CEREBROSPINAL FLUID NUCLEOTIDE-BINDING DOMAIN LEUCINE-RICH REPEAT PYRIN DOMAIN CONTAINING3 AS DIAGNOSTIC MARKER OF BACTERIAL MENINGITIS

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Introduction

Meningitisis a life-threatening which characterized by inflammation of the meninges, which are membranes that cover the brain and spinal cord. The disease can spread worldwide but is more common in certain regions and endemic in Egypt. Both bacteria and viruses can cause meningitis. Bacterial meningitis is more dangerous than viral meningitis Inflammasomes are Intracellular multiprotein complexes linked to inflammatory reactions, which operate as a link between inflammatory and immunological responses. Of all the inflammasome types, the NOD-like receptor family, pyrin domain containing 3 (NLRP3) inflammasomes are implicated in the etiology and development of a number of immunological and inflammation-related conditions, including diseases of the central nervous system (CNS)·Our study demonstrate that during bacterial meningitis, NLRP3 may have some significant pathophysiological impacts ascerebral edema, Microvascular injury, neurological injury, CSF pleocytosis, and necrotic cell death in oligodendroglia have all been linked to these inflammasomes.

Aim of the Work

The aims of this study was to evaluate the role of CSF NLRP3 level as diagnostic marker for bacterial meningitis.

Subjects and Methods

This study was Cross-sectional prospective study conducted on 80 patients admitted in Damanhur fever hospital from august 2023 to march 2024. The Subjects were divided into two groups; group I consisted of 40 patients diagnosed as bacterial meningitis confirmed by CSF analysis and cultures, group II: 40 patients had viral meningitis, which was verified by PCR viral panel and CSF investigation.

Ethical considerations were made, ensuring data privacy and obtaining informed consent from all participants. Each participant underwent detailed clinical evaluations and laboratory investigation which include blood tests for Complete blood picture, .renal function tests, Fasting , post prandial blood glucose, Liver enzymes , liver function test, C-reactive protein (CRP) and Erythrocyte Sedimentation Rate (ESR) and Lumber puncture and CSF examination: chemical analysis for aspect, protein, glucose, total and differential leucocyte count, CSF culture, CSF PCR and CSF NLRP3 level.

Results

The results revealed a significant increase in CSF NLRP3 level in group I (bacterial meningitis) than group II (viral meningitis) as the median NLRP3 level in CSF samples of group I was: 1335.3ng/ml, while in Group II it was 454.8 ng/ml, The diagnostic performance of CSF NLRP3 level in bacterial meningitis, was 0.967 (p <0.001`), the cutoff value of CSF nlrp3 was >655 ng/ml for prediction of bacterial meningitis, with sensitivity of 90.0%, specificity of 82.50%, PPV of 83.7%, NPV of 89.2%. and notable correlation was found between the level of CSF NLRP3 and the prognosis of the disease.

Table 1: Comparison between the two studied groups according to CSF NLRP3 level ng/ml

NLrP3 (ng/ml)	Group I (n = 40)	Group II (n = 40)	U	P
Min. – Max.	600.5 – 2995.0	249.4 – 841.3	53.00*	<0.001*
Median (IQR)	1335.3 (1230.7 – 2346.5)	454.8 (359.9 – 594.8)		

IQR: Inter quartile range
p: p value for comparing between the two studied groups
Group I: Bacterial meningitis
Comparison between the two studied groups according to CSF NLRP3 level
U: Mann Whitney test
*: Statistically significant at p ≤ 0.05
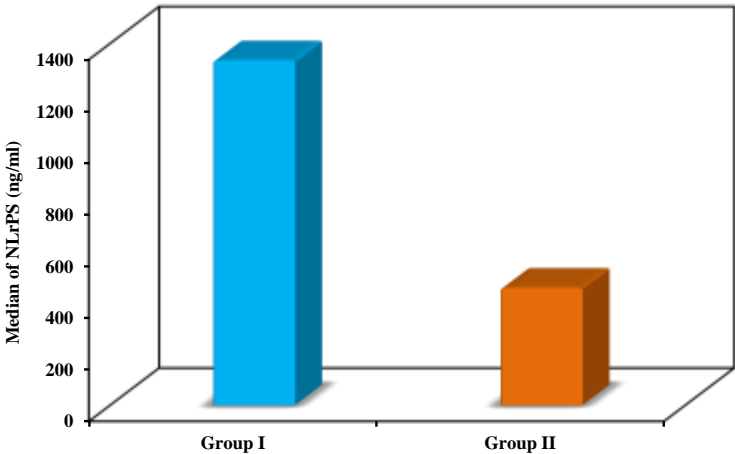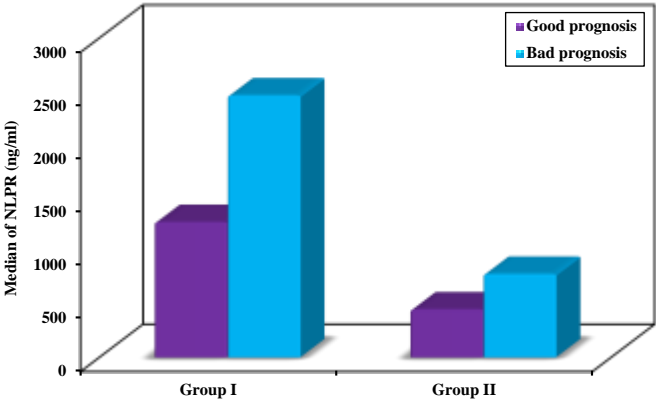**Group II: Viral**

Table2: Diagnostic performance for NLrPS to diagnosis of bacterial meningitis patients

	AUC	P	95% C.I	Cut off	Sensitivity	Specificity	PPV	NPV
NLrPS (ng/ml)	0.967	<0.001*	0.935 –0.999	>655	90.0	82.50	83.7	89.2

Conclusion

• CSF NLRP3 may be applied as a good, applicable, cheap marker for bacterial meningitis diagnosis.
• CSF NLRP3 can be utilized as good prognostic marker in meningitis