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Causes of Meningitis in Children in Al- Batool Teaching Hospital / Diyala Governorate/ Iraq.

A Thesis

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Fulfillment for the Requirement of the Degree of Master in Pediatrics*

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Dedication

*I dedicate this work to my parents who
have been a great source for inspiration
and support*

*This work is also dedicated to my friends
who helped me
for their cooperation during the journey
of the study*

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Summary

Meningitis is a devastating disease that requires a high index of suspicion, prompt diagnosis, and rapid treatment. Differentiating bacterial from nonbacterial meningitis is very important in deciding treatment.

To identify the causative agent of meningitis in children aged < 15 year's old in Al-Batool Teaching Hospital / Diyala Governorate / Iraq.

A descriptive study conducted in Al-Batool Teaching Hospital,

Diyala, Iraq during a period from 1st October 2017 to end February 2018. It included all patients aged <15 years' old who admitted with primary diagnosis of meningitis, presented with clinical signs of meningitis, with total number of patients enrolled were 70. Patients aged >15 years, with operated hydrocephaly, those diagnosed as posttraumatic meningitis and the patients refused lumbar puncture were excluded in this study. Needed information was collected from each patient by a questionnaire designed by the researcher. All patients were subjected to a detailed history , clinical examination , a laboratory and radiological investigation. Blood and Cerebrospinal fluid samples were collected to confirm the diagnosis of meningitis and to differentiate bacterial from viral type. Also investigation such (CBC, Human coxsackievirus A16 (CVA16) antibody (IgM), and High sensitivity C-Reactive protein were performed for all patients.

The mean of age of study sample was 39.51 ± 41.43 months; 57.1% were males; 54.3% were living in urban area and 57.1% of them were vaccinated completely. Fit was presented in 45.7% of study patients, most of these fits were generalized in type (93.8%) and 56.3% of them were lasted for less than 15 minutes. The main cause of meningitis that detected by Cerebrospinal fluid result was viral cause (74.3%) and Coxsackie virus A16 IgM antibody was detected in 70% of cases. Age and duration of fever were significantly associated factors with cause of meningitis ($P = 0.024$ and $p = 0.017$ respectively). About three quarters of cases of meningitis in Al-Batool Teaching Hospital/Diyala Governorate /Iraq were caused by viral infection and Coxsackie virus A16 IgM antibody was the most common virus detected. The associated factors with viral meningitis were young age and short duration of fever. It was noticed that CSF protein was significantly higher in bacterial than in viral meningitis.

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List of Abbreviations

Abbreviatio	Descriptions
AIF	Apoptosis Inducing Factor
BM	Bacterial Meningitis
CBC	Complete Blood Count
CMV	Cytomegalovirus
CNS	Central Nervous System
CPS	Central Pain Syndrome
CSF	Cerebrospinal Fluid
DOT	Directly Observed Therapy
EEG	Electroencephalography
EV RNA	Extracellular Vesicle Ribonucleic Acid
GBS	Group B Streptococcus
HCMV	Human Cytomegalovirus
HIV	Human Immunodeficiency Virus
HSV	Herpes Simplex Viruses
ICP	Intracranial Pressure
IDSA	Infectious Diseases Society of America
LCMV	Lymphocytic Choir Meningitis Virus
LMC	Leptomeningeal Carcinomatosis
LP	Lumbar Puncture
MMPs	Matrix Metalloproteinase
NVD	Normal Vaginal Delivery
PAF	Platelet Activating Factor
PAM	Primary Amoebic Meningoencephalitis

SD	Standard Deviation
SPSS	Statistical Package for Social Sciences
TB	Tuberculosis
TBM	Tuberculous Meningitis
VZV	Varicella Zoster Virus

CHAPTER ONE
INTRODUCTION

1.1 INTRODUCTION

Meningitis is an inflammation of the meninges & the subarachnoid cerebrospinal fluid (CSF) that surrounds the brain and spinal cord, infection of the central nervous system (CNS) is one of the causes of fever in pediatrics' age group, Meningitis is a devastating disease that requires a high index of suspicion, prompt diagnosis, and rapid treatment, Many microorganisms can cause infection including bacterial, viral, and fungal (Charles G, 2016). The presence of microorganisms in normally sterile body fluid specimens may be representative of life threatening infections, Regardless of etiology, most patients with CNS infection have similar clinical manifestations, Common symptoms include headache, nausea, vomiting, anorexia, restlessness, altered state of consciousness, and irritability; most of these symptoms are nonspecific, Common signs of CNS infection, in addition to fever, include photophobia, neck pain and rigidity, bulging fontanelle in children bellow 18 months, obtundation, stupor, coma, seizures, and focal neurologic deficits (Keyrings and Brzezinski sign) (Charles, 2016). Differentiating bacterial from nonbacterial meningitis is very important in deciding treatment, Bacterial meningitis is a life-threatening neurological condition and needs prompt parenteral antibiotics, compared to viral and aseptic meningitis, which carries relatively better outcome (Ray P, 2007).

Acute bacterial meningitis is a major cause of death and disability worldwide, It affects over one million people yearly, with a higher incidence among developing countries and in specific geographic areas (Agier L, 2013). The incidence is presumed to be higher in developing countries because of less access to preventive services, such as vaccination. In these countries, the incidence has been reported to be 10 times higher than that in developed countries (Agier L ,2013).

Meningitis affects people of all races, In the United States, black people have a higher reported rate of meningitis than white people and Hispanic people (Hasbun R, 2017).

Causes of bacterial meningitis in infant and children (ranging from two months-12 years) include: Haemophilus influenzae type B, Streptococcus pneumonia, Neisseria meningitides

and other microorganisms: Staphylococcus aureus, E. coli, Salmonella typhimerium, and Klebsiella (Abdul Hameed B, 2011).

Meningitis is diagnosed by CSF analysis, Gram stain, and culture, CT scan for evidence of brain abscess or increased intracranial pressure (ICP), Blood culture should be performed in all patients with suspected meningitis, and it reveals the responsible bacteria in 80-90% of cases of meningitis. Lumbar puncture (LP) may precipitate cerebral herniation in some severe cases of acute bacterial meningitis, so it would be unwise to undertake a lumbar puncture immediately after cessation of convulsive status epilepticus associated with acute bacterial meningitis (Kneen R, 2002).

Survivors of neonatal meningitis are at considerable risk for long-term neurologic impairment, studies of neonatal meningitis through five years of age found that those who had neonatal meningitis were 10 times more likely to have moderate or severe disability than children who never had meningitis (Bedford H, 2011). Prompt initiation of antibiotics is critical. Delays in treatment are associated with increased mortality and morbidity. Empiric antimicrobials used in suspected meningitis require adequate CSF penetration and sensitivity against the most probable pathogens. Upon identification of the pathogen and its susceptibilities, antimicrobial coverage should be adjusted accordingly (Heath PT, 2010). While the incidence mortality has declined with improved neonatal intensive care practices and universal adoption preventative screening and prophylaxis programs, the associated morbidity remains unchanged. Performing an LP to collect CSF is critical to confirming diagnosis, determining the causative pathogen, and refining antimicrobial therapy. Through better diagnostic practices and development of vaccines, there is great hope that we may further reduce the burden of this devastating disease (Lawrence C, 2015).

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To identify the causative agent of meningitis in children aged <15 years in Al-Batool Teaching Hospital /Diyala Governorate/Iraq.