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Etiology and Incidence of Bacterial Meningitis in Patients in Tobruk Medical Centre

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Abstract: Bacterial meningitis is a medical emergency associated with high mortality rates. Cerebrospinal fluid (CSF) culture is the gold standard for diagnosis of meningitis and it is important to establish the susceptibility of the causative microorganism to rationalize treatment. Objective of this study was to assess the seasonality of the bacterial meningitis and the antibiotic resistance of incriminated bacteria through the year in Tobruk city. This Laboratory-based retrospective analysis of 367 CSF cultures was conducted in Tobruk Medical Centre, Tobruk, from January 2020 - December 2020. Of whom 367, 188 (59%) were male, while 179 (49%) were female. Of 367. Three isolated pathogen was *Klebseilla* spp 2(1%), followed by *streptococcus pyogen* and *Staph aureus* 1 (0%) equally. While 363 (99%) was no growth. The majority of cases 110 (30 %) were cultured in autumn 110 (30%) followed by winter 95 (26%) and spring 88 (24%). in our study the decreasing of bacterial isolation from CSF samples, is maybe due to several reasons such as administration of antibiotics to the patients before CSF sample culturing or the patients were infected with viral infections or the patients were not infected at all. Additional study should focus on avoidable features of vaccines, to reduce the disease problem.

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Introduction

Bacterial meningitis is an acute infection in which the meninges, the subarachnoid space, and the brain parenchyma are all frequently involved in the inflammatory reaction. It caused by bacteria, viruses, fungi, and

parasites. Bacterial meningitis must be distinguished from the more common aseptic (viral) meningitis. and reach the CNS either by hematogenous spread or by direct extension from a contiguous site.[1] Bacterial meningitis affected almost 6000 people every year in the United States; about half of all cases occurred in children 18 years old or younger. [2] The etiology of bacterial meningitis is affected most by the age of the patient. B streptococci and gram-negative enteric bacilli are known as the most common etiologic agents caused of meningitis in neonates. [3, 4] Meningitis is characterized by severe fever, headache, intolerance to light and sound and inflexibility of muscles, especially those of the neck. The central nervous system (CNS) inflammatory reaction from bacterial meningitis may result in decreased seizures, consciousness, raised intracranial pressure, and stroke. [5] In patients suspected of having bacterial meningitis, cerebrospinal fluid (CSF) should be obtained for cultures and empirical antimicrobial therapy initiated immediately. [6, 7] Diagnosis of bacterial meningitis is confirmed by CSF culture for diagnosis of meningitis and important to obtain the antimicrobial susceptibility of the causative microorganism to rationalize treatment. [8, 9] With increased use of conjugate vaccines, the annual incidence of bacterial meningitis in the United States declined from 1.9 to 1.5 cases per 100,000 persons between 1998 and 2003, with an overall mortality rate of 15.6 percent. [1-3] Incidence rates in developing countries remain significantly higher. [10, 11] When selecting the appropriate antibiotic for treating bacterial meningitis must be factors to consider, include its activity against the causative pathogen and its ability to penetrate and attain effective bactericidal concentrations in the CSF. [12] The objective of this study was to assess the seasonality of the bacterial meningitis through the year in Tobruk city.

Material and methods

The retrospective study was performed during the period from January 2020 to December 2020. CSF samples were tested in the microbiology department of Tobruk Medical Center, Tobruk, Libya. The CSF samples bottles were indicated name, and time of collection. The samples were analyzed bacteriological using the methods.

The CSF samples were collected from different wards of the hospital in sterile containers by physicians and delivered to the bacteriology laboratory within half an hour collection and samples were processed following the standard microbiological procedures by inoculating on blood agar, chocolate agar, and Macconkey agar plates prepared as per the manufacturer instruction and incubated at 35- 37C^{o} aerobically. The chocolate agar plates were incubated by putting them in a candle jar, which provided 5-10% CO2 concentration to create a microaerophilic condition for fastidious bacteria. After 20-24 hours of incubation, the plates were examined for the presence of bacterial colonies. Plates, which did not show any growth, were further incubated for an additional 24 hours. Organisms were identified by standard microbiological methods, which included colony morphology, as well as staining, biochemical and serological tests. The strains were subjected to biochemical identification tests to identify bacteria species for TSI (Triple Sugar Iron), gram staining, Motility, Indole test, Urea and Citrate agar, and kept aerobically for 24 hours at 37°C with 5% CO2 atmosphere. [15]

Reference strains: *Strep pneumonia* ATCC49619, *E. coli* ATCC25922 and *Staph aureus* ATCC25923 were tested as controls according to the National Committee for Clinical Laboratory Standards (NCCLS) (National-Committee-for-Clinical-Laboratory-Standards, 1979. [16]

Statistical analysis: Analysis was done by the standard deviation function is STDEV, and the test uses is T- test.

Results and discussion

Distributions of cases positive and negative

Microbial culture and identification remain the gold standard for diagnosing bacterial meningitis**.** [13, 14] The study included 367 patients (188 male and 179 female). Three hundred sixty seven suspected meningitis cases were examined using culture in microbiology laboratory. Bacterial pathogens were isolated from 4 (1%) patients and 363 (99%) were no growth. Other studies, showed higher rates of isolations like those reported by Kala Yadhav Ml. [18]

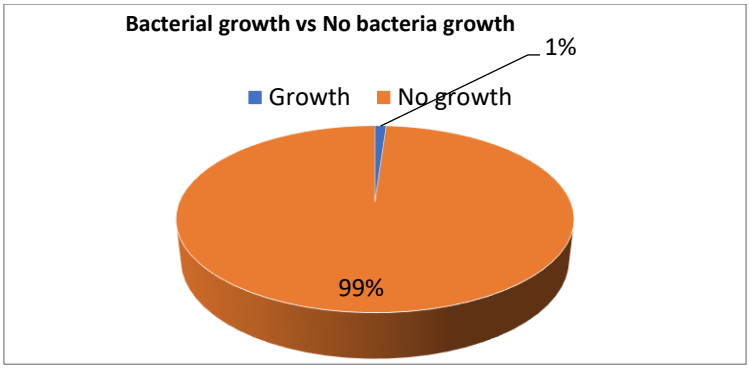

Figure 1 Distribution of cases positive and negative.

Comparison between cases according to the gender:

Three hundred sixty seven suspected meningitis cases were examine during culture in microbiology laboratory. Of whom 367, 188 (59%) were males, while 179 (49%) were females. This finding is in line with the previous reports from Gondar Teaching Hospital. [17]

Gender	Male	Female	Total
Percent	51%	49%	100%
Number	188	179	367

Organisms isolate from CSF cultures of patients of bacterial meningitis

In this retrospective study the three major organisms responsible for bacterial meningitis were *Klebseilla* spp 2(1%), followed by *streptococcus pyogen* and *Staph aureus* 1 (0%) equally. While 363 (99%) was no growth. Dissimilar trend reported from Northwest Ethiopia. [17]

Bacteria	*Strep pyogen*	*Staph aureus*	*Klebseilla* spp.	No growth
Number	1 (0%)	1 (0%)	2 (1%)	363 (99%)

Conclusion

Bacterial meningitis is a medical emergency. [19] In this analysis, 1% of the CSF samples showed microorganism growth. The bacterial species identified were *Klebseilla* spp 2(1%), followed by *streptococcus pyogen* and *Staph aureus* 1, because of the lack of bacterial growth, we have not resolved as statistical analysis of their patterns to antibiotic susceptibility. There is a need to strengthen the infection control practices in the public hospitals. This would be expected to help identify appropriate antibiotics for the management of meningitis.

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