off daddy Savage Rd. Fagba IJU Agege Lagos	Metronidazole, ampicillin

Table 3. List of Nigerian Industries in Kano that manufacture one or more antimicrobials.

S/N	Name of Company	Location (Address)	Example of Antimicrobial products
1	Arguna Healthcare Ltd.	KM. 7, Zaria Road, Kano	Sutrin, Metazole, Ampiclox
2	Asad Pharm. Lab.	KM. 3 Hadejia Road, Kano	Metronidazole, CP – trime,
3	PAL Pharm. Ind.	Plot. 101 Maganda Road, Bompai Ind. Area Kano.	Palagyl, Paltrin, Kapicillin, Ka[clox
4	Intercare Pharm. Ltd	No. 2 Yahaya Gusau Rd. Near BUK Road, Gadon Kaya	Sulphur & Whitefield ointment, Ampicillin
5	Vitrohealth Ltd.	No. 7 Hassan Road, Mainagge Qrts. Kano	Vitrogyl, Saptrin
6	SA'A pharm. Product. Ltd Phase II Kano	100 Sharada Ind. Estate	Co-trimpazole,
7	Falacol Pharm. Ltd.	RC. 79898 Km 14 Hadejia Road P. O. Box 4471, Kano Tel.: 064 – 64819	Co-trim, metronidazole
8	Kano State Drug Man. Company	Ibrahim taiwo Road. Opposite Racho Kano (Gidan Bello Dandago)	Kanacillin, Kanaclox, Amoxyl, Cotrimoxazole, Kanaquine

Table 2. contd.

9	Ugo Lab.Products	31 Burma Road Sabongari Kano	Ugotrin, Ugogyl, Ugochloro, Ampicillin,
10	New Bethel Pharm.	969 Zawachiki Qtrs. Panshekara Road Kano	Bacptrin
11	Gongoni Co. Ltd	89A Sharada Ind. Estate Kano	Antiseptic, germicides
12	Toabat	Maikalwa Plot 522, Zaria Road Kano	Co-trim, Ampicillin, Metronidazole syp and suspension

Table 4. List of Industries in other parts of Nigeria that manufacture antimicrobials at the time of the survey.

S/N	Name of Company	Location (Address)	Example of Antimicrobial products	States in Nigeria
1	Bentos Pharm. Ltd	Km 8 Old Lagos Road Ibadan Oyo State	Metronidazole syrup.	Oyo
2	Bond Chem. Ltd.	Adeshaka layout, Awe Oyo state	Metronidazole syrup. Co-trimaxazole	Oyo
3	Coenek Pharm. Ltd.	Plot 219 Ibeagwa, Aka Street, Nike Layout, Phase II Enugu	Co-trim, metronidazole, ampicillin	Enugu
4	Nigerian German Chem. NGc	Abeokuta, Ogun State	Ampival, Ampicillin syrup	Ogun
5	Kwara Chem. Coy. Ltd.	3 Oko Erin Road, Ilorin	Aracillin syrup	Kwara
6	A.C. Drugs Ltd.	Alor Road Edward Nnaji Layout, Enugu	A.C Ancillin suspension	Enugu
7	David Lab. Ltd.	4/75 Owerri Ind. Layout	Evacillin suspension	Imo
8	Rugal Pharm. Co	Plot 17/25 Fed. Housing Estate, Enugu	Rugacillin suspension	Enugu
9	Farmex Meyer Ltd.	Km. 38 Lagos – Abeokuta Rd. Sango Ogun State	Metrocide, Clofenol (Dr. Meyers)	Ogun
10	Fairline Pharm. Ltd	Ofe oke osina Ideato North Imo State	Metro D	Imo
11	Gawo Pharm. Nigeria Ltd	Iweka Road, Onitsa	Metronidazole, ampicillin syrup	Anambra
12	Idowu Ventures Ltd.	Idowu Ind. Estate Arinkinkin Ogbomosho	Cotriclox	Osun
13	Juhel Nigeria Ltd	F – 67 Ind. Area Baiwadi, Anambra	Co-trimoxazole	Anambra
14	Juleil Nigeria Ltd.	F – 67 Ind. Area Baiwadi, Anambra	Co-trimoxazole	Anambra
15	Leady Pharm. Ltd	Plot 3*4, Jomori Ind. Est. Idi – Iroko Road Ola Ogun state	-	Ogun
16	Nichben Pharm. Ltd.	Owerri – Onitsha Road Awo – Owena, Imo State	Co-trimoxazole, ampicillin, gentamycin	Imo
17	Rajrab Pharm, Ltd	72/80 Coca – Cola Rd. Ilorin, Kwara State	Metronidazole, ampicillin, amoxil	Kwara
18	Sam Pharm. Ltd	2 western reservoir Road Ilorin	Co-tim, Chloramphenicol ayp, Pacacillin	Kwara
19	Eva pharm.	Imo Nigeria	Evatrim	Imo
20	Unique Pharm. Ltd.	Vee pee Ind. Aven. Km. 28 Abeokuta Ota Ogun State	Unigyl (IV), Metronidazole	Ogun
21	Tuyil Pharm. Plc	25 Stadium Road Ilorin	Metronidazole, Co-trimoxazole	Kwara
22	Impact Pharm. Ltd.	Plot 17/25 Fed. Housing Est. Trans – Ekulu, Enugu	Pacaline, Ampicillin syp.	Enugu
23	Gauze Pharm.	Enu-lfefe Village, Awka, Anambra State	Chloroquine, co-trim	Anambra
24	Dana Pharm Ltd	Shiroro Road Minna, Niger State	Danacillin, Danaclox,	Niger

liquid of antimicrobials namely; ampicillin, Co- trimoxazole, metronidazole, chloramphenicol, amoxicillin, ampiclox and erythromycin thus reducing the demand for such dose forms from overseas companies.

More work needed to be conducted to prove that the factories in Nigeria had facilities designed and constructed according to standards expected of pharmaceutical production industries and in conformity with the statutory requirements by National Agency for Food, Drug Administration and Control. The issue of availability and affordability of the drugs encountered during the investigation has brought out the fact that there were several brands of paediatrics preparation of ampicillin, chloroquine, co-trimoxazole and metronidazole, whereas, chloramphenicol was represented by a few brands. The report of Mukhtar and Oyeyi (2005a, b) authenticated this finding. This also led to the confirmation that chloramphenicol production has declined globally (Stephen, 2003). The possible reason may be that many industries were producing same type of products which were being sold in the same free market. Perhaps also, the economic theory of consumer demand and supply that determines price limit was in effect as explained by Anyele (2002). Therefore, the findings of Bernard et al., (1999) that some developing countries including Nigeria were facing shortage and prohibitive cost of essential drugs such as the ones included in the present study may no longer be applicable for Nigeria.

Conclusion

The study noted the proliferation of local pharmaceutical industries in Nigeria. These were observed to be engaged in the formulation of one or more oral antimicrobial suspension of first choice in chemotherapy. This is a mark of industrial progress in Nigeria.

Appendix

Questionnaire to production pharmacists and company representatives for assessment of pharmaceutical Industries formulating oral antimicrobial suspensions in Nigeria
Dear Sir/Madam,

This questionnaire is hereby presented for your specialized and professional attention regarding whether your company produces oral antimicrobial suspension in

Nigeria or otherwise. The responses would be treated with care and confidentiality.

Thank you.

1. Age.....Sex.....Years of working experience.....
2. Profession and Rank of Respondent.....
- 3.Factory/Office (Large Scale/Small scale).....

4. Incorporation date.....NAFDAC Reg. No.....
5. Do you produce Oral antimicrobial suspension(s)?.....
6. Please mention below the antimicrobials you produce.
i.....ii.....
.....ii.....
iv.....v.....
.....vi.....
vii.....viii.....
.....ix.....
7. Result (if any) of any independent scientific investigation on effectiveness of your antimicrobials.....
8. Is your factory constructed to conform to the required standard of the Pharmaceutical Council of Nigeria (PCN) and Good Manufacturing Practice (GMP) of the World Health Organization (WHO) as well as the NAFDAC? Yes [] No [] please try to explain your response (s).....
9. Are your drugs enlisted by the ministry of health as recommended drugs for prescription in Nigerian clinics and hospitals.....
10. How do you ensure quality, safety and bioavailability of your antimicrobial products(s)
11. NAFDAC Registration.....
12. Do you exports your products to other countries.....

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