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Skin and Venereal Diseases

Efficacy and Safety of Ozenoxacin in the Treatment of Bacterial Skin Diseases in Adult and Paediatric Patients

Dr. Shanjina Sharmin[*1], Dr. Md. Mamunur Rashid Siddique[2], Dr. Rokhsana Khanam[3], Dr. Nasrin Sultana [4]

[1]Assistant Professor, Department of Skin and Venereal Diseases, US-Bangla Medical College Hospital, Narayangonj, Dhaka, Bangladesh
[2]Junior Consultant, Department of Skin and Venereal Diseases, Saheed Ziaur Rahman Medical College Hospital, Bogura, Bangladesh
[3]Assistant Professor, Department of Skin and Venereal Diseases, Medical College for Women & Hospital, Uttara, Dhaka, Bangladesh
[4]Assistant Register, Department of Skin and Venereal Diseases, Shaheed Suhrawardy Medical College & Hospital, Dhaka, Bangladesh

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***Corresponding author:** Dr. Shanjina Sharmin
Assistant Professor, Department of Skin and Venereal Diseases, US-Bangla Medical College Hospital, Narayangonj, Dhaka, Bangladesh

Abstract **Original Research Article**

***Background*:** Ozenoxacin, a novel topical antibacterial agent with incredible bactericidal recreation in opposition to gram-positive bacteria, has been established as a cream with 1% energetic drug for the cure of Adult and Paediatric Patients. ***Objectives*:** The aim of this study is to assess the efficacy and safety level of ozenoxacin in the treatment of bacterial skin diseases in adult and paediatric patients. ***Methods*:** This is an observational study. This study was carried out on 130 patients the find out about the population including male and female patients in the Department of Dermatology, US-Bangla Medical College Hospital, Narayangonj, Bangladesh. The duration of the period from June 2021 to May 2022. The period from Data was entered in MS Excel and Statistical analysis was done using SPSS-24. ***Results*:** This study shows that according to age of 130 Patients aged ≥2 months to <18 years. Here according to Age distribution**.** Skin diseases were 35.1%, 52.6%, 11.4% when age was ≥2 months to < 12 months. When age was 12 months to <18 years, skin diseases were 26.1%, 65.2%, 8.7%. And skin diseases were 46.4%, 42%, 11.6% when age was ≥18 years.The Pathogens isolated chart (n=130). Here Staphylococcus aureus were 55.8%, Streptococcus pyogenes were 9.2% and other pathogens were 55.8%. ***Conclusion*:** Topical ozenoxacin is active and well-tolerated in the treatment of Adult and Paediatric Patients. This impact is demonstrated by rapid onset of response and most efficient medical and microbiological response. Topical ozenoxacin represents a novel option for the treatment.

Keywords: Ozenoxacin, Bacteria, Paediatric, Microbiological.

INTRODUCTION

Skin, the largest organ of human body and is the primary structural barrier of the body. Any system that alters it can lead to infection [1]. The skin has a resident or saprophytic microbiota composed of bacteria that support properly the acidic and dry surroundings of the epidermis. When this microbiota is altered, it favours the improvement of transient microbiota that can trigger infections. Skin infections are a common motive for session in pediatric dermatology, having a wide spectrum of severity [2]. Topical treatment of superficial skin infections is commonly adequate to deal with them, except there are risk factors in the host, the infections is severe, extensive, or has complications [3].

Common superficial skin infections are Impetigo, Ecthyma, Folliculitis, Carbuncles and Paronychia. When the pyoderma extends just below stratum corneum is called Impetigo. It is of 2 types; (1) Non Bullous Impetigo and Bullous Impetigo. Non bullous type is the most common paediatric skin infections which usually start in a traumatized area. It begins as erythemous papule, later becomes unilocular vesicle and pustular. It ruptures and becomes a yellow, golden crust. Bullous impetigo mostly occurs in infant and rapid progression of vesicles into bullae (size >5mm in diameter) in untraumatized skin. Ecthyma is the consequence of failure to treat Impetige. Follculitis is a pyoderma within hair follicle secondary to follicular occlusion by keratain, over hydration or either bacterial or fungal infection. It is 2 types: superficial or deep. In superficial type the pustule is located at the opening of hair follicle, whereas in deep type infection extends becoming a furuncle or boil. Carbuncles are aggregation

of interconnected furuncles that drain through multiple opening.

Impetigo is located mainly on face, neck and hands although scratching pruritic lesions can be transferred to other part of the body and close contacts [4]. Patients are advised to be confined home until 24 hours after initiaton of appropriate antimicrobial therapy. Control of infection is important to relieve symptoms; miminize scarring associated with excoriation and prevents serious complications such as glomerulonephritis or rheumatic heart diseases [5]. The main causative pathogens of skin infection are MSSA (Methicilline sensitive S.aureus). MRSA (Methicilline resistant S. aureus) and streptococcus pyogens [6].

Topical treatments enable delivery of high local drug concentrations directly to the affected skin thereby facilitating the antimicrobial ability to mutational resistance. Topical therapies are formulated to be minimally absorbed, which lowers systemic toxicity associated with oral intake. Topical agents commonly used to treat SSTI are fusidic acid and mupirocin. Rates of resistance to mupirocin are increasing day by day against MRSA [7]. Resistance against fusidic acid develops due to alteration in elongation factor G. altered permeability, inactivation by enzymes and efflux 1,2,3,4.

Ozenoxacin is a non-fluoridated quinolone for topical use indicated, in accordance to the product information sheet, for the treatment of non-bullous impetigo in patients older than 6 months [8]. Ozenoxacin has a bactericidal mechanism of action due to simultaneous inhibition of the enzyme's topoisomerase IV and DNA gyrase, necessary for bacterial replication, through which it produces fast bacterial death [9].

In vivo study using a mouse model of S. aureus-induced dermal infection showed superior efficacy of topical ozenoxacin 1% formulations versus mupirocin 2% ointment and retapamulin 1% ointment, as indicated by significant reductions in mean microbiological counts in infected skin samples and superior bacterial eradication rates. Preclinical trials showed the absence of chondrotoxic potential with ozenoxacin.

Phase I studies showed that ozenoxacin has negligible transdermal absorption and does not induce phototoxicity, photoallergy or contact allergy.

In two pivotal phase III studies of patients as young as 2 months with Impetigo, ozenoxacin 1% cream significantly improved clinical and microbiological success rates compared with placebo (vehicle) cream and was well tolerated,

Ozenoxacin has a good security and tolerability profile and is not systemically absorbed. As, unlike fluorquinolones, ozenoxacin is no longer fluorinated, it has not shown chondrotoxicity, phototoxicity, or the induction of contact dermatitis at some stage in its medical development [10]. Ozenoxacin is a novel non-fluorinated quinolone. At May 2019, ozenoxacin 1% cream has been approved in 12 countries of the European Union (EU) for topical treatment of non-bullous impetigo in patients aged 6 months and older [11]. Although few patients under 6 months of age and/or with Bullous Impetigo have been enrolled in pivotal phase III medical trials of ozenoxacin, in the USA and Canada. ozenoxacin 1% cream is indicated for topical treatment of non-Bullous and Bullous impetigo in patients aged two months and older [12].

Comparative in vitro research has proven that ozenoxacin has amazing antimicrobial activity towards staphylococci and streptococci, the essential pathogens concerned in impetigo. Ozenoxacin additionally effective against methicillin, mupirocin, and ciprofloxacin-resistant strains of S. aureus [13]. Ozenoxacin's dual inhibitory activity in opposition to the bacterial replication enzymes, DNA gyrase and topoisomerase IV, protects it from improvement of resistance, [14] and the absence of a fluorine atom in its molecular shape confers a higher protection profile than that of fluorinated quinolones, consisting of a lack of quinolone-induced chondrotoxicity [15]. Topical ozenoxacin is negligibly absorbed, and phase I research confirmed incredible dermal tolerability [16]. Collectively, these properties advise that ozenoxacin may additionally be a precious option for empirical therapy of localised Impetigo. Clinical research of ozenoxacin 1% cream confirmed that it is positive and nicely tolerated in adults with Impetigo [17].

METHODS

The study was an observational study which was conducted in over a period from June 2021 to May 2022 with a semi structured questionnaire at the department of Dermatology, US-Bangla Medical College Hospital, Narayangonj, Bangladesh, was the study's settings. About 130 study population who attended in the Department of Dermatology in this hospital. After collection, the data were checked and cleaned, followed by editing, compiling, coding and categorizing according to the objectives and variable to detect errors and to maintain consistency, relevancy and quality control. The choice of treatment was made by the patient after a full discussion with the multidisciplinary team consisting of Dermatologists. Collected data were edited and analyzed according to the objectives and variables by IBM software-Statistical package for Social Science (SPSS 25) version. Ethical clearance was taken from the Institutional Review Board of the institution.

RESULTS

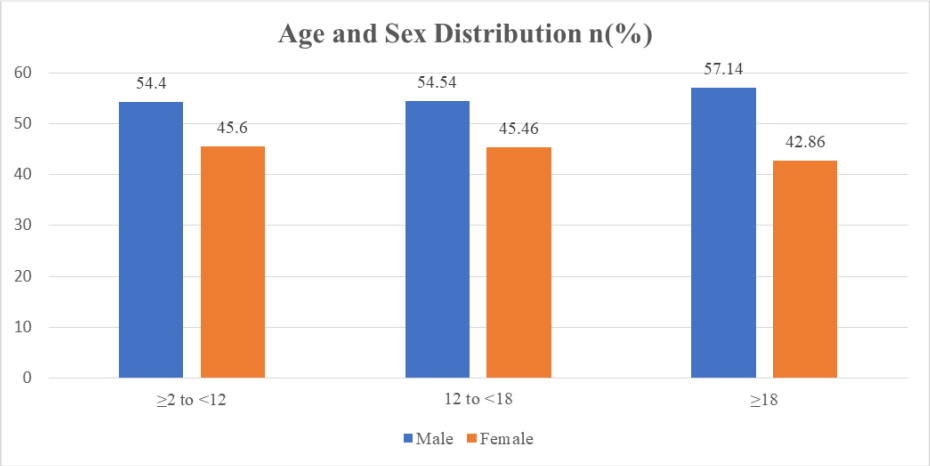

Figure I: Demonstrated distribution of the study according to age and sex of 130 Patients

Figure I show the Demonstrated distribution of the study according to age and sex of 130 Patients. Here according to age of female, ≥2month to < 12month was 26(45.6%), 12month to <18yr was 5(45.46%) and ≥18yr was 15(42.86%). And according to age of male, ≥2month to < 12month was 31(54.4%), 12month to <18yr was 6(54.54%) and ≥18yr was 20(57.14%).

Table I: Location of the Bacterial Skin Diseases according to age (n=130)

Location of the Bacterial Skin Diseases	≥2 to 12 n=76(%)	12 to<18 n=(%)	≥18n(%)
Face	32(56.1)	6(52.2)	19(53.6)
Upper trunk	5(8.8)	3(30.4)	5(14.5)
Lower trunk	6(11.4)	1(8.6)	3(7.2)
Right arm	9(15.8)	2(17.4)	5(14.5)
Left arm	6(5.25)	2(17.4)	4(11.6)
Right Leg	9(15.8)	1(8.6)	4(11.6)
Left Leg	9(15.8)	2(17.4)	3(10.1)

Table I demonstrated the Location of the Bacterial Skin Diseases according to age (n=130). According to Location of the Bacterial Skin Diseases, Face, Upper trunk, Lower trunk, Right arm, left arm, Right Leg and Left Leg were 32(56.1%), 5(8.8%), 6(11.4%), 9(15.8%), 6(5.25%), 9(15.8%) and 9(15.8%) when ≥2month to12month; 6(52.2%), 3(30.4%), 1(8.6%), 2(17.4%), 2(17.4%), 1(8.6%) and 2(17.4%) when 12month to<18yr and 19(53.6%), 5(14.5%), 3(7.2%), 5(14.5%), 4(11.6%), 4(11.6%) and 3(10.1%) when ≥18yr.

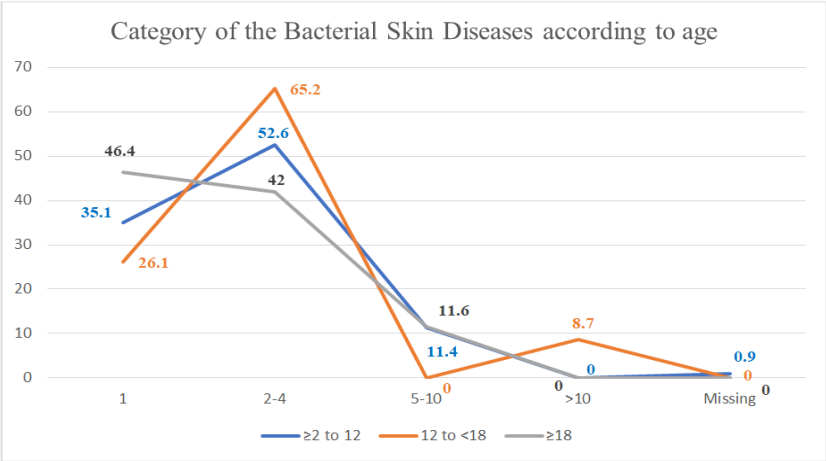

Figure II: Category of the bacterial skin disease according to age

Figure II show the Category of the bacterial skin disease according to age. Here skin diseases were 35.1%, 52.6%, 11.4% when age was ≥2month to < 12month. When age was 12month to <18yr, skin diseases were 26.1%, 65.2%, 8.7%. And skin diseases were 46.4%, 42%, 11.6% when age was ≥18yr.

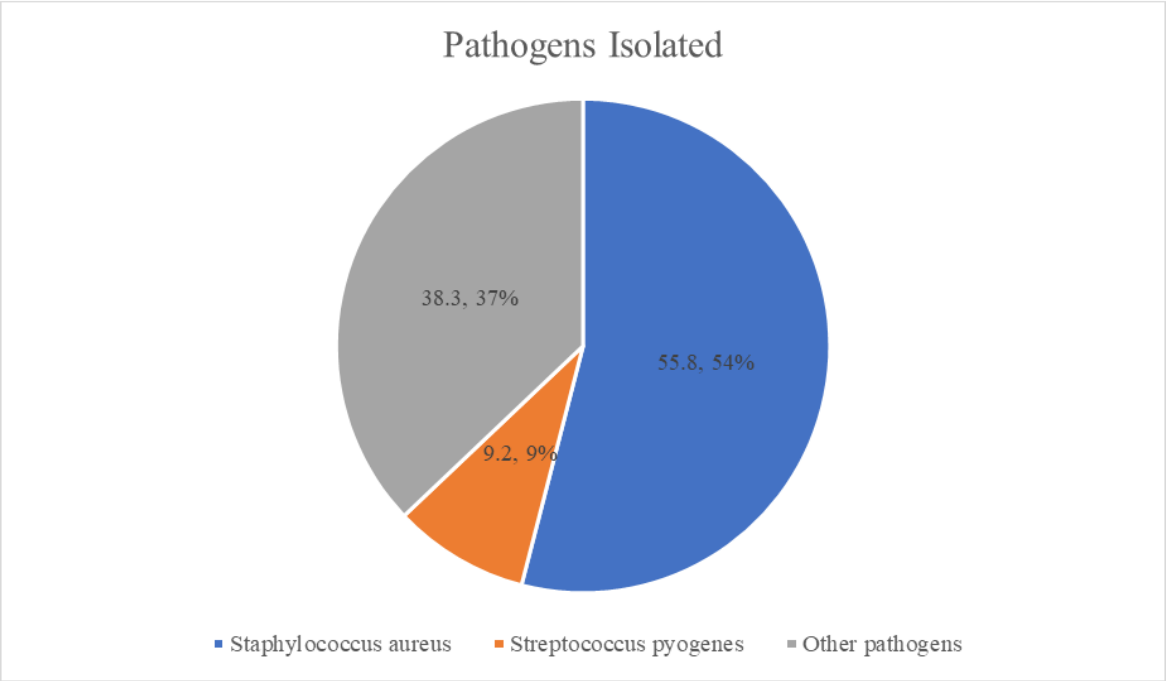

Figure III: Pathogens isolated chart (n=103)

Figure III show the Pathogens isolated chart (n=103). Here Staphylococcus aureus were 55.8%, Streptococcus pyogenes were 9.2% and other pathogens were 55.8%.

DISCUSSION

The efficacy and security of ozenoxacin in the paediatric population with non-bullous impetigo have been examined by means of pooling facts for patients who had participated in section I or section III medical trials [18]. In the combined population, medical and microbiological success rates with ozenoxacin have been significantly most useful to these with vehicle, confirming the effects of the pivotal section III trials [19]. In analyses via age group, ozenoxacin verified earlier and superior bacterial eradication in contrast with vehicle in all age groups. Microbiological success rates with ozenoxacin ranged from 81.8 to 100% after 3–4 days of treatment, and from 90.5 to 100% after 5 days treatment [20]. Corresponding microbiological success rates have been appreciably decreased with vehicle and additionally in the retapamulin. Due to the rapid bactericidal activity of ozenoxacin as indicated in this sub analysis, its early microbiological eradication activity may additionally have vital significance in preventing transmission of Impetigo, a particularly contagious condition.

In our study, according to age of female, ≥2 month to < 12 month was 26(45.6%), 12 month to <18 year was 5(45.46%) and ≥18 year was 15(42.86%). And according to age of male, ≥2month to < 12month was 31(54.4%), 12month to <18yr was 6(54.54%) and ≥18yr was 20(57.14%). And according to Location of the Bacterial Skin Diseases, Face, Upper trunk, Lower trunk, Right arm, left arm, Right Leg and Left Leg were 32(56.1%), 5(8.8%), 6(11.4%), 9(15.8%), 6(5.25%), 9(15.8%) and 9(15.8%) when ≥2month to12month.

Safety and tolerability are essential facts of any medication intended supposed for use in the pediatric population, specifically one that consists of infants. Among 287 children handled with ozenoxacin throughout the three studies, no security concerns have been identified [21]. The absence of local reactions to ozenoxacin or its vehicle, and the negligible systemic absorption of ozenoxacin, are consistent with the effects of section 1 research carried out at some point of its medical development.

Ozenoxacin belongs to a new generation of topical antibiotics with selective inhibition of DNA replication and is structurally characterised as a nonfluorinated quinolone [22]. Ozenoxacin has confirmed bactericidal activity in opposition to the most frequent gram-positive pathogens related with skin and smooth tissue infection, inclusive of MRSA and mupirocin- and fusidic acid–resistant strains [23]. Ozenoxacin has additionally exhibited increased inhibitory activity than different quinolones for bacterial DNA gyrase and topoisomerase IV, enzymes indispensable for the transcription and replication

procedures of bacterial DNA which may additionally account for its activity in opposition to quinolone resistant strains [24].

In our present study, the Category of the bacterial skin diseases were 35.1%, 52.6%, 11.4% when age was ≥2 month to < 12 month. When age was 12 months to <18 year, skin diseases were 26.1%, 65.2%, 8.7%. And skin diseases were 46.4%, 42%, 11.6% when age was ≥18yr. And Staphylococcus aureus were 55.8%, Streptococcus pyogenes were 9.2% and other pathogens were 55.8%.

Various researches has shown that ozenoxacin has a very low ability to generate resistances in vitro, which is attributed to its dual goal of action and its speedy bactericidal impact at low concentrations. This effective bactericidal exercise has been evidenced clinically. Ozenoxacin has a particular security and acceptability profile and is now not systemically absorbed. As, not like fluorquinolones, ozenoxacin is no longer fluorinated, it has no longer proven chondrotoxicity, phototoxicity, or the induction of contact dermatitis for the duration of its medical development.

Limitation of the Study

The present study was conducted at a very short period of time. Sonographic assessment of scar thickness was not done. Absence of previous operative records of patient with previous caesarean section.

CONCLUSION

The bactericidal activity in comparison to each susceptible and resistant organisms is a necessary function of ozenoxacin because the bacterial pressure and achievable for resistance are usually not recognized at the starting of therapy. Ozenoxacin, which has amazing antibacterial activity against staphylococci and streptococci, a fast bactericidal impact and low attainable to choose resistant mutants, seems to be a beneficial choice to deal with adult and paediatric Patients.

RECOMMENDATIONS

A multicenter double blinded study in the divisional/ tertiary hospitals of whole Bangladesh can reveal the real picture. The study period should be long. Multi-disciplinary approach of research work can make a study precise & more authentic in this regard.

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DECLARATION

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Conflict of Interest: None declared.

Ethical Approval: The study was approved by the ethical committee of US-Bangla Medical College Hospital, Narayanganj, Bangladesh.

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