

# Antibiotics Usage in Treatment of Bacterial Meningitis by Using Single Antibiotic Instead of Two or Three Antibiotics

Dr. Mohammed Saleem Mustafa DM<sup>1</sup>, Dr. Ammar Yaseen Abdullah DM<sup>2</sup>,  
Dr. Yasser Basher Shukur Al Hanoon<sup>3</sup>, Dr. Salih Sulaiman Mahamood DM<sup>4</sup>

<sup>1</sup>Directorate of Nineveh Health, Al-Salaam Hospital, DM, Mosul, Iraq

<sup>2</sup>Directorate of Nineveh Health, Ibn - Sinaa Hospital, DM, Mosul, Iraq

<sup>3</sup>Directorate of Nineveh Health, Medical Community Section, Health And Hospital Management, Mosul, Iraq

<sup>4</sup>Directorate of Nineveh Health, Al-Shefaa Hospital, DM, Mosul, Iraq

---

## ABSTRACT

**Background:** meningitis is an inflammation (Swelling) of protective membranes (meninges) of the brain and spinal cord; many drugs were used in treatment of bacterial meningitis according to the type of pathogens and ages of the patients.

**Objective:** To compare the results of treatment using single antibiotic instead of two or three antibiotics in bacterial meningitis.

**Methods:** A prospective study carried out on (42) patients of both sexes were admitted in Al Shifa Hospital for chest and infectious diseases (Mosul city, Iraq) from the first January to the end of December on 2016.

**Results:** There is no much difference in outcome of treatment by using single antibiotics in treatment of bacterial meningitis in compare of using two or three antibiotics.

**Conclusion:** In certain situation we can use single antibiotic instead of two or three antibiotics in treatment of bacteria meningitis.

**Keywords:** Antibiotic (AB), Bacterial meningitis (BM), Cerebrospinal fluid (CSF), Nervous System (NS).

---

## PREFACE

During domination of ISIS over Mosul city (Iraq) in 2014 -2017, Doctors in hospitals who treat the patients faced many difficulties in treating the patients. These problems like lack of medicines and medical supplies, which obligate the doctors to use antibiotics, which is available only in hospitals.

## INTRODUCTION

Meningitis is inflammation (Swelling) of the covering membranes (meninges) of the brain and spinal cord [1], [2]. Acute infection of (NS) are among the most important problems in medicine because early recognition, efficient decision making and rapid institution of therapy can be life saving. Meningitis is an acute infection of the meninges present with a characteristic combination of pyrexia and Meningism. Meningism consist of headache, photophobia and stiffness of the neck, often accompanied by other signs of meningeal irritation, including Kernig's sign ( Extension at the knee with the hip joint flexed causes spasm in the hamstring muscles) and Brudzinski's sign (passive flexion) of the neck causes flexion of the hips and knees). Meningism is not specific to meningitis and can occur in patient with subarachnoid hemorrhage. The severity of clinical features varies with causative organisms. [1,2].

Causes of meningitis could be bacterial, viral bacterial, protozoal or fungal, malignant diseases and inflammatory disease such as Saracoidosis and Behcet's disease [1, 2, 3, 4,5, 6].

Bacterial meningitis can be caused by different type of pathogens<sup>[3]</sup> like *streptococcus pneumoniae*, *Neisseria meningitidis*, gram negative bacilli, *staphylococci*, *listeria monocytogenes*, *Haemophilus influenzae*, *streptococcus agalactate*, *bacteroid fragilis*. The most common type of bacteria that caused meningitis shown in (Table 1).

**Table 1: Bacterial causes of meningitis and encephalitis<sup>[1]</sup>**

Age of onset	Common	Less common
Neonate	<i>Gram-negative bacilli ( Escherichia coli, proteus)</i> <i>Group B streptococci</i>	<i>Listeria monocytogenes</i>
Pre-school child	<i>Homophiles influenza</i> , <i>Neisseria meningitidis</i> <i>Streptococcus pneumoniae</i>	<i>Mycobacterium tuberculosis</i>
Older child and adult	<i>Neisseria meningitidis</i> <i>Streptococcus pneumoniae</i>	<i>Listeria monocytogenes</i> <i>Mycobacterium tuberculosis</i> <i>Staphylococcus aureus</i> (skull fracture ) <i>Haemophilus influenzae</i>

Diagnosis of bacterial meningitis is by blood culture, C.T scan or M.R.I and CSF examination. CSF examination is one of the most important diagnostic method in diagnosis of meningitis<sup>[1-6]</sup>. (Table 2) reveals C.S.F abnormalities in bacterial meningitis

**Table 2: Cerebrospinal Fluid (CSF) Abnormalities in Bacterial Meningitis<sup>[1]</sup>**

Opening pressure	> 180 mmH <sub>2</sub> O
White blood cells	10/ $\mu$ L to 10,000/ $\mu$ L ; neutrophils predominate tap
Red blood cells	Absent in nontraumatic tap
Glucose	< 0.45 g/L (> 45 mg / dL)
CSF / serum glucose	0.4
Protein	> 0.45 g/L (> 45 mg / dL)
Gram's stain	Positive in <60 %
Culture	Positive in <80 %
Latex agglutination	May be positive in patients with meningitis due to <i>S. pneumonia</i> , <i>N. meningitis</i> , <i>H. influenzae</i> type b, <i>E.coli</i> , group B <i>Streptococci</i>
Limulus lysate	Positive in cases of gram-negative meningitis
*PCR	Detects bacterial DNA

\*Polymerase Chain Reaction

**Table 3: Antibiotics Used in Empirical Therapy of Bacterial Meningitis and focal CNS infection<sup>[1]</sup>**

Indication	Antibiotic
Immunocompetent children > 3 months and adults < 55	Cefotaxime, Ceftriaxone Or Cefepime + Vancomycin
Adults > 55 and adults of any age with alcoholism or other debilitating illnesses	Ampicillin, Ceftriaxone, Cefotaxime Or Cefepime + Vancomycin

## METHODS AND MATERIALS

This study was done on (42) patients of both sexes in Shefaa hospital in Mosul city from 1st January 2016 to end of December 2016 by using single antibiotics in treating bacterial meningitis and bacterial encephalitis instead of two or three antibiotics. All the patients were examined clinically and they had meningitis, CSF for all of them was examined and the result shows bacterial infection, but without culture and sensitivity of the CSF because it was not available. The total number of patients is (42) patients they are divided into two groups according to their age;

Group A: The number of these patients in this group (36) patients, their ages are ranging between (more than 3 months to less than 55 years) this group also subdivided into two subclass.

Group A1 - The number of the patients in this subclass is (24) patients from the total number (36) patients all of them have bacterial meningitis and their ages (>3 months to < 55 years). All these patients were treated by two antibiotics as standard therapy (Ceftriaxone or Cefotaxime + Vancomycin).

Group A2 - The number of the patients in this subclass is (12) patients from the total number (36) patient complaining from the same disease and the same ages(> 3 months to < 55 years) but all of them were given single antibiotic (Ceftriaxone) because other antibiotics are not available in the hospital.

Group B: The number of the patients in this class are (6), the age in all of them is more than (55 years). This group is subdivided into B1 and B2.

Group B1: The number of the patients in this subclass is (3). Their ages more than (55) years, three all of them were given three antibiotics (Ampicillin + Ceftriaxone + Vancomycin) as a standard empirical therapy.

Group B2: The number of the patients in this subclass is (3), their ages more than (55) years. All of them were given single antibiotic (Ceftriaxone) which is only available in the hospitals.

## RESULTS

For group (A1). The number of patients which given two antibiotics (Ceftriaxone or Cefotaxime + Vancomycin) are (24) patients from the total number (36) patients, all of them are cured and had full recovery.

For group (A2). (12) patients are treated from the total number (36) patient who complaining from the same disease but they are given one antibiotic which is (Ceftriaxone) for (14) days, (11) patients from the total number (12) are cured and had full recovery and only one patient is died, as shown on (Table 4).

**Table 4: Results of treatment on A1 and A2 groups**

The age of the patients (>3 months < 55 years)	Number of the patients	Results of treatment	Percentage of curing
Two antibiotic (Ceftriaxone + Vancomycin) used in treatment	24	Full recovery	100 %
Single antibiotic (Ceftriaxone) used in treatment	12	(11) Full recovery & (1) died	91.66 %

The result of B1 group: The number of the patients in this subclass are (3). (Their ages are more than 55 years) all of them were given three antibiotic as standard empirical therapy (Ampicillin + Ceftriaxone + Vancomycin) and all of them were cured and had full recovery.

For group B2 the number of the patients in the subclass are (3), (Their ages more than 55 years) all of them were given single antibiotic (Ceftriaxone) because other antibiotics are not available in the hospital. All of them were cured and had a full recovery. As shown on (Table 5).

**Table 5: Results of treatment on B1 and B2 groups**

The age of the patients (< 55 years)	Number of the patients	Results of treatment	Percentage of curing
Three antibiotic (Ampicillin + Ceftriaxone + Vancomycin) used in treatment	3	Full recovery	100 %
Single antibiotic (Ceftriaxone) used in treatment	3	Full recovery	100 %

## CONCLUSION

The study concluded that in certain difficult situations. One could use single antibiotic in treating bacterial meningitis instead of two or three antibiotics because there is no so much difference in the results of treatments by using single antibiotic instead of two or three antibiotics.

### **RECOMMENDATION**

Encouraging more studies should be done on a more number of patients who complain with bacterial meningitis to confirm the outcome of the results of the study which done in Al-Shefaa hospital in Mosul city, Iraq.

### **REFERENCES**

- [1]. Longo DL, Fauci AS, Kasper DL, Hauser SL, Jameson J, Loscalzo (Eds). "Harrison's principles of internal medicine", 18th edition, New York: The McGraw Hill Companies: 2012. Vol. 2 pp. 3410 - 3417.
- [2]. Britton, edited by Brian R. Walker, Nicki R. Colledge, Stuart H. Ralston, Ian D. Penman; illustrations by Robert (2014). Davidson's principles and practice of medicine, 22nd ed., Edinburgh: Churchill Livingstone/Elsevier, pp. 1201-1202
- [3]. Kliegman RM, Stanton BF, St. Geme JW, Schor NF, Behrman RE, editors. Nelson Text Book of Pediatrics. 19th ed. WB Saunders Co; Philadelphia. 2012. pp. 2087- 2095.
- [4]. M. Longmore, I. B. Wilkinson, E. H. Davidson, A. Foulkes, and A. R. Mafi "Oxford Handbook of Clinical Medicine" Oxford University Press, Oxford, UK, 8th edition, 2010. pp. 832- 853.
- [5]. Cecil, Russell L. 1881-1965., Lee Goldman, MD, and Andrew I Schafer. Goldman's Cecil Medicine. 18th ed. Philadelphia: Elsevier/Saunders, Vol. 2012, pp. 1604- 1610
- [6]. P. Wyatt, Robin N. Illingworth, Colin A. "Oxford Handbook of Emergency Medicine", 4<sup>th</sup>, Oxford University Press, Inc. New York, United State, 2012, pp. 224-225.