Original Article

Efficacy of Copper Sulphate to Prevent Ophthalmic and Dermatological Human Infections

Naseer Ahmad Raja[1], Aneela Khawaja[2], Durdana Zafar[3], Uzma Nazim[1], Rubina Tallay Qasim[4] and Muhammad Arshad Rana[5]

ABSTRACT

Objective: Copper is an essential trace element for human body. To date unfavorable effects of copper sulphate are related to environmental or occupational matters. No information has been documented regarding its use for healing or preventive purposes. This study determines the efficacy of copper sulphate in preventing ophthalmic and dermatological infections in humans in village of Punjab, Pakistan.

Study Design: Descriptive observational study

Place and Duration of Study: This study was conducted at the Community Medicine,Rahbar Medical & Dental College, Lahore from January, 2010 to December, 2020.

Materials and Methods: Total 400 study participants of different age groups (5-60 years), living in same environmental conditions, were divided into 2 equal groups as cases (n=200) and control (n=200). Gender distribution was equal in all age groups of both cases and control. Verbal consent was taken from all the adult subjects (18-60 years) and from parents of children (5-17 years). The participants of case group took Crystals of copper sulphate orally, in dose of 1 µgper Kg of body weight (¼ of millets size) after meal once weekly, usually with glass (250 ml) of milk. Control subjects did not take any medicine.

Results: Among 200 case participants, only 1.5% acquired ophthalmic and dermatologic infection. None of the children among case group developed any ophthalmic or skin disease. Among control group, 57% of the adult subjects expressed eye and skin infections (p-value .0016), while 16% children and 15% children developed eye and skin infection respectively.

Conclusion: The use of copper sulphate for therapeutic purposes has been reported for the first time. Local authorities must take regulatory measures regarding public awareness in terms of beneficial effects of copper sulphate.

Key Words: copper sulphate, beneficial effects, dermatologic, ophthalmic, infection

Citation of article: Naseer Ahmad, Aneela, Durdana, Uzma Nazim, Rubina Tallay Qasim and Muhammad Arshad Rana. Efficacy of Copper Sulphate to Prevent Ophthalmic and Dermatological Human Infections. Med Forum 2021;32(2):107-109.

INTRODUCTION

Copper is an essential micronutrient element, that maintains the health status of an individual adequately. The medicinal use of copper sulphate ranges from treatment as antibiotics, as prophylactic for skeletal muscle disorders, anemias, hypotrophy, and in diagnostic radiology for neoplastic disorders.[1,2] Although microelements are consumed in very less amount but several physiological roles like enzymes and /or hormone production, growth regulation, developmental and functional progress of immune and reproductive systems are regulated by essential trace elements.[3]

Consumption of copper by human civilizations dates back to 5000 BC. With the advancement of science and technology, now we know that copper maintains the epithelial and connective tissues within the body, and tensile strengthening of the skin and circulatory system. Some vital key roles i.e., production of different pigments and hormones cannot occur without copper. Therapeutic application of copper containing combinations shows vast biological activity as antibiotic, antifungal, anti-inflammatory, antimalarial as well as anticancer[4, 5].

Among different groups of people oral use of copper sulphate is a traditional and hereditary norm. These groups correlate a number of beneficial effects of

[1.] Department of Community Medicine / Pathology[2] / Forensic Medicine & Toxicology[3], Rahbar Medical & Dental College, Lahore.
[4.] Department of Cardiology, APWMO, Punjab Institute of Cardiology, Lahore.
[1.] Department of Ophthalmology, Holy Family, Rawalpindi.

Correspondence: Dr. Naseer Ahmad Raja, Senior Demonstrator Community Medicine, Rahbar Medical & Dental College, Lahore.
Contact No: 0300-8418415
Email: naraja118@gmail.com

Received: January, 2021
Accepted: January, 2021
Printed: February, 2021

copper sulphate on human body as treatment and prevention of different diseases, i.e., improved vision and prevention of eye infections, treatment of skin diseases, better quality life, prevention of neurological disorders as its deficiency or low concentration in early life can result in underdevelopment of central nervous system.[6,7]

Previous studies have documented use of copper sulphate as an emetic to achieve intoxication after exposure to poisonous substances [8] A Bordeaux mixture named as invented in the Bordeaux region of France, contains copper sulphate is used as fungicide in farming. Although, it was introduced as preventive remedy, but prolonged use became poisonous to human subjects and weather pollutant [9].

The aim of this descriptive observational study is to assess the efficacy of copper sulphate in preventing ophthalmic and dermatological infections in humans.

MATERIALS AND METHODS

This study was conducted at the Community Medicine, Rahbar Medical & Dental College, Lahore from January, 2010 to December, 2020. Total 400 study participants enrolled on voluntary basis, were divided into 2 equal groups as cases (n=200) and control (n=200). Verbal consent was taken from all the subjects above 18 years of age, and from parents of children (age 5-17 years); after explaining the good and bad/ dangerous effects of copper sulphate on human body, including use of over dose and empty stomach. Children less than 5 years of age, pregnant women and adults not giving verbal consent and not willing to participate in the study were excluded. Demographic variables like age in years, height in inches, weight in kilogram and body mass index (BMI) of all the case and control subjects was noted. Gender distribution was equal in cases and controls. The participants of case group took crystals of copper sulphate orally, in dose of 1 µgper Kg of body weight (¼ of millets size) after meal. This dose was taken once weekly, usually with glass (250 ml) of milk. Some persons complaint of vomiting after ½ to 2 hours because of gastric irritation. A metallic taste was felt in the mouth for about one day. Some individuals took it in capsule and some preferred in jaggery, to avoid the bitter/metallic taste of copper sulphate in mouth. None of the case subjects took copper sulphate on empty stomach. Control group did not take any medicine. All the study individuals were living in the same environmental conditions and for cooking, drinking and washing purposes consuming same irrigation system.

Statistical analysis: The data was analyzed using SPSS version 20. Continuous variables were summarized as mean and standard deviation (±SD) while categorical variables were expressed as frequency and percentages. Statistically, P-value ≤ 0.05 was considered significant

RESULTS

Gender distribution was same in both case (n=200) and control group (n=200). Age wise distribution among both case and control group is shown in figure 1 (p-value=.50). None of the children in case group acquired either ophthalmic or dermatological infection. On the other hand, 32 children (16%)and 25 adults (12.5%) got eye infections; 30 children (15%) and 27 adults (13.5%) developed skin infections from control group as shown in Table 2 (p-value significant, .0016).

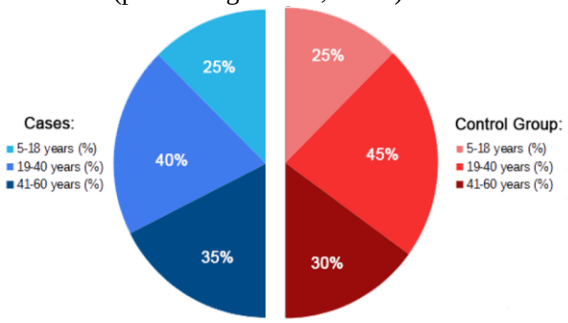

Figure No.1: Frequency distribution of different age groups in cases and controls (n=400)

Table No.1: Demographic Details of Study Population (n=400)

Demographic Variables	Mean ± SD (Cases)	Mean ± SD (Control)
Age (years)	32.35 ± 15.07	31.3 ± 14.49
Height (inches)	64.3 ± 3.81	64.3 ± 3.81
Weight (kilogram)	62.94 ± 15.25	62.28 ± 14.85
Body mass index (BMI)	23.6 ±8.6	23.3 ±8.45

Table No.2: Comparison of Ophthalmic and dermatological infections in study population (n=400)

Variables	Cases (n=200)		Control (n=200)	
	Males	Females	Males	Females
Ophthalmic Infections	None	01	35 (17.5)	22 (11)
Dermatological infections	02	None	33 (16.5)	24 (12)
Total (%)	02 (01)	01 (0.5)	68 (34)	46 (23)
	3 (1.5)		114 (57)	
Chi-sq p-value	0.338 .56		9.87 .0016*	

(*p-value → highly significant)

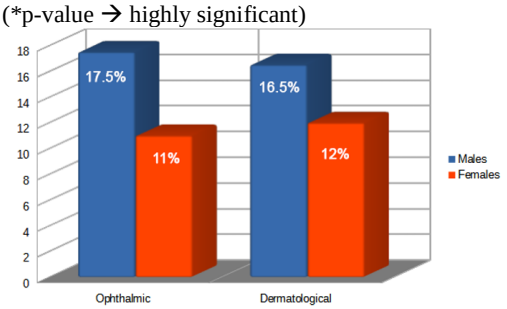

Figure No.2: Frequency percentage of ophthalmic and dermatological infections in control group (n=200).

DISCUSSION

Copper metabolism is directly or indirectly involved in some of the neurological disorders (acerulo-plasminemia, Alzheimer disease, amyotrophic lateral sclerosis, Huntington disease, Menkes disease, occipital horn syndrome, Parkinson disease, prion disease, and Wilson disease). Inadequate levels or low concentration of copper can lead to incomplete development of central nervous system can be prevented by suitable levels of copper sulphate. Minimal mood changes had been documented by our study participants using copper sulphate regularly. This positive effect is comparable with the antidepressant effect of copper sulphate use documented by Słupski. [7]

The beneficial effects of copper on spinal cord ischemia -reperfusion injury have been observed in animal models. [10] Medicinal effect of copper sulphate along with hot spring water on eczematous skin condition has been documented by Ribet et al. [11]

Currently, various applications of copper are of vital importance in day-to-day life. With the advancement of technology, metallic copper surfaces have greatly reduced the percentage of nosocomial pathogens in health care centers [12, 13]. This date back, when copper was used for sterilizations of drinking water, disinfections of swimming pools, eye ailments, burns, skin ulcers, chest wounds, headache and other neurological symptoms since 2000 B.C. Researchers have documented possible health effects of copper tubing, home wells and in childhood hepatic disorders. [14,15]

CONCLUSION

The efficacy and real benefits of copper sulphate on human subjects need further elaboration. Data supporting favorable use of copper sulphate as a trace element is lacking. To the best of our knowledge not a single case of copper over dosage and or poisoning was seen in our study subjects.

Author's Contribution:

Concept & Design of Study:	Naseer Ahmad
Drafting:	Aneela, Durdana,
Data Analysis:	Uzma Nazim, Rubina Tallay Qasim and Muhammad Arshad Rana
Revisiting Critically:	Naseer Ahmad, Aneela
Final Approval of version:	Naseer Ahmad

Conflict of Interest: The study has no conflict of interest to declare by any author.

REFERENCES

1. Skalnaya MG, Skalny AV. Essential trace elements in human health: a physician's view. Publishing House of Tomsk State University, Tomsk 2018;224.
2. de Romaña DL, Olivares M, Uauy R, Araya M. Risks and benefits of copper in light of new insights of copper homeostasis. J Trace Elements Medicine Biol 2011;25(1):3-13.
3. Nieder R, Benbi DK, Reichl FX. Microelements and their role in human health. Soil Components Human Health 2018;317-74.
4. Medici S, Peana MF, Zoroddu MA. Noble metals in pharmaceuticals: applications and limitations. Biomedical Applications Metals,Springer, Cham 2018;3-48.
5. Ingle AP, Paralikar P, Shende S, Gupta I, Biswas JK, da Silva Martins LH, et al. Copper in medicine: perspectives and toxicity. Biomedical Applications of Metals Springer, Cham 2018;95-112.
6. Pal A, Prasad R. An overview of various mammalian models to study chronic copper intoxication associated Alzheimer's disease like pathology. Biometals 2015;28(1):1-9.
7. Słupski J, Cubała WJ, Górska N, Gałuszko-Węgielnik M, Wiglusz MS. Role of copper in depression. Relationship with ketamine treatment. Medical hypotheses 2018;119 (10):14-7.
8. Battineni JK, Boggula N, Bakshi V. Phytochemical screening and evaluation of anti-emetic activity of Punica granatum leaves. European J Pharmaceutical Medical Res 2017;4(4):526-32.
9. Pscheidt JW, Heckert S, Cluskey SA. Tank mixing fungicides for effectiveness against eastern filbert blight of hazelnut. Plant Disease 2018;102(5): 919-24.
10. Tural K, Ozden O, Bilgi Z, Kubat E, Ermutlu CS, Merhan O, et al. The protective effect of betanin and copper on spinal cord ischemia–reperfusion injury. J Spinal Cord Med 2020;28(3):1-7.
11. Ribet V, Mielewczyk E, Sirvent A, Georgescu V, Rossi AB. A novel dermo-cosmetic product containing thermal spring water, sucralfate, copper sulfate, and zinc sulfate in the management of hand eczema. Clin CosmetInvestig Dermatol 2018; 11(7):373-81.
12. Michels HT, Michels CA. Potential of copper alloys to kill bacteria and reduce hospital infection rates. Internal Med Rew 2016;3(3):1-16.
13. OK, Ergin A, Hascelik G. Antimicrobial activity of copper alloys against invasive multidrug-resistant nosocomial pathogens. Current Microbiol 2015; 71(2):291-5.
14. Von Muehlendahl KE. Copper tubings, home wells and early childhood cirrhosis. Eur J Pediatr 1996; 155(12):1061.
15. Lytle DA, Wahman DG, Schock MR, Nadagouda MN, Harmon S, Webster K, et al. Georgeite: a rare copper mineral with important drinking water implications. Chem Eng J 2019;355(10):1-10.