Microbiological studies on ophthalmic bacterial infection among some Egyptian patients

A Thesis

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Presented by

Pharmacist / Aya Osama Ahmed Omer
Bachelor from Misr International University
Faculty of pharmacy

Under supervision of

Ass. Prof. Dr/ Magda H. Mahran
Assistant professor of Microbiology
Research Institute of Ophthalmology

Dr/ Zeinab Helal Ahmad Helal
Lecturer of Microbiology and Immmunology
Faculty of Pharmacy- Girls
Al Azhar University

Microbiology and Immmunology Department
Faculty of Pharmacy- Girls-
Al Azhar University
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دراسات ميكروبيولوجية على العدوى البكتيرية فى العين بين بعض المرضى المصرين

رسالة مقدمه للحصول على درجة الماجستير فى العلوم الصيدلية
(الميكروبيولوجى و المناعة)

مقدمة من

الصيدلانية / ايه اسامه احمد عمر
بكالوريوس الصيدلة و العلوم الصيدليه
كلية الصيدلة- جامعة مصر الدوليه

تحت اشراف

ا.م./ ماجدة حسن مهران
استاذ مساعد بقسم الميكروبيولوجى و المناعة
معهد بحوث امراض العيون

د/ زينب هلال احمد هلال
المدرس بقسم الميكروبيولوجى و المناعة
كلية الصيدلة- بنات
جامعة الازهر

كلية الصيدلة- بنات – جامعة الأزهر
(٢٠١٤)

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Aya Osama Ahmed Omer

Dedication

This work is dedicated to

My Mother

I cannot say, and I will not say that she is dead, she is just away. All that I am or hope to be I owe to her, for her support and encouragements.

My father

For his everlasting sacrifices, support and advices.

Many thanks to both of you

Aya

Contents

List of abbreviations

Abbreviation	Full term
C	Chloramphenicol
CO2	Carbon dioxide
Ch. Trachomatis	*Chylamydia trachomatis*
E. coli	*Escherichia coli*
E.E.	Endogenous Endophthalmitis
EMB	Eosin methylene blue
FDA	Food and drug administration
G	Gentimycin
HPV	Human papilloma virus
HSV	Herpes simplex virus
I	Intermediate
IMVIC	Indole methyl red voges- proskauer citrate test
K. pneumonia	*Klebsiella pneumoniae*
LPS	Lipopolysaccharide
MIC	Minimum inhibitor concentration
mRNA	Messenger ribosomal nucleic acid
MSA	Mannitol salt agar
N. gonorrhoeae	*Neisseria gonorrhoeae*
P. mirabilis	*Proteus mirabilis*
Ps. aeruginosa	*Psedomonas aeruginosa*
PIA	Polysaccharide intercellular adhesion
R	Resistant
S	Susceptible
S. aureus	*Staphylococcus aureus*
S. epidermidis	*Staphylococcus epidermidis*
St. pneumonia	*Streptococcus pneumoniae*
SD	Stander deviation
STI	Sexually transmitted infection
TSI	Triple sugar iron
US	United State
UV	Ultraviolet
VZV	Varicella zoster virus
V/V	Volum/ volum

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2. Literature Review

2.1. The Basics of Eye Anatomy

The eye is a complex optical system - very similar to a camera. Vision begins when light enters the eye through the cornea, a powerful focusing surface. From there, it travels through clear aqueous fluid, and passes through a small aperture called the pupil. As muscles in the iris relax or constrict, the pupil changes size to adjust the amount of light entering the eye. Light rays are focused through the lens, and proceed through a clear jelly-like substance in the center of the eye called vitreous, which gives it form and shape. When light rays finally land on the retina, the part of the eye similar to film in a camera, they form an upside-down image. The retina converts the image into an electrical impulse that travels along the optic nerve to the brain, where it is interpreted as an upright image as shown in figure (1) **(Jennings, *et al.*, 2013).**

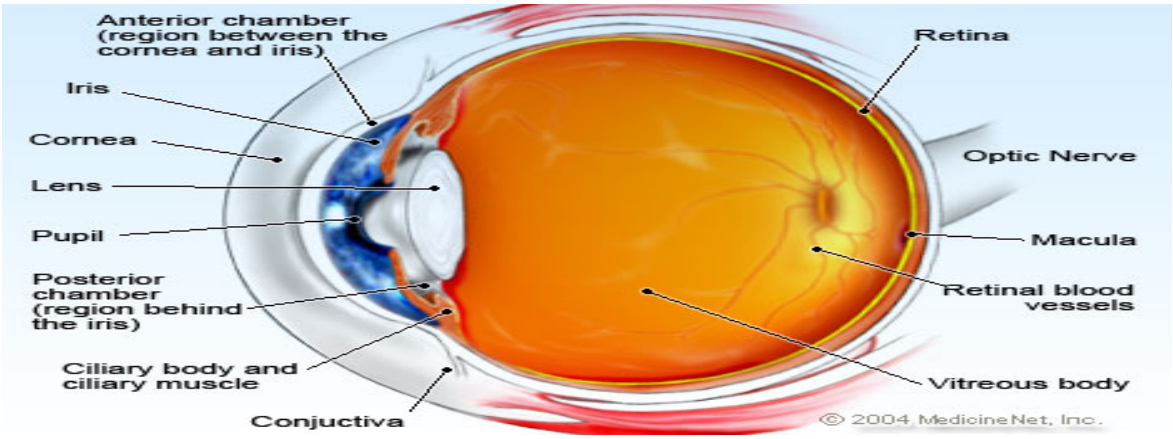

Figure 1: Diagram show the anatomy of eye (Jennings, *et al.*, 2013)

Cornea is the anterior clear part of the eye. It is the first clear "window" through which the light enters the eye. The transparency of the cornea is important in order for vision to be clear. Though it has many functions, one of the most important is to bend (refract) light entering the eye toward the lens, which in turn additionally focuses the light to the retina. The cornea also has a protective function (**Bertucci, 2001).**

Iris is a thin circular disc that gives our eyes their "color" and acts like the diaphragm of a camera. It is perforated near its center by a circular aperture called the pupil. The pupil varies greatly in size under different levels of light **(Alexander, 1990).**

Pupil is the center opening or circular aperture of the iris that appears black when viewing one's eyes. The pupil enlarges when a person is in dim light and constricts (gets smaller) in bright light. Pupil reflexes are checked by doctors to assess certain neurological conditions **(Scott, 2001).**

Conjunctiva is the thin transparent tissue overlying the sclera which continues over the posterior part of the upper and lower lids. Containing the most immunocytes of all the anterior eye structures, it serves as a protective layer against allergens and infective agents. The conjunctiva can be broken down into its three structurally separate parts: the palpebral conjunctiva lines the internal eyelids, the bulbar conjunctiva lines the sclera, and the fornix connects the latter two forming a cul-de-sac portion. An inflammation of the conjunctiva is called conjunctivitis **(Yetman and Coody, 1997).**

Aqueous is fluid that bathes structures in the anterior third of the eye. This fluid is derived from the blood vessels in the ciliary body processes and through a circulatory recycling process flows from the posterior chamber into the anterior chamber. Eventually it returns to the blood system draining out through structures including the Canal of Schema (**Bertucci**, **2001**).

Retina is a thin multi-layered sensory tissue that lines the back of the eye. The retina contains two types of photoreceptors (neurons) called rods and cones. Visual information received by the photoreceptors is translated to neural signals by the nerves called ganglion cells. The rods are more abundant in the peripheral retina and work to detect light/dark changes as well as shape and movement. Cones detect color and distinguish fine detail which is why they are denser in the central retina, especially in the fovea (**Marren *et al.*, 2001).**

Optic Nerve is the collective input of information from ganglion cells which are carrying information from the retinal photoreceptors. The optic nerve carries this information to the brain where the signals are interpreted allowing visual perception (**Komo**, **2004**).

2.2. Signs and symptoms of eye infections

Pain in the eye; a feeling that something is in the eye (foreign body sensation); increased sensitivity to light (photophobia); yellow, green, bloody, or watery discharge from the eye; increasing redness of the eye or eyelids; A grey or white sore on the colored part of the eye (iris) ; fever with no other cause and blurred or decreased vision **(Jennings, *et al.*, 2013).**

2.3. Complications of eye infections

There are two types of clinical forms of eye infections; internal and external. The external eye is susceptible to numerous infections and injuries because it is in direct contact with environmental elements. Some external eye disease carries the risk of causing vision loss. External clinical forms are blepharitis, conjunctivitis, keratitis, dacryocystitis, and dacryoadenities. While internal clinical form is endophthalmitis. Hordeolum has internal and external feature; external hordeolum is infection of eyelash at root and cause swelling, while internal hordeolum is infection beneath the surface of middle of eyelid **(Hwang**, **1996; Scott, 2001 and Jennings, *et al.*, 2013**).