RESULT

The present work deal with 41 cases of clinically diagnosed meningitis, who admitted to Benha Fever Hospital bet. 1983 - 1984 .C.S.F. of these cases were subjected to complete bacteriological examination by staining with Gram stain and Zeihl-Neelsen stain, culture on Mueller Hinton and blood agar media, and for biochemical reactions and serological identification for isolated cases of Neisseria .

Table(2) Number and percentage of meningitic children admitted to Benha Fever Hospital bet. 1983-1984 in relation to age and sex.

Age/year	Total		Male		Female	
	No.	%	No.	%	No.	%
< 1	7	17	4	18	3	17
1 - 5	12	29	7	30	5	28
5 - 9	13	32	7	30	6	33
> 9	9	22	5	22	4	22
Total	41		23		18	

The distribution of 41 cases of acute bacterial meninsitis in children admitted to Benha Fever Hosnital in relation to age and sex was seen in Table (2).It was shown that males were valnerable to infection than females and a good number of cases were among children at age group 5-9 years old. Fig. (1) showed that the incidence of infection below one year and at 8 - 9 years old were relatively high in relation to other age groups .

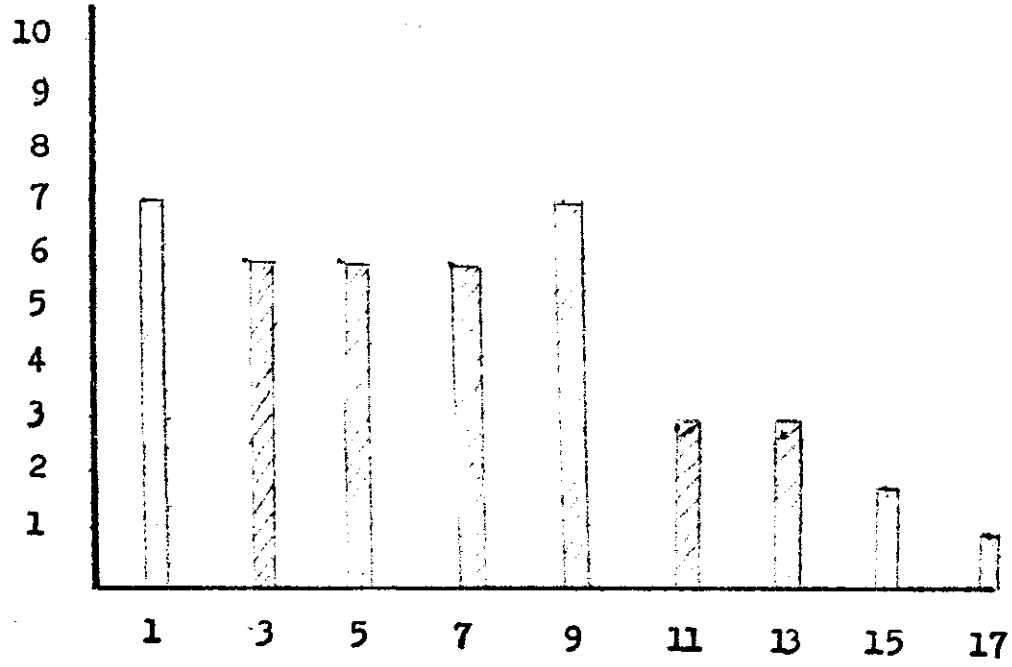

Fig. (1) Number of meningitic cases admitted to Benha Fever Hospital (1983 - 1984) in relation to the age of patients .

As shown in Table (3) the etiologic agents of examined C.S.F. specimens were identified by both direct smear and culture on Mueller Hinton and blood agar, 19.5 of cases were diagnosed by direct smear, while 41.5 by culture . 39 % of cases were negative for both culture and smear.

Table (3) : Diagnosis of 41 cases of meningitis admitted to Benha Fever Hospital through 1983 -1984 by direct smear** and culture* of C.S.F.

	No.	%
Smear	8	19.5
Culture only	17	41.5
Negative culture and smear.	16	39 %

* Culture on blood agar and Mueller Hinton media

** Smear stained with Gram stain and acid fast stain .

Table(4) : Etiology of acute bacterial meningitis admitted to Benha Fever Hospital bet. 1983 - 1984 .

Diagnosis	No	%
N. meningitidis	16	39
H. influensae	4	9.7
S. pneumoniae	3	7.9
P. pyocyanea	2	4.8
Undetermin etiology	16	39
Total	41	

The organisms caused acute bacterial meningitis in patients admitted to Benha Fever Hospital (1983-1984) Were shown in Table (4) . It was found that the percentage of different isolated organisms were 39 % Neisseria meningitidis, 9.7 % Haemophilus influenzae, 7.4 % Streptococcus pneumoiae and 4.8 % seudomonas pyocyanea. In 39 % of cases the etilogy was undtermined . Noteworthy to mention that Neisseria meningitidis gave the high percentage of infection.

It was found that 16 isolates were Neisseria meningitidis identified from their colonies appearing on Mueller Hinton medium being oxidase positive as well as ferment glucose and maltose, Smearsd prepared from colonies showed Gram negative diplococci and gave visible agglutination with polyvalent antisera of Neisseria meningitidis.

Four isolates were Haemohilus influenzae as verified from their colonies on blood agar being oxidase negative non motile and by Gram stain gave Gram negative coccobacilli . They were indol positive .

Three isolates were Streptococcus pneumoniae, being Gram positive diplococci and have a positive Bile Solubility test .

Two isolates were Pseudomonas pyocyanea, being Gram negative bacilli, motile, colonies were surrounded by greenish blue pigments, also, they were oxidase positive and indol negative.

All isolated strains of Neisseria meningitidis were belong to serogroup A .

Table(5) Distribution of isolated organisms(from 25 patients of acute bacterial meningitis admitted to Benha Fever Hospital bet 1983 1984)according to different age groups .

Age/years	No. of isolated organisms			
	N. meningitidis	H. influenzae	S. pneumoniae	P. pyocyane
<1	1	2	-	-
1- 5	1	2	2	1
5 -9	7	-	1	1
>9	7	-	-	-

The distribution of the 25 organisms isolated from cases of meningitis admitted to Benha Fever Hospital bet. 1983 - 1984 according to the different age group was recorded in table (5) It was shown that cases of Neisseria meningitidis were isolated commonly at age group more than 5 years while Haemophilus infulenzae and Streptococcus pneumoniae at age group 1 - 5 years .

Sensitivity of various isolated organisms from meningitic cases to different antibiotic sensitivity disk were seen in Table (6) in which Nesseria meningitidis were highly senitive to pencillin, Ampiclox and Garamycin , moderly sensitive to Rifampicin, slightly sensitive to Erythrocyin and Topramycine and resistant to Cephalotin. Haemophilus Influenzae were highly sensitive to Garamycin and Topramycine, modretly sensitive to Rifampicin and Erythrocyin, slightly sensitive to Pencillin and Ampiclox and resistant to cephalotin . Streptoccus pneumoniae were highly sensitive to Pencillin, Ampiclox and Rifampicin, modretly sensitive to cephatotin, slight sensitive to Erythrocyin and resistant to Garamycin . Pseudomonas pyocyaneus were highly sensitive to Garamycin and Topramycin, modertly sensitive to Rifampicin slight sensitive to cephalotin and resistant to Pencillin, Ampiclox and Ergthrocyin.

Table(6) : Sensitivity of the different isolated organisms from studied meningitic cases to different drug sensitivity disk.

Organisms	Pencillin	Amp iclox	Garamycin	Rifampicin	Erthrocyin	Cephalotin	Topramycine
N. meningitidis	+++	+++	+++	++	+	-	+
H. influenzae	+	+	+++	++	++	-	+++
S. pneumoniae	+++	+++	-	+++	+	++	-
P. pyocyanea	-	-	+++	++	-	+	+++

+++ = 2.5 Cm ++ = 1.5 Cm + = 1 Cm - = Resistance

Table (7): Mean laboratory values of acute bacterial meningitis patients admitted to Behha Fever Hospital bet. 1983 - 1984 .

Values	meningococcal meningitis	Haemophilus meningitis	Streptococcal meningitis	Pseudomonas meningitis	Purulent meningitis	Aseptic menigitis
C.S.F Leukocytes /mm^3	12,500 Lymphocyte predominant)	11,270 Lymphocyte predominant)	9,300 Lymphocyte predominant)	10,100 Lymphocyte predominant)	11,900 Lymphocyte predominant)	500 Lymphocyte predominant)
C.S.F Sugar mg/ 100ml	25	23	23	26	25	40
C.S.F Protein mg /100ml	200	180	170	182	200	90
C.S.F Chlorid mg/100ml	680	690	620	690	680	730

PMNs : Polymorph nuclear leucocyte .

The mean laboratory value of acute bacterial meningitis admissions to Benha Fever Hospital bet 1983 - 1984 was shown in Table (7). In all cases of meningococcal meningitis, Haemophilus meningitis, pneumococcal meningitis, and Pseudomonas meningitis cells count were highly elevated, with excess polymorph neulear leukocyte, the protein contents were markedly elevated, the sugar contents were decreased and the chloride contents were shown slight decreased .

Aspectic meningitis were suspected in six cases . In this cases the picture of CSF differ greately, it showed that normal value of chlorid and sugar and slight elevation in the protein content. Cells count were reached 500 / mm^3 with exess lymphocytes. (Normal value of Protein, Sugar and chloride were loss 40 mgm / 100 m, above 40 mg / 100 ml 750 mg / 100 ml respectivety .

Discussion

Acute bacterial meningitis had been a reportable disease in Egypt for a considerable number of years and data on the disease were available from the ministry of health (El-Akkad, 1969) since 1912 .

Meningitis is always considered as a medical emergency (Hoffman, 1981).Hence a rapid diagnosis and prompt treatment are important to prevent the occurance of the post meningitis sequelae .

The nasopharynx is known to harbour different bacterial and fungal species in healthy individuals .About eight members of genus Neisseria are included among the normal flora of the nasopharynx (Buchanan and Gibbons 1975, Topely and Wilson 1975). The presence of one or more of the Neisseria species are of no significant importance except N. meningitidis because it causes epidemic cerebro-spinal meningitis. Therefore, healthy presons harbouring this organism in their nasopharynx, whether following recovery from the disease or contracting the organism from cases, are considered to be the only reservoir of infection to other susceptible subjects.

other bacteria causing mankind infections, N. meningitidis is a non-sporing fragile organism which cannot withstand dryness and temperatures outside the human body. Besides there is no animal or vector reservoir known to harbour this organism as well as no purulent escaping discharge which can keep the survival of the organism for sometime as the case with its twin N. gonorrhoea. This would explain the spread of the disease in warm winter months through droplet infection and the reason of the flaring up of the disease in an epidemic wave when the percentage of the carrier state is greatly increased; the later phenomenon was noted by some authors (El-Akkad, 1969 ; Dugaid et al., 1978).

The diagnosis was made by examination and culture of cerebrospinal fluid (Crossman and Delmer,1978)Three organisms, Neisseria meningitidis, Streptococcus pneumoniae and Haemophilus influenzae, account for the majority of reported cases of acute bacterial meningitis from all parts of the world (Straus , 1979).

Meningococcal meningitis appears to occur in epidemic waves in countries in which the disease is endemic. In Egypt a 2 to 3 years period of high incid-

ence occurs at approximately 10 years intervals (El-Akkad, 1969).The disease apparantly takes each of these long intervals for the percentage of susceptible children in the population to reach a level necessary for another outbreak to take place after which herd immunity would develop and the process repeats itself .

Young children and newly-born infants are more susceptable to meningitis(Forfor and Arnest 1983) Feigin and Dodge (1976) attributed this phenomena to relatively high vascularity of their brains and low level of immunity against some organisms especially E.Coli, Haemophilus influenzae and B haemolytic streptococci. Ganong (1975) reported that immaturity of blood brain barrier in early years of life are also responsible for meningitis .

Franciosi et al., (1973) attributed the causes of increased incidence of bacterial meningitis in the world during the past several decades to increase Haemophilus influenzae type b infection and in recent years to Streptococcus agalactiae infection .

The causes of acute bacterial meningitis differed greatly with the age of patients , and show seasonal variation. Meningitis usually occurs in dry cool season.

For example meningococcal meningitis were unusual under 2 months of age but become more prevalent after that(Feigin and Cherry 1981) It occurs in adolscent and adults at incidence rates that are substantially lower than those in children due to asymptomatic nasopharyngeal infection and cross reaction between group B meningococcal polysaccharide and the K1 capsule of E.Coli. Hoffman1981).Minear and Edman(1978)Sipple and Girgis (1978) mentioned that meningococal meningitis in Cairo Arab Republic of Egypt form 50 - 60 % from the total reported cases and the high incidence of infection occurs among children at age group 5 - 9 years old .

Haemophilus influenzae is considered the most commen cause of meningitis from 4 month untile 3 years of age (Bell and McCormick, 1975 and Parke et al., 1972).Minear and Edman(1978) and Cadoz et al., (1981) reported that 75 % and 89.4 of Haemophilus meningitis occurs among children less than 2 years in Egypt and Dakar repectively. This explained by Feigin etal.(1971)and Norden (1974) who reported that neonatal infection due to Haemophilus influenzae was attributed to failure by the newborn to acquire antibodies from mother . In children , above

3 years prolonged nasopharyngeal carriage in the absence of disease has been associated with the appearence of bactericidal antibody to Haemophilus influenzae (Sell, et al., 1973).

Pneumococcal meningitis became less common because pneumonia, acute or chronic otitis media and mastoiditis which predispose to it could be treated or effectively prevented (Forfor and Arnest, 1980).

In the present study Neisseria meningitidis , Haemophilus influenzae, Streptoccus pneumoniae and Pseudomonas pyocyanea were isolated from 25 cases of acute bacterial meningitis out of 41 cases and its percentages were (39% , 0.7,7.4, 4.8%) respectively. Neisseria meningitidis represented the high incidence of infection, and the great majority of cases occured at age group 5-9 years old. On the other hand cases of Haemophilus influenzae and Streptococcus pneumoniae occured below 5 years old. This coninciding with the result obtained by Minear and Edman (1978) , Sippel and Girgis (1978) .and Gadoz et al.,(1981). The number of recorded cases was low, this can be attributed to several factors . One of these factor is that the present work was preceded by an out break of

cerebro spinal fluid meningitis in Benha among children. This was followed by massive vaccination and prophylaxis treatment with Rifampicine and Sulphediazine . This measured would lessen the incidence of the disease and subsequently the carrier who is the main source of infection .

Gram negative bacilli are the most common cause of meningitis in early infancy (Groover et al.,1961) Yu and Grauang, 1963 and Lorber, 1974). Keith and Svien (1961) and Gorman, et al.,(1962) revealed that E.Coli followed by Klebsiellas Pseudomonas, Protens and Alcaligenes were the responsible pathgen. In the present study Gram negative enteric bacilli whihc has been isolated was pseudomonas, representing 4.8 % of cases. Failure of isolation of other Gram negative becilli may be due to restricted cases .

In the present study the rate of infections in males (55 %) was higher than that of females (45%). A simillar differences was also noticed by some workers Ziai and Hoggesty(1958) Saker et al., (1960) Yu and Grauong(1963) and Bovre et al., (1977).

In all series of acute bacterial meningitis there are a number of samples in which no organisms were isolated (Swartz and Dodge , 1965. Hodges and Perkins 1975 and Minear and Edman , 1978) . This agree with the present study in which the percentage reachs 25 % . This could explained by Hoffman and Edwards (1972) Who reported that the patients produce antibody more rapidly when he infected with meningococci group C, this lead to sterile CSF but Jensen et al.,(1969) suggeste that the treatment with antibiotic prior to admission was the main caus of C.S.F. Sterility.

Lapeyssonic (1969) W.H.O. (1969) reported that meningitis caused by group A meningococcus was confined during the past World War II period to the Africa continent,where,it produced large and devasating epidemic. Sanborn, (1969) and Sipple and Girgis (1978) reported that serogroup A meningococci were the predominant serogroup isolated in Egypt. This agreed with the present work in which all cases of Neisseria meningitidis belong to serogroup A, and disagreed with Oberti et al., (1981) who reported that over 90 % of the strains isolated belong to group C in Vietnam. Recently, meningococci serogroup

A were reported to cause epidemic meningitis in Finland, Brazil, Canada, North Western N.S., Argentine and England (Ronald, et al 1972). Anonymous, 1974 W.H.O. , 1976 ; and Anonymous, 1976).

In the present study 6 cases were found to have sterile C.S.F. with normal sugar content and normal or high protein contents, cells count of C.S.F. reached 500/ mm^3 with excess lymphocyte. The absence of any drug intake, especially antibiotics before admission to the hospital, with acute onset and rapid course of the disease with out serious sequelae diagnosed viral meningitis .

Specific antibiotic therapy was established for most organisms that cause bacterial meningitis . An important object for this therapy is to obtain the antimicrobial drugs to which the causative organism is susceptible. So the isolated organism should be tested for sensitivity to different antimicrobial agents this is because resistance strains of Neisseria meningitidis has been reported to certain agents such as sulphonamide (Feldman 1966, Sippel et al., 1973, Finley 1976) penicillin (Contoyiannis and Adamopoulos 1974).

Mienocycline (Devine et al., 1971) and Rifampicin (Devine et al., 1972 and Eickhoff 1975).

In the present study all the strain were sensitive to Penicillin which agree with Hoffman (1981) and Michael (1983) who recomended Penicillin for the treatment of meningitis because of its wide antibacterial spectrum and excellent penetration, and disagreed with the result obtained by Contoyionnis and Adamopoulos (1974) in which resistance to pencillin was recorded.

Topramycin and other aminoglycoside antibiotics give high sensitivity to Gram negative bacilli but they dont penetrate the blood brain barrier. Intrathecal or intraventricular injections of this drugs are usually used (Hoffman, 1981).

From our study we found that N.meningitidis was the most common organism coused acute bacterial meningitis in Benha and the high incidence of infection were among children from 5-9 years old. N.meningitidis group A is the main strain causes meningitis in Egypt. Penicillin is the drug of choice for treatment of meningitis because of its wide antibacterial spectrum and excellent penetration into C.N.S., topramycine and other aminoglycoside give high sensitivity to Gram negative bacilli but not penetrate the blood brain barrier .

SUMMARY

Cerebro spinal fluid was collected by lumbar puncture from 41 child with signs and symptoms of meningeal irritation at different age groups. The paitents were admitted to Benha Fever Hospital and university Fever Hospital during September 1983 to February 1984 .

The collected sample was examined at first by Gram stain and concentrated by centrifugation. The supernatent fluid used for chemical analysis while the deposite inoculated on Mueller Hinton and blood agar media.

Colonies appeared on Mueller Hinton were tested by oxidase reagent and confirm diagnosis by sugar fermentation reactions and serogrouping with Nfisseria meningitidis polyvalent and monovalent antisera. Other colonies were examined and identified by motility test IMViC test , bile solubility test and oxidase test .

The etiology was identified in 25 cases(61 %) from 41 collected samples. 16 specimens were Neisseria meningitidis by being Gram negative diplococci and oxidase positive, 4 cases of Haemophilus influenza were isolated,they were Gram negative cocco - bacilli,

oxidase negative , indol negative and non motile. The other organisms isolated were 3 cases of Streptococcus pneumoniae being Gram positive diplococci and showed positive bile solubility test , 2 cases of pseudomonas was known from their colonies on the culture they were oxidase positive , motile and indole negative .

The present study revealed that males were more exposed to infection than females(55 % to 45 %) . Meningococcal meningitis was the most frequent form of meningitis in children . It formed about 64 % of diagnosed specimens. The highest incidence of infection occured between 5-9 years old. All the isolated strains of Neisseria were belong to group A serotype .

Haemophilus infneunzae form about 16 % from the diagnosed cases, it occured more in patients at age group below 5 years old. On the other hand infection with Streptococcal pneumoniae form 12 % of cases and occured in children below 9 years old. The last organisms which isolated, but not common, were Pseudomonas, only 2 cases were reported .

All the isolated organisms were tested for drug sensitivity test to choose the most effective and suitable drug for the treatement . It was found

that all the isolated strains of Neisseria meningitidies were sensitive to Penicillin Garamycin and Ampiclox while Topramycine had high degree of effect against Gram negative bacilli (Haemophilus influenzae and Pseudomonas). Cephalotine had negligable effect on the most organisms except Streptococcus pneumoniae.