The role of some laboratory biochemical and blood tests for meningitis patients for early detection of the disease .

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Abstract

Meningitis is the inflammation of the membranes surrounding the brain and spinal cord, which is a gastrointestinal disease and complications of deafness, epilepsy and loss of concentration. The diagnostic methods of the disease are high temperature and stiffness of the neck and sensitivity of light and body convulsions and types of viral and bacterial meningitis. The study aimed to do some laboratory biochemical and blood tests for meningitis patients for early detection of the disease, the information was taken from the statistics and documentation department of Misurata Medical Center after approval from the center from 1 January2018 to 20 May 2019, the data were taken from patients' profiles such as age, gender, and type of meningitis as well as after medical analysis such as spinal fluid analysis and analysis of white blood cells and reactive protein c (CRP) in serum and culture CSF, the rate of entry to the period reached 5694 children, of which 46% were girls and 54% were boy and stay in center between 4 days and 13 years, the cases were diagnosed with medical tests and the number of infected cases reached 37 children, where the incidence of meningitis was 0.6% of the total number from the present study we find that some medical tests may play an important role in the detection of bacterial meningitis and this has been shown by several previous studies, especially the analysis of the reactive protein (CRP) of the spinal fluid.

Keywords: Meningitis disease, Biochemical test, Blood test, early detection.

I. INTRODUCTION

Meningitis is inflammation of the brain surrounding the brain and spinal cord is a severe disease and suffer about 8.7 million people from meningitis in 2015, causing the deaths of approximately 379000 people(Abubakar, Tillmann, & Banerjee, 2015; Vos et al., 2017), although the mortality rate may be reduced to 15% when appropriate treatment is used, in the case of neglect and lack of appropriate treatment(Abubakar et al., 2015), it leads to serious complications such as deafness, epilepsy, memory loss, paralysis and septicemia(Van de Beek, de Gans, Tunkel, & Wijdicks, 2006), the clinical diagnostic methods of the disease are high temperature, neck stiffness, light sensitivity and body cramps, which is one of the main factors for diagnosing the disease (Attia, Hatala, Cook, & Wong, 1999; Van de Beek et al., 2004), there are two types of meningitis, either bacterial or viral infection and often the distinction between them is difficult to share the same symptoms especially in young children(Berkley et al., 2001; De Cauwer, Eykens, Hellinckx, & Mortelmans, 2007), bacterial meningitis is more dangerous than viral meningitis and requires a long period of treatment, it is a contagious disease Often people with bacterial infection are at risk of death, while most cases that are cured are permanently(Noska & Tunkel, 2015), despite the development of diagnostic and therapeutic methods of the disease, the mortality rate is still up to 30% in pneumococcal inflammation and meningococcal meningitis(Brouwer, McIntyre, de Gans, Prasad, & van de Beek, 2010), the analysis of spinal cord fluid through a hole in the lumbar spine is the most commonly used test in the identification of the disease and is examined the presence of red blood cells and white and the protein and glucose level in the sample spinal fluid to determine the type of meningitis(Brouwer et al., 2010; Chaudhuri et al., 2008), since meningitis is a life-threatening disease and mortality rates are high, treatment should not be delayed to avoid bacterial resistance to the body. It is important to determine the type of infection to use appropriate treatment, aim this study knowledge do role some laboratory chemical and blood tests have a role in the detection of meningitis disease?

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Materials and Methods

After approval with the Misrata Medical Center, the children section was taken from the statistics and documentation department, the time period was from 1 January 2018 to 30 May 2019 and collected information such as sex and age as well as after medical analysis such as spinal fluid analysis and analysis of white blood cells and reactive protein C (CRP) and culture CSF.

Results and Discussion

The data collected from the statistics and documentation department at the Misurata Medical Center in the Children's Department, the total number of children during the year was 5694 including 37 children who had meningitis, Where the incidence of meningitis was 0.6% of the total number as shown in Figure (1).

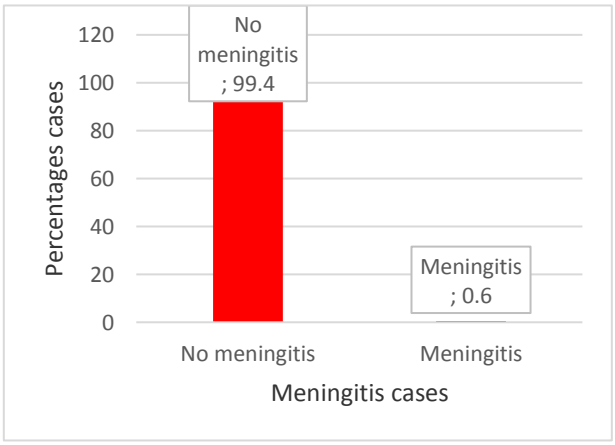


Figure (1): Percentages of the total number of meningitis cases.

The number of infected cases ranged from 1 to 13 years as shown in Table (1), it was found that most of the cases exposed to the disease among the age group (3-13 years).

Table (1): Distribution of age groups between cases**.**

Age child	*Meningitis cases*	*Bacterial meningitis*	*Viral meningitis*
1day-1year	24	1	23
1.5 year-2year	2	0	2
3 year-13year	11	3	8
	37	4	33

While most of the cases of infection were boy reaching 20 (54%) while girl 17(46%) as shown in Figure (2).

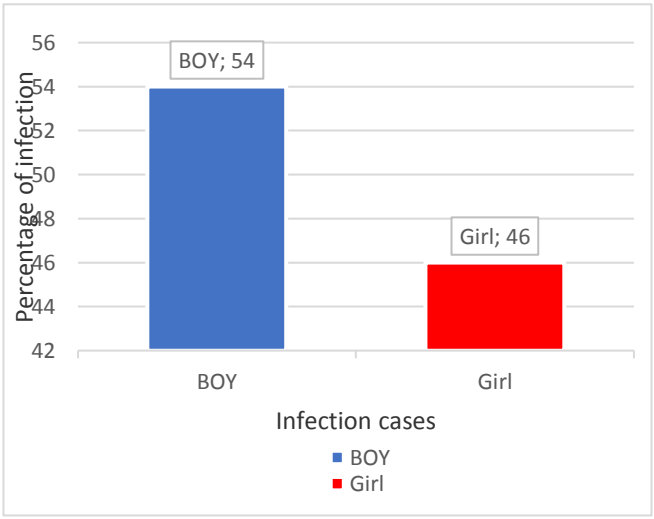


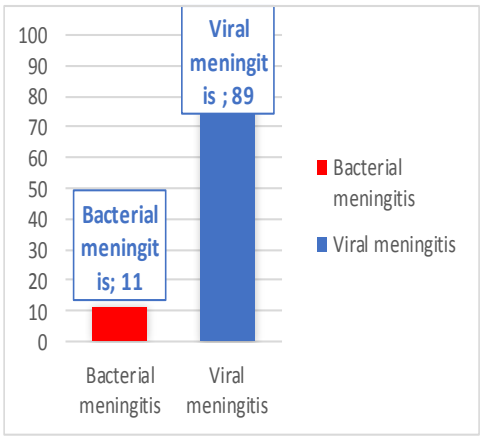
Figure (2): Percentage of infection between cases

As shown in Table (2) the length of time spent in the cases of residence in the center where we note that most cases were similar to recovery in the period of time between two to 10 days and this indicates the good health care by the health center.

Table (2): The length of time spent in the cases.

Length of hospital stay	*Total*
2 - 10day	**25**
11 - 20day	**8**
21 - 53day	**4**
	37

Most of the cases were found to be infected with viral meningitis, which was 89%, while bacterial was 11% as in figure (3), and most of the pathogenic bacteria *Streptococcus pneumoniae*.

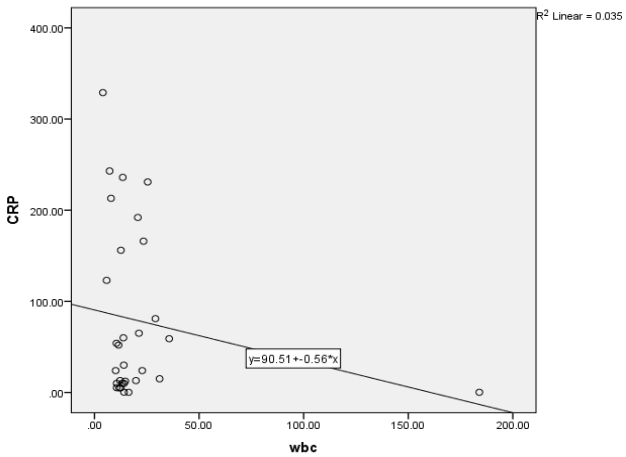


. Figure (3): Percentage of meningitis types.

After reviewing the case files, we find that most of the pathological cases of protein abnormality in the spinal fluid is high and this indicates the bacterial infection of the cases as in studies (Ali, Saeed, & Suliman, 2017; Fouad et al., 2014; Lee, Kwon, Lee, Kim, & Kang, 2015), while we find a decrease in the percentage of sugar for the spinal fluid of the affected cases also play white blood

cells in the early detection of the disease as in the study(Rasol & Sultan, 2019), and addition to the work of the culture of the spinal cord fluid as well as the test of Gram stain determine either the case is infected with bacteria and give the result of rapid detection, But nowadays we need faster tests to detect the disease because its symptoms are similar to flu, Blood tests such as leukocyte analysis as well as reactive protein in the blood sample contributed to early detection of the disease, the information obtained was inaccurate due to the different work places of the analysis, in addition to the fact that some analyzes are not present in the case file, While some previous studies show the importance of medical analysis in detection, especially culture analysis of the liquid, but there are some analyzes such as analyzes of the reactive protein of the spinal cord fluid, which contributes to the early detection of the disease as in studies(Malla, Malla, Rao, Basnet, & Shah, 2013) (Prasad, Nair, & Kalghatgi, 2005).

When examining the statistical correlation of medical tests with each other, we find that there is no correlation between white blood cells with serum reactive protein in serum (p value > 0.05) as in figure (4).



Figure(4): Correlation between WBC with CRP

		wbc	CRP
wbc	Pearson Correlation	1	-.188-
	Sig. (2-tailed)		.311
	N	31	31
CRP	Pearson Correlation	-.188-	1
	Sig. (2-tailed)	.311	
	N	31	31

There is no association between a protein in the spinal cord fluid and a reactive protein in the serum (p value > 0.05) as in figure (5).

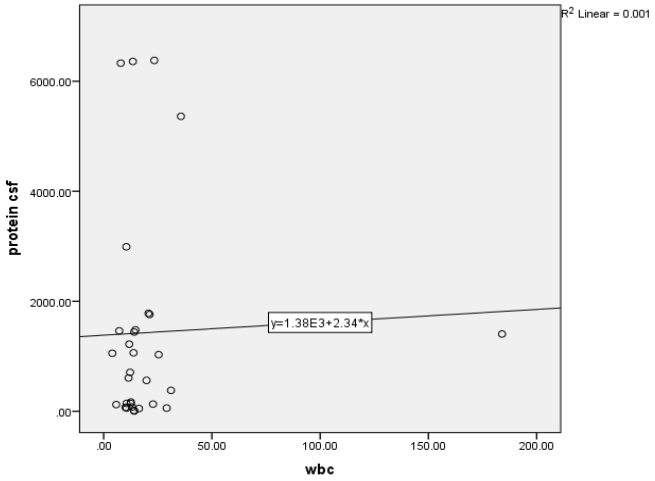


Figure (5): Correlation between WBC with Protein CSF.

		wbc	protein csf
wbc	Pearson Correlation	1	.037
	Sig. (2-tailed)		.843
	N	31	31
protein csf	Pearson Correlation	.037	1
	Sig. (2-tailed)	.843	
	N	31	31

While there is a link between protein in the spinal cord fluid and reactive protein in the serum (p value < 0.05) as in figure (6).

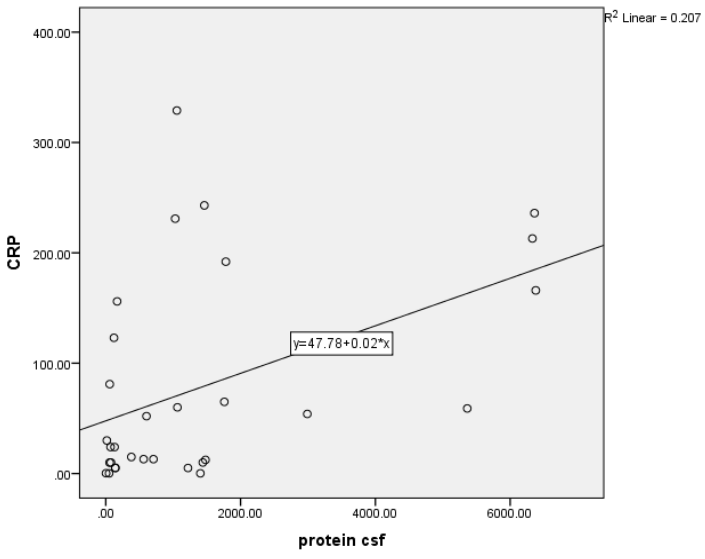


Figure (6): Correlation between CRP with Protein CSF

		protein csf	CRP
protein	Pearson	1	.455*

csf	Correlation		
	Sig. (2-tailed)		.010
	N	31	31
CRP	Pearson Correlation	.455*	1
	Sig. (2-tailed)	.010	
	N	31	31

Correlation is significant at the 0.05 level (2-tailed).

The white blood cells in the cerebrospinal fluid had no association with white blood cells (p value > 0.05) as in figure (7).

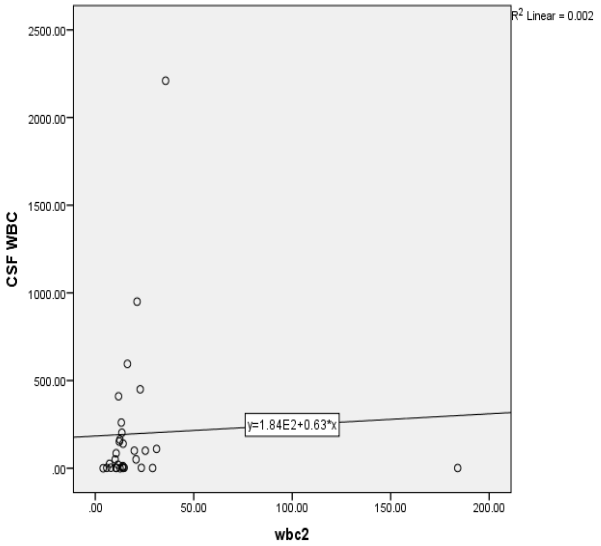


Figure (7): Correlation between WBC with WBCCSF

		wbc2	CSF WBC
wbc2	Pearson Correlation	1	.046
	Sig. (2-tailed)		.806
	N	31	31
CSF WBC	Pearson Correlation	.046	1
	Sig. (2-tailed)	.806	
	N	31	31

The error rate was found to be significant and the error rate is high, especially in the results of spinal fluid as in table (3).

Table (3): The error rate in medical analysis used.

Descriptive Statistics

	N	Mean
	Statistic	Std. Error
wbc	31	5.59184
CRP	31	16.74030
wbc1	31	5.59184
protein csf	31	353.49397
protein csf	31	353.49397
CRP	31	16.74030
wbc2	31	5.59184
CSF WBC	31	77.12422
Valid N (listwise)	31	

Conclusions

Conclude from the present study we find that some medical tests may play an important role in the detection of bacterial meningitis and this has been shown by several previous studies, especially the analysis of the reactive protein of the spinal fluid.

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