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بسم الله الرحمن الرحيم

HANAA ALY

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قسم

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Efficacy of Colorimetric Method for Identification of Organisms causing Burn Wound Infection and Their Pattern of Antimicrobial Susceptibility at Ain Shams University Hospitals

Thesis

Submitted for Partial Fulfillment of Master Degree in Medical Microbiology and Immunology

By

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Nouran Mohamed

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List of Abbreviations

Abb.	Full term
BA	Blood agar
BSA	Body surface area
BWEs	Burn wound exudates
CLSI	Clinical and Laboratory Standard Institute
CoNS	Coagulase Negative *Staphylococci*
ESBLs	Extended spectrum beta lactamases
HAI	Hospital acquired infections
ICU	Intensive care unit
IV	Intravenous
K. pneumoniae	*Klebsiella pneumoniae*
LMIC	Low- and middle-income countries
MDR	Multidrug-resistant
MHA	Muller Hinton agar
MRSA	Methicillin-resistant *S. aureus*
P. aeruginosa	*Pseudomonas aeruginosa*
PAIs	Pathogenicity islands
S. aureus	*Staphylococcus aureus*
TBSA	Total body surface area
TSI	Triple Sugar Ion Test
VF	Virulence factors
WHO	World Health Organization
XDR	Extensively drug-resistant

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Abstract

Introduction: Burn wound infections are one of the most dangerous burn complications because they are a leading cause of morbidity and mortality in burn patients. Their successful treatment necessitates the rapid isolation and identification of causative species using antibiotic susceptibility patterns that are acceptable.

Aims and objectives: To evaluate the efficiency of the **chromogenic medium (HiChrome universal medium)** in comparison to conventional method in identification of organisms causing burn wound infections regarding time, accuracy and cost and profiling of antimicrobial susceptibility patterns of burn wound isolates.

Methods: Eighty-three wound samples were collected from inpatient and ICU patients at Ain Sham University Burn Unit. All the wound swabs were analysed using conventional media and chromogenic medium (HiCrome Universal medium) to compare between their results. Antibiotic sensitivity testing was done using disk diffusion method.

Results: HiChrome universal medium was effective and could identify all organisms in the obtained samples within 24 hours and its efficacy was almost the same as conventional method including (Nutrient, Blood and MacCkonkey's agar medium followed by biochemical tests) but more rapid**.** Out of the 83 swabs taken, positive growth was detected in 81 swabs (97.5%). Out of this, gram negative organisms were isolated from 45(54.2%) isolates while 21(25.3%) grew solely gram positive organisms. However 15(18.1%) grew mixed gram positive and negative organisms. *Staphylococcus aureus* (30.1%) was the commonest among gram positive organisms 25(30.1%) and *Pseudomonas aeruginosa* 38(45.8%) was the commonest among gram negative organisms. Vancomycin was the most effective antibiotic against gram positive bacteria and Imipenem was the most effective against gram negative organisms.

Conclusion: HiCrome Universal agar can be used to quickly isolate all organisms with low cost.

Keywords: Hichrome universal media, chromogenic media, burn wound infection, antibiotic susceptibility.

INTRODUCTION

Burn wound infection continues to be a major issue of concern in developing countries ***(Manning, 2018).*** There are many factors which lead to infections in burn patients, such as exposed body surface, immunocompromised state, invasive procedures carried out in the health care facility, and prolonged hospital stay ***(Marcus et al., 2019).*** Burn wounds are commonly infected by organisms which delay wound healing ***(Chaudhary et al., 2019).***

The wound is initially colonized by Gram-positive bacteria such as *Staphylococcus aureus* and *methicillin-resistant S. aureus* followed by gram negative bacterial infection such as *P. aeruginosa*, *E. coli and K. pneumoniae* ***(Pangli et al., 2019).***

Identification of organisms has used to be done by conventional methods especially in the developing countries ***(Ayeni et al., 2015).*** However, none of the conventional media including blood agar, nutrient agar and macckonkey agar media can support the growth and identification of different wound organisms without performing different biochemical tests which is time and money consuming ***(Rogers, 2009).***

The chromogenic media can reduce the number of these confirmatory tests and they are well adapted for identification of samples containing mixed organisms ***(Arreola et al., 2012).***

HiChrome universal differential medium is a type of chromogenic media that can help in isolation of most of organisms causing wound infection ***(Merlino et al., 2011).*** The pathogens grow as colored colonies due to their enzymatic effects on substrates present in the chromogenic agar medium ***(Perry, 2017).***

AIM OF THE WORK

This study aims to:

- Evaluate the efficiency of the chromogenic medium (HiChrome universal medium) in identification of organisms causing burn wound infections regarding time, accuracy and cost.
- Profiling of antimicrobial susceptibility patterns of burn wound isolates.