Original Research Article

Availability of antifungal eye drops in hospital and private retail pharmacies: a survey conducted in Kumasi, Ghana

Linda Gyanfosu¹, George Asumeng Koffuor^{1*}, Samuel Abokyi², Akua Afriyie Abruquah³,
Felix Ikechukwu Eze¹

¹Department of Pharmacology, Faculty of Pharmacy and Pharmaceutical Sciences, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana

²Department of Optometry, School of Allied Health Sciences, University of Cape-Coast, Cape-Coast, Ghana

³Department of Dispensing Technology, Kumasi Polytechnic, Kumasi, Ghana

Received: 22 August 2016

Accepted: 27 September 2016

*Correspondence:

Dr. George Asumeng Koffuor,

E-mail: gkoffuor@yahoo.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Effective treatment of oculomycosis involves the use of antifungal eye drops in addition to systemic antifungal medications. The aim of this study therefore was to ascertain the availability of antifungal eye drops in hospital and private retail pharmacies in Kumasi, in the Ashanti Region of Ghana.

Methods: A cross-sectional survey using a structured questionnaire to obtain information on stocking of antifungal eye drops was administered to workers in 99 randomly selected pharmacies in Kumasi between January-June, 2015.

Results: Respondents sampled from the pharmacies were: Pharmacists (37.4%), Medicine counter assistants (36.4%), and Pharmacy technicians (26.3%). Although none of the pharmacies visited had antifungal eye drops (AEDs) in stock, 25 (25.3%) had stocked these before; 18 (72%) stocked fluconazole while 7 (28%) stocked natamycin (17 (68%) indicated fluconazole to be the most patronised). The stocking pattern was not regular as 16 (64%) only stocked on demand. 51.5% the acquired AEDs from local importers of pharmaceutical medicines while 48.5% imported them by themselves. For the 74 (73.7%) pharmacies that did not stock, 60 (80.8%) indicated that AEDs were not NHIS-approved medicines, 51 (68.9%) indicated unavailability from wholesalers to stock, and another 27 (36.4%) indicated that prescriptions were rarely received at the pharmacies. Majority 71.7% of the respondents perceived AEDs to be scarce in Ghana.

Conclusions: Antifungal eye drops are unavailable in hospital and private retail pharmacies in Kumasi, and is perceived to be scarce in Ghana.

Keywords: Endophthalmitis, Fluconazole eye drops, Keratomycosis, Natamycin eye drops

INTRODUCTION

Oculomycosis is a fungal infection of the eye which commonly manifests itself as exogenous or endogenous endophthalmitis, and keratomycosis.^{1,2} The incidence of oculomycosis is higher; in tropical and semitropical areas of the world, and with warmer temperatures, rampant

rainfall, windy seasons, and harvest periods.^{3,4} It is more common among the agricultural population, and is responsible for 4-60% of cases of corneal ulcers in tropical areas.⁵⁻⁷

In Ghana it accounts for 36.7% of corneal ulcers.³ Reports on oculomycosis globally has increased in recent

years as the development and availability of laboratory diagnostic materials and techniques has aided its diagnosis.⁸

Oculomycosis is sight threatening if early diagnosis and appropriate treatment is not instituted. Treatment of oculomycosis usually involves use of antifungal eye drop (AEDs) in addition to systemic antifungal medications, and in some cases surgical interventions.⁹ Conventionally, medical therapy involving the use of topical antifungal medication, which include the polyene antifungals, the azole and triazole and its derivatives such as Echinocandins.⁹⁻¹²

This study therefore investigated the availability of AEDs in private retail and hospital pharmacies in Kumasi, in the Ashanti region for Ghana. From this study, policy makers and stake holders such as the Ministry of Health (MOH) and the agencies under its umbrella including the Ghana Health Service (GHS), Christian Health Association of Ghana (CHAG), the National Health Insurance Scheme (NHIS), Non-Governmental Health Organizations, as well as Private Health Institutions would be well informed to be able to provide and meet the needs for the treatment of oculomycosis in Ghana.

METHODS

Study area

The study was conducted in Kumasi, the second largest city in Ghana. It is a metropolitan district with a population of 2,035,064 (represents about half the population in the region), in the Ashanti Region of Ghana. The region is the most populated (19.4% of the total population) in Ghana.¹³ There are about 300 active private retail pharmacies (PRPs) in Kumasi; out of the about 400 in the region. The city also has the second largest number of PRPs in the country. The total health facilities in Kumasi are about eighty (80) in number. Most of the primary hospitals have eye clinics which have attached pharmacies.¹⁴

Study population

Study participants recruited were Pharmacists, Pharmacy technicians and Medicine counter assistants from 99 PRPs and HPs randomly selected from the metropolis for this study. Only one participant who may be the pharmacist, pharmacy technician or medicine counter assistant, but preferable the Pharmacist was recruited per pharmacy.

There three category of professionals were used because, the pharmacists is a highly ranked health professional who dispense prescription medications to patients and offer expertise in the safe use of prescriptions; the pharmacy technician is a health care provider who performs pharmacy-related functions, generally working under the direct supervision of a licensed pharmacist; and

the medicine counter assistant is a person who has completed the prescribed training equipped to assist other members of the respondent, to provide optimal pharmaceutical care to patients by performing various duties in accordance with the Pharmacy Act, 1994 (Act 489) and any other regulations prescribed by the Pharmacy Council.¹⁵

Sample size

A total of 99 PRPs and HPs were used in this study. The sample size was deemed appropriate after an estimation of the minimum possible size was calculated using Glenn's equation; $N_0 = z^2 pq / e^2$, Where N_0 is Sample size, z^2 is the abscissa of the normal curve that cuts off an area α at the tails ($1-\alpha$ equals the desired confidence level, e.g. 95%), e is the desired level of precision, p is the estimated proportion of an attribute that is present in the population, and q equals to $1-p$, this sample is sufficient for this study.¹⁶

Study design and instrument for data collection

A structured questionnaire on bio-data of respondents, pattern of stocking frequency, most patronized, prescriptions received, accessibility, and perceived availability (obtainability) of antifungal eye drops among others, was administered to the study participants in a cross-sectional survey on the availability of antifungal eye drops in PRPs and HPs, from January to June 2015.

The questionnaires were administered by trained research assistants. Completed questionnaires were collected from respondents either on the same day or two weeks after the initial visit if the respondent was incapable of completing the questionnaire during that visit.

Inclusion criteria

Only licensed pharmacies were used in the study. The Pharmacists, Pharmacy technicians, or the Medical counter assistants should be regular workers in the licenced PRP or HP, and should have been at post for at least one year.

Exclusion criteria

Pharmacy shops dispensing solely herbal medications were excluded from this survey.

Ethical consideration in this study

The study was approved by the Research Ethics Committee, Department of Pharmacology, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana. Informed consent was obtained from each person eligible for the study before participation in accordance with the tenets of Declaration of Helsinki for the use of human participants for research.

Data collection and analysis

All questions were coded with values, imputed into SPSS V 20 (SPSS, Chicago, Illinois, USA) to obtain the frequencies and their corresponding percentages. Graphs were drawn using Sigma Plot V 11 (Systat Software, Inc., San Jose, CA).

RESULTS

A total of 99 Pharmacies were visited, of which 70 (70.7%) were PRPs and 29 (29.3%) were HPs. Professionals encountered were; Pharmacists 37 (37.4%), Medicine Counter Assistants 36 (36.4%), and Pharmacy technicians 26 (26.3%); the majority (38.4%) of whom had worked for 4-8 years in the pharmacies. Fifty-one (51.5%) were males and forty-eight (48.5%) were females (Table 1).

Table 1: Demographics and other characteristics of respondents.

Demographics/characteristics	No. of respondents (%)
Gender	
Male	51 (51.5)
Female	48 (48.5)
Pharmacy visited	
Hospital pharmacy	29 (29.3)
Private retail pharmacy	70 (70.7)
Profession	
Pharmacist	37 (37.4)
Pharmacy technician	26 (26.3)
Medicine counter assistant	36 (36.4)
Duration of practice	
1 to 3	35 (35.4)
4 to 8	38 (38.4)
9 to 13	11 (11.1)
>13	15 (15.2)

Availability of topical ocular antifungal agents in pharmacies

Of the 99 pharmacies randomly visited none had antifungals eye drops (AEDs) in stock; with 74 (74.7%) reporting no past history of stocking these drugs. Of the 25 (25.3%) pharmacies with a past history of stocking AEDs, 18 (72%) reported stocking fluconazole and 7 (28%) stocked natamycin with a common reason being that these medications were the most patronised. Sixteen (64%) of the pharmacies stocked AEDs only on demand, 4 (16%) stocked monthly, and 5 (20%) stocked irregularly (Figure 1). For the twenty-five pharmacies which ever stocked AEDs, 51.5% acquired these from local pharmaceutical wholesalers or importers of pharmaceutical medicines while 48.5% imported them by themselves. None of the respondents indicated local or extemporaneous preparation of AEDs in their facility.

Figure 1: The stocking pattern of pharmacies which had ever stocked antifungal eye drops (AEDs).

Barriers to stocking AEDs

The common reasons given for the unavailability of stocked AEDs by those pharmacies were that AEDs were difficult to obtain commercially 51 (51.5%), and that AEDs were scarcely demanded by prescription 20 (20.2%) (Figure 2). Regarding the frequency at which prescriptions for AEDs were brought to the pharmacies, most 36 (36.4%) of the respondents indicated that prescriptions were rarely received (Figure 3).

Figure 2: Reasons for pharmacies not stocking antifungal eye drops.

Figure 3: Frequency at which prescriptions for antifungal eye drop are received in the hospital or private retail pharmacies.

Perception on the availability of AEDs

Concerning availability of AEDs, the majority 71 (71.7%) perceived it to be scarce while a few (12.1%) indicated they were available (Figure 4).

Figure 4: The perception of respondents on the availability of antifungal eye drops at hospital or private retail pharmacies in Ghana.

DISCUSSION

This study aimed at ascertaining the availability topical ocular antifungal eye medications in both hospital and private retail pharmacies in Ghana. To achieve this objective, information on stock and frequency of stocking, reception of prescriptions, most commonly prescribed AEDs, and perceived availability of AEDs were sought for from HPs and PRPs. Respondents to this survey were pharmacists, pharmacy technicians, and medical counter assistants whose responsibilities included procurement and stocking of medications, interpretation of written prescriptions, and dispensing of prescription medicine (<http://www.pharmacycouncilghana.org>).¹⁷ More than two-thirds of respondents were from private retail pharmacies because PRPs are in the majority in the region, and secondly, only hospital pharmacies which run clinics for ophthalmic patients were selected for the study since these hospitals stock medications to serve specific needs of their patient population.

The incidence of oculomycosis is high having a seasonal distribution which peaks during the planting and harvesting period of the year.^{1,18} Ocular antifungal medications are therefore in high demand during these seasons and some pharmacies then stock AEDs only on demand which could be a drawback to effective treatment of oculomycosis all year round. Even with this pattern of oculomycosis, this study reveals that AEDs were neither available in HPs nor PRPs within the study period (January to June), the peak season of oculomycosis in Ghana.

The principal drugs which could be formulated into eye drops for the treatment of oculomycosis include

Natamycin, Amphotericin B, Flucytosine, Clotrimazole, Miconazole, Econazole, Ketoconazole, and Itraconazole.² The number of commercial antifungal ophthalmic preparations available are relatively small as depicted in this study. Most attention is shifted to antibiotic eye drops which are used to treat bacterial infections (easy to diagnose and treat) of the eye.^{18,19}

While most of the pharmacies visited had never stocked AEDs the few that had stocked before stocked either fluconazole or natamycin eye drops. These two are the only licensed topical antifungals for ophthalmic use by the Food and Drug Authority (FDA) and are in the EML of Ghana (EML, 2010).^{20,21} This is consistent with observations in other countries, as only few antifungal medications have been shown to be effective and without adverse effects when used topically on the eye. Natamycin is the only AED commercially approved by the United States Food and Drug Administration for the treatment of oculomycosis.¹² Also, in Brazil natamycin and amphotericin B are the licenced AEDs used to treat oculomycosis.¹⁸

Even though AEDs were stocked by pharmacies when in demand, the main reason given for the not stocking antifungal eye drops was unavailability of AEDs from wholesalers to be bought. In Ghana, FDA approved medicines including AEDs are imported by registered wholesale pharmaceutical companies (FDA, 2014).²⁰ Some of these wholesalers may not import AEDs probably because of its low market demand relative to an anti-infective like antibiotic.

Since only few topical ocular antifungals are commercially available these medications are expensive. In the therapeutic management of oculomycosis prolonged antifungal treatment is often required. According to Tuli (2011), the economic cost for treating oculomycosis is huge. Considering the increased risk of oculomycosis in agricultural workers, and the fact that majority of this population is impoverished makes them incapable of affording treatment cost for oculomycosis.^{22,23}

AEDs are sourced from pharmaceutical wholesalers who import the drugs from outside the country. There is no one local pharmaceutical company that manufacture antifungal eye drops. Unavailability of AEDs is a result of the fact that importers are not meeting the market demands while AEDs are not manufactured locally. This borders on the perception that oculomycosis is an uncommon fungal eye disease in earlier study and it has not been given much attention in Ghana.

None of the pharmacy shops indicated local or extemporaneous preparation of AEDs within their facilities. They depend solely on the importers; this practise of preparing quality and safe AEDs within the facility could help in meeting the demands of the public where the local importers and manufacturers fell short. With exception of natamycin which comes in a

suspension, every other AEDs in circulation is prepared by reconstitution or from other dosage forms such as dissolving the contents of capsules in appropriate solvent and filtering as in flucytosine or prepared from infusions as in ketoconazole.²⁴

AEDs are not included in the National Health Insurance Scheme (NHIS) medicine list and hence cost of these medications are incurred by the patients (NHIS, 2014).²⁵ Conventionally, hospital pharmacies stock medicines with most reference to the Essential Medicine List of Ghana.²¹ Private retail pharmacies are commercially driven with the goal to maximise profit, and buy and stock only medication that will be patronized by patients and approved by the Food and Drugs Administration. Quality health care is expensive for the average Ghanaian, the NHIS was introduced to help bridge this gap. The global action fund for fungal infection whose vision is to reduce illness and death associated with fungal diseases worldwide has advocated the need for global availability of natamycin 5% at affordable cost.²⁶ Also, policy makers and stake holders could adopt ANVISA (National Health Surveillance Agency) system in Brazil to authorize and give incentives to a local pharmaceutical company to either produce or import, market and distribute AEDs.¹⁸ AEDs could be exclusively formulated by pharmacist for each patient and sold directly by accredited pharmacies, either through a call-in prescription or by postal delivery and dispensed with the retention of prescription.¹⁹ This could help produce enough quantity to meet the demands of the public.

CONCLUSION

Antifungal eye drops are unavailable in hospital and private retail pharmacies in Kumasi, and is perceived to be scarce in Ghana.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

- Hagan M, Wright E, Newman M, Dolin P, Johnson G. Causes of suppurative keratitis in Ghana. *Br J Ophthalmol*. 1995;79(11):1024-8.
- Philip AT. Review on current perspectives on ophthalmic mycoses. *Clin Microbiol Rev*. 2003;6(4):730-97.
- Leck AK, Thomas PA, Hagan M, Kaliyamurthy J, Ackuaku E, John M, et al. Aetiology of suppurative corneal ulcers in Ghana and South India, and epidemiology of fungal keratitis. *Br J Ophthalmol*. 2002;86(11):1211-5.
- Bharathi MJ, Ramakrishnan R, Meenakshi R, Padmavathy S, Shivakumar C, Srinivasan M. Microbial keratitis in South India: influence of risk factors, climate, and geographical variation. *Ophthalmic Epidemiol*. 2007;14(2):61-9.
- Hofling-Lima AL, Forseto A, Duprat JP, Andrade A, Souza LB. Laboratory study of the mycotic infectious eye diseases and factors associated with keratitis. *Arquivos Brasileiros de Oftalmologia*. 2005;68(1):21-7.
- Florentina L, Margarita S, Diógenes C, Christopher NT, Norma F, Ramona S, et al. Epidemiological characteristics of microbiological results on patients with infectious corneal ulcers: a 13-year survey in Paraguay. *Graefes Arch Clin Exp Ophthalmol*. 2004;242(3):204-9.
- Xie L, Zhong W, Shi W, Sun S. Spectrum of fungal keratitis in north China. *Ophthalmology*. 2006;113(11):1943-8.
- Vijaya SR, Mangala PG, Sarita NK. Prevalence of oculomycosis in a tertiary care centre. *Al Ameen J Med Sci*. 2011;4(4):334-8.
- Mravičić I, Dekaris I, Gabrić N, Romac I, Glavota V, Mlinarić- Missoni E. An overview of fungal keratitis and case report on *Trichophyton* keratitis; In Srinivasan M. Keratitis., InTech 2012, Available from: <http://www.intechopen.com/books/keratitis/fungalkeratitis>. Accessed on August 18, 2016.
- Zubair A, Darlene M, Anat G. Current thoughts in fungal keratitis: diagnosis and treatment. *Curr Fungal Infect Rep*. 2013;7(3):209-18.
- Nayak N. Review of Fungal infections of the eye: laboratory diagnosis and treatment. *Nepal Med Coll J*. 2008;10(1):48-63.
- O'Day DM. Selection of appropriate antifungal therapy. *Cornea*. 1987;6(4):238-45.
- Population and housing census. Regional analytical report Ashanti region, 2010. Available at www.ghanastatisticalservice.com. Accessed 9 June, 2013.
- Ghana hospitals, 2012. Available at <http://ghanahospitals.org/regions/reg.php?r=Ashanti>. Accessed 25 November, 2015.
- Pharmacy Act – Ghana legal - legal portal for Ghana, 1994. Available at www.moh.gov.gh/wp-content/uploads/2016/02/Pharmacy-Act-1994-Act-489.pdf. Accessed 9 June, 2015.
- Glenn DL. Determining Sample size. Sampling the evidence of extension program impact, PEOD-5, 1992. Available at <http://edis.ifas.ufl.edu/pd006>. Accessed 28 November, 2015.
- Pharmacy council accreditation policy on training of medicine counter assistants, 2012. Available at <http://www.pharmacycouncilghana.org>. Accessed 25 November, 2015.
- Ibrahim MM, de Angelis R, Lima AS, Viana de Carvalho GD, Ibrahim FM, et al. A new method to predict the epidemiology of fungal keratitis by monitoring the sales distribution of antifungal eye drops in Brazil. *PLoS One*. 2012;7(3):1-4.
- Derrick S. Anti-infective ophthalmic preparations in general practice. *S Afr Fam Pract*. 2012;54(4):302-7.

20. Food and drugs authority Ghana, 2014. Available at <http://www.fdaghana.gov.gh/>. Accessed 17 December, 2015.
21. Ghana essential medicine list 6th ed, 2010. Available at <http://www.moh-ghana.org>. Accessed 16 December, 2015.
22. Sonal ST. Fungal Keratitis. *Clin Ophthalmol*. 2011;5:275-9.
23. Bharathi MJ, Ramakrishnan R, Samala V, Meenakshi R, Palaniappan R. Epidemiological characteristics and laboratory diagnosis of fungal keratitis. A three-year study. *Indian J of Ophthalmology*. 2003;51(4):315-21.
24. Guilherme GM, Newton KJ, Rosane SC. Antifungals in eye infections: drugs and routes of administration. *Revista Brasileira de Oftalmologia*. 2013;72(2):132-41.
25. National health insurance medicine list, 2014. Available at <http://www.nhis.gov.gh/medlist.aspx>. Accessed 29 February, 2016.
26. Juan L, Rodriguez T. Fungal keratitis fact sheet. Global action fund fungal infection fact sheet, 2015. Available at <http://www.gaffi.org/media/fact-sheets/>. Accessed 17 December, 2015.

Cite this article as: Gyanfosu L, Koffuor GA, Abokyi S, Abruquah AA, Eze FI. Availability of antifungal eye drops in hospital and private retail pharmacies: a survey conducted in Kumasi, Ghana. *Int J Community Med Public Health* 2016;3:3045-50.