Results

The causative organisms were detected in the 35 cases examined either by one or more methods which were gram stain, culture and latex agglutination.

The clinical figures of these patients shows that the most common symptoms of meningitis were fever (85.7%), vomiting (71.4%) irritability (34.3%) convulsions 31.4% and purpuric rash 14.3% (Table 1).

Table (1): Distribution of the studied patients according to symptoms and signs of bacterial meningitis

Distribute / S. & S.	No.	%
• Fever :	30	85.7
• Vomiting :	25	71.4
• Irritability :	12	34.3
• Convulsions :	11	31.4
• Stiff neck	10	28.6
• Lethargy	10	28.6
• Anorexia	7	20.00
• Focal neurological defect	5	14.3
• Headache	4	11.4
• Coma	3	8.6
• Purpuric rash	5	14.3

Table (2): Age (year), sex and investigation results

Case No.	Age (year)	Sex	Organism isolated from C.S.F.	Gram Stain	Latex agglutination	CSF Culture	Chemical analysis		Comber's 9 test for CSF		
							CSF glucose mg/dl	CSF protein g/L	No. leucocyte /µL	Protein g/L	Glucose mg/dl
1	2.5	M	N. meningitidis	+	+	+	32	170	>500	>100	<50
2	5	M	N. meningitidis	+	+	+	33	250	>500	>100	<50
3	1.5	F	N. meningitidis	-	-	+	40	280	>500	>100	<50
4	6.5	M	N. meningitidis	+	-	+	20	300	>75	>100	<50
5	1	F	N. meningitidis	+	-	+	17	240	>500	>100	<50
6	8	M	N. meningitidis	+	-	+	30	140	>75	>100	<50
7	11	F	N. meningitidis	-	-	+	33	550	>500	>500	<50
8	12	M	N. meningitidis	+	+	+	33	130	>75	>100	<50
9	7.5	M	N. meningitidis	-	-	+	20	176	>500	>100	<50
10	12	F	N. meningitidis	+	-	+	18	160	>75	>100	<50
11	6	M	N. meningitidis	+	-	+	10	240	<500	>100	<50
12	9	M	N. meningitidis	+	+	+	41	350	>500	>100	<50
13	10.5	M	N. meningitidis	-	-	+	12	118	>500	>100	<50
14	9	F	N. meningitidis	-	-	+	30	231	>75	>100	<50
15	6.5	F	N. meningitidis	+	+	+	10	120	>75	>100	<50
16	2.5	M	H. influenza	+	+	+	10	168	>500	>100	<50
17	3	M	H. influenza	+	+	+	32	244	>500	>100	<50
18	4.5	F	H. influenza	-	-	+	60	196	>75	>100	<50
19	5.5	M	H. influenza	+	+	+	23	213	>500	>100	<50
20	3	F	H. influenza	-	+	+	20	196	>75	>100	<50
21	4	M	H. influenza	+	+	+	23	201	>500	>100	<50
22	1.5	M	H. influenza	-	+	+	10	173	>500	>100	<50
23	3.5	F	H. influenza	+	+	+	12	183	>75	>100	<50
24	0.6	M	H. influenza	+	+	+	70	136	>75	>100	>50
25	1.5	F	H. influenza	+	+	+	50	112	>500	>100	>50
26	1	M	H. influenza	-	+	+	50	105	>75	>100	>50
27	0.6	F	H. influenza	+	+	+	15	138	>500	>100	<50
28	4	M	S. pneumoniae	+	+	+	60	252	>75	>100	>50
29	9	F	S. pneumoniae	-	-	+	40	210	>500	>100	<50
30	12	M	S. pneumoniae	+	+	+	10	180	>500	>100	<50
31	8	M	Meningococcal septicemia*	+	-	-	60	180	>75	>100	>50
32	6.5	F	Meningococcal septicemia*	-	+	-	60	200	>500	>100	>50
33	9	F	Meningococcal septicemia*	-	+	-	0	300	>500	>100	<50
34	3	F	Meningococcal septicemia*	-	+	-	30	150	>500	>100	<50
35	1.5	F	Meningococcal septicemia*	+	-	-	32	180	>75	>100	<50

*** Those with a clinical diagnosis of meningococcal meningitis had CSF leucocytosis, and clinical features of meningitis plus a purpuric rash, in the absence of a positive CSF culture result.**

M = Male **F = Famele**

Table (2) illustrates the age, sex and the investigation results of each patient included in the study

Table (4) shows the relation between the sex and the type of organism where N.meningitidis was positive in 15 cases 9 were males and 6 were females. S.pneumoniae was positive in 3 cases, 2 males and 1 female. H.influenzae was positive in 12 cases 7 males and 5 female.

Meningococcal septicaemia was positive in 5 cases 1 male and 4 females by clinical, gram stain and latex agglutination test.

Table (5): Age & sex distribution of the studied patients of bacterial meningitis according to the type of organisms detected

Sex / Age (ys) / Acc. to type of org..	Males		Females		Total	
	No.	%	No.	%	No.	%
N. meningitidis :						
<2 y's.	0	0.0	3	30.0	3	15.0
2-6 y's.	2	20.0	1	10.0	3	15.0
>6-12 y's.	8	80.0	6	60.0	14	70.0
Subtotal	10	100.0	10	100.0	20	100.0
S.preumoniae :						
<2 y's.	0	0.0	0	0.0	0	0.0
2-6 y's.	1	50.0	0	0.0	1	33.3
>6-12 y's.	1	50.0	1	100.0	2	66.7
Subtotal	2	100.0	1	100.0	3	100.0
H. Influenzae :						
<2 y's.	3	42.9	2	40.0	5	41.7
2-6 y's.	4	57.1	3	60.0	7	58.3
>6-12 y's.	0	0.0	0	0.0	0	0.0
Subtotal	7	100.0	5	0.0	12	1000

Table (5) shows the relation between age and sex and the type of the affecting organism. It shows that in 20 affected cases by N.meningitis 3 cases were less than 2 years and 3 were less than 6

years and equal or more than 2 years and 14 cases were more than 6 years. Ten of these cases were males and 10 were females.

In 3 cases affected by S.pneumoniae, no cases were below 2 years, one case was less than 6 years and more than or equal 2 years and 2 cases were more than 6 years. One of these cases was female and 2 were males.

In 12 affected cases with H.influenzae, five cases were below 2 years and 7 cases were below 6 years of age and more than 2 years. No cases were positive in the age group more than 6 years with 7 male and 5 females affected.

Table (6): The value of C.S.F culture in diagnosis of septic meningitis

C.S.F culture / Type of organism	No.	%
•N. meningitidis (N=20)	15	75%
•H. influenza (N=12)	12	100%
•S. pneumoniae (N=3)	3	100%
•Total (N=35)	30	85.7%

Table (6) shows the results of culture among the studied patients. In 20 cases affected with N. meningitidis 15 were positive by

culture with (75%). In 12 cases affected with H. influenza all cases were positive by culture with (100%). In 3 cases affected with S.pneumniae all cases were positive by culture with (100%).

Table (7): The value of gram stain among the studied cases of bacterial meningitis

Gram stain / Type of organism	No.	%
•N. meningitidis (N=20)	12	60.0
•H. influenza (N=12)	8	66.7
•S. pneumoniae (N=3)	2	66.7
•Total (N=35)	22	62.9%

Table (7) shows the results of gram stain among the studied patients. In 20 cases affected with N. meningitidis 12 were positive by gram stain with (60%). In 12 cases affected with H. influenza 8 cases were positive by gram stain (66.71). In 3 cases affected with S. pneumniae 2 cases were positive by gram stain (66.7%).

Table (8): The value of Latex agglutination among the studied cases of bacterial meningitis

Latex agglutintion / Type of organism	No.	%
•N. meningitidis (N=20)	8	40.0
•H. influenza (N=12)	11	91.7
•S. pneumoniae (N=3)	2	66.7
•Total (N=35)	21	60%

Table (8) shows the results of latex agglutination among the studied patients. It shows that out of 20 cases affected by N. miningitidis 8 cases were positive by latex agglutination with a percentage of 40%. Out of 12 cases affected by H. influenza 11 cases were positive by latex agglutination with a percentage of 91.7%. Out of 3 cases affected by S.pneumoniae 2 cases were detected by latex agglutination with a percentage of 66.7%.

Table (9): Sensitivity & specificity of C.S.F. gram stain in diagnosis of bacterial meningitis in comparison to C.S.F. culture.

C.S.F. culture / C.S. F. Gram stain	Positive		Negative		Total	
	No	%	No.	%	No.	%
Positive	20	66.0	2	40.0	22	62.7
Negative	10	33.3	3	60.0	13	37.3
Total	30	100.0	5	100.0	35	100.0
Sensitivity = 66.0 %			specificity = 60.0%			

Table (9) shows the sensitivity and specificity of CSF gram stain in comparison to C.S.F culture as a method of diagnosis. Out of 35 detected organisms in the 35 examined cases 22 were positive by gram stain and 13 were negative. While 30 were positive by culture and 5 samples were negative. The sensitivity and specificity of the gram stain compared with the culture were 66.0% and 60% respectively.

Table (10): Sensitivity and specificity of C.S.F. latex agglutination in diagnosis of bacterial meningitis in comparison to C.S.F. culture

C.S.F. culture / Latex agg.	Positive		Nagitive		Total	
	No	%	No.	%	No.	%
Positive	18	60.0	3	60.0	21	60.0
Negative	12	40.0	2	40.0	14	40.0
Total	30	100.0	5	100.0	35	100.0
Sensitivity = 60.0 %			specificity = 40.0%			

Table (10) shows the sensitivity and specificity of the CSF latex agglutination test compared with the culture. It shows that 21 were positive results for the latex agglutination and 14 were negative results. For the culture 30 were positive and 5 were negative. Latex agglutination had sensitivity of 60% and specificity of 40%.

Table (11): Means & S.D. of C.S.F. glucose & proteins in the studied patients of bacterial meningitis

Parameter / Value	$\bar{X}$	± S.D.	Range	
			Minimum	Maximum
•C.S.F. glucose (mg/dl)	28.80	±16.71	10.00 -	70.00
•C.S.F. protein (mg/dl)	205.40	±87.88	105.00 -	550.00

Table (11) shows that the C.S.F glucose was found below the normal value (mean 28.8 ±16.71 mg/dl) while the CSF total proteins were above normal values (mean 205.4±87.88 mg/dl).

Table (12): Chemical & cytological results of the studied patients of bacterial meningitis according to Comber's 9 test in C.S.F

Distribution / Results of Comber's 9 test	No.	%
• Glucose (mg/dl) : <50	31	88.7
>50	4	11.3
• Protein (mg/dl) : 100	33	94.3
500	2	5.7
• Leucocytes /μL : 75	16	45.7
500	19	54.3

Table (12) shows the results of the comber's 9 test of the examined CSF samples. It shows that glucose values in 31 samples were less than 50 mg/dl while in 4 samples they were more than 50 mg/dl.

As for the protein values, 33 cases were about 100 mg/dl and 2 samples were about 500 mg/dl. The Leucocytic counts in the CSF of 16 cases were about 75/μl while in 19 samples they were about 500/μl.

Table (13): Mean ± S.D. & range of peripheral leucocytic count among the studied patients of bacterial meningitis.

Value / leucocytic count	$\bar{X}$	± S.D.	Range	
			Minimum	Maximum
• Total /cmm.	17563.3	±4992.3	9000.0	29600.0
• Segmented	84.07	±3.83	75.00	89.00
• Lymphocyte	14.30	±3.70	9.00	22.00
• Monocyte	1.60	±0.67	1.00	3.00

Table (13) shows the total and differential counts of white blood cells in peripheral blood of the 35 cases it shows that the mean of the total count of white blood cells was (17563.3±4992.3 cmm) with a range of (9000/cm) to (29600/cmm).