Original Research Article

The Use of Zinc Oxide in a Public Healthcare Organization in Riyadh Region

ABSTRACT

Aim: The present study aimed to describe the use of zinc oxide in a public healthcare organization in Riyadh Region.

Methodology: This is a retrospective study that includes reviewing the electronic prescriptions of zinc oxide among outpatients in a public healthcare organization in Riyadh Region

Results: More than 52% of the patients who received zinc oxide were males and the age of 79.41% of them was less than 10 years. More than 55% of the patients received zinc oxide for 1 week and 17.65% of them received zinc oxide for 2 weeks. All of the prescriptions were prescribed by residents (100.00%). Most of the prescriptions were written by emergency department (76.47%).

Conclusion: The present study showed that zinc oxide was uncommonly prescribed in Al-Kharj. Additional studies are needed to explore the frequency of and the pattern of using it in different settings.

Keywords: Outpatient, topical, use, zinc oxide

INTRODUCTION

Zinc oxide is used in a wide range of cosmetics and personal care products including nail products, makeup, baby lotions, foot powders, bath soaps [1]. Topical zinc oxide is an over-the-counter mild astringent with weak antiseptic properties [2]. It is also widely used to manage and prevent diaper rash and other skin conditions in addition to that it works by forming a barrier on the skin to protect it from irritants and from moisture [3,4].

Zinc oxide is available in several dosage forms. It is available as rectal suppository, topical cream, topical dressing, topical lotion, topical ointment, topical paste, topical powder, topical spray, and topical stick [5]. Several studies showed the medical applications of zinc oxide; it has been announced as active material in a numerous of applications such as antifungal [6,7], drug delivery [8,9], antibacterial [10,11], photocatalysts [12,13], gas sensors [14,15] and antioxidant [16].

No significant side effects have been reported with using topical zinc oxide products. Only minor skin sensitivity or irritation has been reported in some persons [2]. Moreover, no significant drug interactions have been reported with topical zinc oxide [2].

Looking into the increasing importance of drug utilization studies, there was a need to conduct a similar study for different topical agents. Therefore, the present study aimed to describe the use of zinc oxide in a public healthcare organization in Riyadh Region

METHODOLOGY

This is a retrospective study that includes reviewing the electronic prescriptions of zinc oxide among outpatients in a public healthcare organization in Riyadh Region. The inclusion criteria include outpatient prescriptions that contain zinc oxide in the study period. Exclusion criteria include all of the inpatient prescriptions in addition to the outpatient prescriptions that don't contain a zinc oxide dosage form.

The collected data included the demographic data of patients, the number of zinc oxide prescriptions that were prescribed during different months of the study, duration of zinc oxide use, the type of the prescriptions, and the departments that prescribed zinc oxide.

The data were collected in Excel spreadsheet software, were analyzed descriptively and were represented as percentages and frequencies.

RESULTS and DISCUSSION

Only 34 patients received zinc oxide prescription from the outpatient department in 2018. More than 52% of the patients were males and the age of 79.41% of them was less than 10 years. Table 1 shows the personal data of the patients.

Table 1. The personal data of the patients.

Variable	Category	Number	Percentage
Gender	Female	16	47.06
	Male	18	52.94
Age	Less than 10	27	79.41
	10-19	2	5.88
	20-29	0	0.00
	30-39	3	8.82
	40-49	1	2.94
	50-59	0	0.00
	60-69	1	2.94
Nationality	Saudi	31	91.18
	Non- Saudi	3	8.82

Table 2 shows the number of zinc oxide prescriptions that were prescribed during different months of the study. About 17.65% of the prescriptions were prescribed in July, 11.76% in April, and 11.76% in September.

Table 2. The number of zinc oxide prescriptions.

Month	Number	Percentage
January	2	5.88
February	3	8.83
March	3	8.83
April	4	11.76
May	1	2.94
June	2	5.88
July	6	17.65
August	3	8.83
September	4	11.76
October	2	5.88
November	2	5.88
December	2	5.88

Table 3 shows the duration of zinc oxide use. More than 55% of the patients received zinc oxide for 1 week and 17.65% of them received zinc oxide for 2 weeks.

Table 3. The duration of zinc oxide use.

Duration	Number	Percentage
5 Days	5	14.71
1 Week	19	55.88
2 Weeks	6	17.65
1 Month	4	11.76

All of the prescriptions were prescribed by residents (100.00%). Most of the prescriptions were regular prescriptions (85.29%). Table 4 shows the type of the prescriptions that contained zinc oxide.

Table 4. The type of the prescriptions.

Prescription type	Number	Percentage
Regular	29	85.29
Emergency	2	5.88
Urgent	1	2.94
V.I.P	2	5.88

Table 5 shows the departments that prescribed zinc oxide. Most of the prescriptions were written by emergency department (76.47%).

Table 5. The departments that prescribed zinc oxide.

Department	Number	Percentage
Dermatology	8	23.53
Emergency	26	76.47
Total	34	100.00

The present study showed that zinc oxide was uncommonly prescribed in Al-Kharj. This could be due to the availability of numerous Alternative drugs.in contrast to this result, several studies showed that zinc oxide is prescribed commonly. Zinc oxide is prescribed commonly and it is commonly used as nanoparticles in personal care products, sensors, antibacterial creams, and biomedical applications [17]. Chaurasia et al stated that zinc oxide Eugenol is prescribed commonly to treat dry socket [18]. Moreover, Holmes et al reported that zinc oxide is frequently used in commercial sunscreen formulations to deliver their broad range of UV protection properties [19].

Zinc oxide is used to manage and prevent diaper rash and other skin conditions in addition to it is used to protect the skin from irritants and from moisture [3,4]. So, it is rational that zinc oxide is prescribed by emergency and dermatology departments because in general patients with skin conditions are treated in these departments.

Most of the patients used zinc oxide for 1 week or for 2 weeks. It is usually used for 1 weeks and if the patients don't improve he should visit their prescribers [4]. It is generally safe and can be used for longer duration if recommended by the prescribers.

CONCLUSION

The present study showed that zinc oxide was uncommonly prescribed in Al-Kharj due to the availability of numerous Alternative drugs. Additional studies are needed to explore the frequency of and the pattern of using it in different settings.

REFERENCES

1. Chemicalsafetyfacts. Zinc oxide. Cited 17 November 2021. Available: https://www.chemicalsafetyfacts.org/zinc-oxide/.
2. Medicinenet. Zinc oxide topical. Cited 17 November 2021. Available: https://www.medicinenet.com/zinc_oxide-topical/article.htm.
3. Pubchem. Zinc oxide. Cited 17 November 2021. Available: https://pubchem.ncbi.nlm.nih.gov/compound/Zinc-oxide.
4. Webmd. Zinc oxide topical. Cited 17 November 2021. Available: https://www.webmd.com/drugs/2/drug-7102/zinc-oxide-topical/details.
5. Drugs.com. Zinc oxide topical. Cited 17 November 2021. Available: https://www.drugs.com/mtm/zinc-oxide-topical.html.
6. Kavyashree D, Shilpa CJ, Nagabhushana H, Daruka Prasad B, Sreelatha GL, Sharma SC, et al. ZnO superstructures as an antifungal for effective control of Malassezia furfur, dermatologically prevalent yeast: prepared by aloe vera assisted combustion method. ACS Sustain. Chem. Eng. 2015;3:1066–1080.
7. Sharma RK, and Ghose R. Synthesis of zinc oxide nanoparticles by homogeneous precipitation method and its application in antifungal activity against Candida albicans. Ceram. Int. 2015;41, 967–975.
8. Yuan Q, Hein S, Misra RDK. New generation of chitosan-encapsulated ZnO quantum dots loaded with drug: synthesis, characterization and in vitro drug delivery response. Acta Biomater. 2010;6:2732–2739.
9. Chen T, Zhao T, Wei D, Wei Y, Li Y, Zhang H. Core-shell nanocarriers with ZnO quantum dots-conjugated Au nanoparticle for tumor-targeted drug delivery. Carbohydr. Polym. 2013;92:1124–1132.
10. Jones N, Ray B, Ranjit KT, Manna AC. Antibacterial activity of ZnO nanoparticle suspensions on a broad spectrum of microorganisms. FEMS Microbiol. Lett. 2008;279:71–76.

11. Applerot G, Lipovsky A, Dror R, Perkas N, Nitzan Y, Lubart R, et al. Enhanced antibacterial activity of nanocrystalline ZnO due to increased ROS-mediated cell injury. Adv. Funct. Mater. 2009;19:842–852.
12. Banerjee P, Chakrabarti S, Maitra S, and Dutta BK. Zinc oxide nano-particles - Sonochemical synthesis, characterization and application for photo-remediation of heavy metal. Ultrason. Sonochem. 2012;19:85–93.
13. Lee KM, Lai CW, Ngai KS, Juan JC. Recent developments of zinc oxide based photocatalyst in water treatment technology: a review. Water Res. 2016;88:428–448.
14. Rai P, Yu YT. Citrate-assisted hydrothermal synthesis of single crystalline ZnO nanoparticles for gas sensor application. Sens. Actuat. B Chem. 2012;173:58–65.
15. Waclawik ER, Chang J, Ponzoni A, Concina I, Zappa D, Comini E, et al. Functionalised zinc oxide nanowire gas sensors: enhanced NO 2 gas sensor response by chemical modification of nanowire surfaces. Beilstein J. Nanotechnol. 2012;3:368–377.
16. Kumar B, Smita K, Cumbal L, Debut A. Green approach for fabrication and applications of zinc oxide nanoparticles. Bioinorg. Chem. Appl. 2014;2014:523869.
17. Singh S. Zinc oxide nanoparticles impacts: cytotoxicity, genotoxicity, developmental toxicity, and neurotoxicity. Toxicol. Mech. Methods. 2019;29(4), 300–311.
18. Chaurasia NK, Upadhyaya C, Dixit S. Comparative Study to Determine the efficacy of Zinc Oxide Eugenol and Alveogyl in Treatment of Dry Socket. KUMJ. 2017;15(59), 203–206.
19. Holmes AM, Song Z, Moghimi HR, Roberts MS. Relative Penetration of Zinc Oxide and Zinc Ions into Human Skin after Application of Different Zinc Oxide Formulations. ACS nano. 2016;10(2):1810–1819.