Prevalence of bacteremia among children complaining different kinds of infections under 12 years old in Baghdad

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Abstract:

This study was designed to determine the percentage and the main causative agent causing bacteremia among children aged up to 12 years and complaining from different types of infections (Respiratory, intestinal, and urinary tract infection) in Baghdad. Results showed that the percentage of infection was 46.19 % the main causative agents were Enterobacteriaceae including (**E.coli** , **Pseudomonas** , **Salmonella.typhi** .**Serratia** , **Enterobacter** , **Klebsiella**)and other than Enterobacteriaceae which includes(**Staph.aureus** , **Staph.epidermidis** , **Streptococcus.Pneumonia** and ά-hemolytic streptococci) .Regarding the age factor ,results showed that the highest infection rate was among the age group (1 day-12 month) and (12 -36month) (64.89%)and (15.95%)respectively while the lowest was in (61 month – 12 years)and (37 -60 month) (12.76%) and(6.38) respectively .

All bacterial strains isolated from patient were submitted to sensitivity test, results showed various reactions towards different types of antibiotics used in this study.

Key words: bacteremia, different infections, children, Baghdad.

Introduction:

Blood stream infections (BSI) remain a major cause of morbidity and death in patients undergoing treatment for different types of diseases. However, all recent epidemiological and therapeutic studies under line the absolute need for knowledge of the factors governing the infections in each center [1]

Knowledge of the pattern of blood stream infections (BSI) can help to determine antibiotics prescribing policy and infection control procedures [2]

Blood stream infections could be caused by many pathogens: Shigellosis , the acute enteric infection caused by bacterial of genus **Shigella** , [3] has a world wide distributions with an estimated annual incidence of (164.3) million cases, of which (163.2)million occur in developing countries, and (1.1) million deaths , 69% of all episodes and 61% of all **Shigella**-related deaths involve children younger than five yeas old [3] Although usually confined to the colonic mucosa, shigellosis sometimes can cause extra intestinal complications.[3]

Recent publications have showed light on the clinical characteristics of **Shigella**-induced bacteremia, surgical complications, urogenital symptoms, and neurological manifestations. [3]

The clinical presentation of bacteremic children was more gradual, and associated gastro enteric and dehydration was less pronounced.[4]

These findings may contribute in part to the inadvertent discharge of bacteremic children from the emergency department. [4]

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The skin and soft tissues infections caused by **Haemophilus influenza** type b (Hib)[5] are usually mild but can be potentially serious due to the high probability of bacteremia. Prompt in saturations of empiric intravenous antibiotic therapy according to the localizations and characteristics of the lesion is mandatory to prevent severe complications. [5]

Haematogenous focal infections are rare complications of bacteremia or sepsis caused by viridians group streptococci. Children complain of sever muscle pain associated with viridians streptococcal infections should be carefully evaluated for the presence of focal pyogenic complications and rhabd myolusis. [6]

Aim of the Study

1- Determine the incidence of bacteremia among children having different other infections.

2-Specify the most age group that are exposed to infection and responses beyond that

3- Specify the most frequent microorganisms that are responsible for causing bacteremia in children.

4- Determine the most effective antibiotics that can be used to treat bacteremia.

Materials and Methods:

Samples

407 patients aged less than 12 year were included in this study along the period January –May 2005 attending Al-Mansor teaching hospital (medical city) complaining from different types of infections (diarrhea & gastrointestinal tract infection , respiratory infection and urinary tract infection).

Isolation: -

3 ml of patients blood is cultured on a vial containing 25 ml brain heart infusion broth, sample is drown to the vial by needle through a small pore on the vial's cover, the vial then incubated over night at 37 C. Few drops are taken from the vial by needle on the next day and cultured on Blood agar medium, Chocolate agar medium and MacConkey agar medium then incubated for 24 h. On 37 c normally for blood and MacConkey agar medium and under Co2 for Chocolate agar medium [7].

This process must be repeated each 24h.For five days long for detecting all types of organisms' .Each plate then must be examined

For morphological characteristics as a first step in diagnosis then gram stain for examine under microscope to distinguish G (+ve) from G (-ve) bacteria, and its morphology [7].

Diagnosis:

Sets of biochemical tests are made for further diagnosis include IMVIC for colonies grown in MacConkey agar medium to identify **E.coli** and **Klebsiella** spp. (Coagulase test with human serum to identify **Staphylococcus aureus** and **S.epidermedis**).(Culture on nutrient agar for noticing the pigmentation of **Pseudomonas** spp.then oxidase test is made for further diagnosis) (Culturing on semi-solid mannitol for motility and mannitol fermentation to identify **Salmonella** Spp. Then antisera testing with anti –O, H Ag for further diagnosis).

- hemolytic Streptococci is noticing on blood agar plate then examined under microscope after staining with gram satin.[2] Gelatinase test and Vogas Proskaour for the diagnosis of **Serratia** spp. [7].

Chocolate agar medium showed 2 types of bacterial growth, suspected

Neisseria spp. is further diagnosed by oxidase test (+ve) and **Hemophilus** spp.is further diagnosed by showing(+ve) results for V factor test it shows satallitism phenomenon.[2]

The whole procedures followed in isolation & diagnosis are summarized in figure (1).All isolated bacterial strains were submitted to sensitivity test to evaluate their response to different types of antibiotics that might be used in the treatment of infection.

Table (1): The biochemical tests used in the identification of microorganisms.

Bacterial Spp,	Biochemical tests							
	Coagulase	Oxidase	Gelatinase	indol	MR	VP	Citrate	Mannitol salt agar
S.aureus	+							
S.epidermedis	-							
Neisseriae		+						
Pseudomonas		+						
Serratia			+					
E.coli				-	-	+	+	
Klibsiella				+	+	-	-	
Salmonella								+

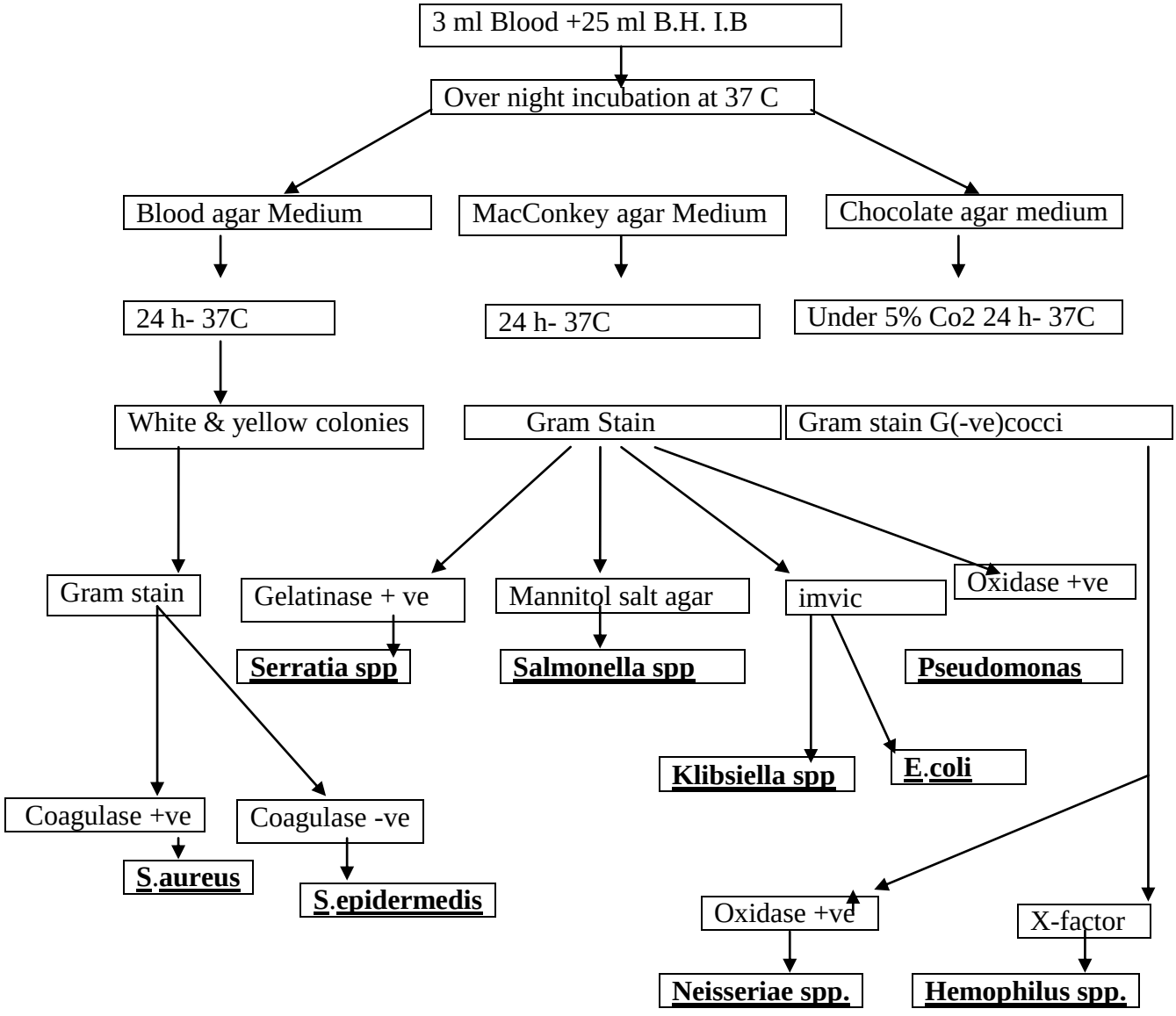

Fig.(1): The practical procedure & techniques used in the diagnosis of microorganisms (7).

Result and Discussion:

407 patient were included in this study (males & females) less than 12 years, 188 (46.190 %) patients sowed growth of different types of micro-organisms while 219 patient (53.8 %) showed no growth as shown in figure (2).

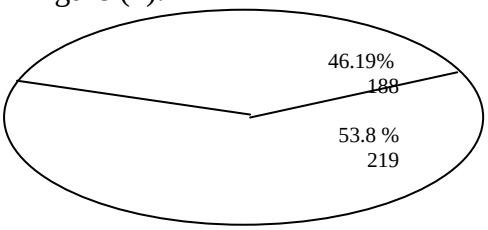

Fig. (2): The distribution of infection among the studied samples.

The percentage 46.19% is relatively high in consideration that the blood is a sterile liquid in the body .this is due to other infections that children could be infected with like diarrhea or respiratory tract infections or urinary tract infections that might cause spread of the causative agent from the infected organs to the blood stream or might be nosocomial infections that patients might infected with during admission to the hospital.

Results also showed that the type of the causative organisms isolated from patient were different .Table (2) show us the details:-

Table (2): type of causative organism isolated from patients.

Type of organism	No. of Patients	% of infection
ά -Hemolytic streptococci	8	4.25 %
S.aureus	40	21.27 %
S.epidermidis	103	54.78%
Klesiella spp.	11	5.85 %
S.typhi	8	4.25 %
Pseudomonas spp.	3	1.59 %
E.coli	7	3.72%
Serratia Spp.	2	1.06 %
S.pneumonia	1	0.53 %
Enterobacter spp.	5	2.65 %

The highest infectious causative agent mostly isolated from samples was **S.epidermedis** and **S.aureus** (54.78)% and (21.27)% respectively .this may be due to the fact that these two species are widely spread on the skin so it might be transmitted by contamination of the needle during sampling or can invade the blood stream through wound infection or burns or other infections in the skin .Other causative agents (including enteric & other species)are found in blood stream may be due to other infections in the body such as diarrhea or respiratory tract infection or urinary tract infections so the causative microorganism can invade the blood steam from these organs and cause bacteremia .

Regarding age factor results on table (3) showed the highest are group mostly exposed to infection:-

Table (3): distribution of the infection among patients group

Age group	No .of cases	% of cases
1 day – 1 year	122	64.89 %
12 -36 month	30	15.95%
37-60 month	12	6.38 %
61 month - 12 year	24	12.76 %
total	188	100 %

The age group which is mostly exposed to infection was 1 day – 1 year (64.89%), this result seems to be acceptable because of the not well developed immunological status of children at this age since their defense mechanism is still uncompleted and unable to protect body organs against microorganism. The lowest infections rate was among the age group (37-60) months (6.38%) this result seems to be logic since the stronger than new born babies besides the vaccination programmed is almost completed in this age gives a further support to the immune system to protect the body against various infections. All bacterial isolates were submitted to sensitivity test to recognized their respond to various types of antibiotics; results are shown in the table (4)

Table (4): Sensitivity test of bacterial isolated for different types of antibiotics

Bacteria	sensitive	Resistant
ά- **hemolytic strept**	Vancomycin Oxycycline Cephalothin Erythromycin Ampicillin Ciprofloxacin	Amikacin Augmentin
Staphylococcus,**aureus**	Lincomycin Vancomycin	Oxycycline Cephalothin Erythromycin Ttrimethoprim
Klebsiella	Ciprofloxacin	Amikacin Ampicillin Cephalothin Nalidixic acid
Salmonella,**typhi**	Amikacin Ampicillin Cloramphinicol	Nalidixic acid Cephalothin
Pseudomonas	Ciprofloxacin Amikacin Cephalothin	Clindamycin Ampicillin Cephalosporin Trimethoprim Nalidixic acid
E.**coli**	Gentamycin Amikacin	Ciprofloxacin Cephalothin Oxycycline Erythromycin
Serratia	Cephalothin Amikacin	Nalidixic acid Cephalosporin
Streptococcus,**pneumonia**	Vancomycin Amikacin Cephalothin	Nalidixic acid Clindamycin Cephalosporin
Enterobactor spp	Amikacin Ciproploxacin	Ampicillin Cephalothin Cephalosporin Nalidixic acid

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مدى انتشار مرض تجرثم الدم لدى الاطفال المصابين بامراض مختلفة اخرى دون سن الثانية عشرة من العمر في مدينة بغداد

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الخلاصة:

صممت هذه الدراسة لتحديد نسبة الاصابة وألاحياء المجهرية المسببة لمرض تجرثم الدم عند الاطفال دون سن 12 سنة من العمروالذين يعانون من التهابات مختلفة (التهاب الجهاز التنفسي , الهضمي , والتهاب المجاري البولية) في مدينة بغداد , أظهرت النتائج ان نسبة الإصابة 64.19 % من مجموع الاطفال المشمولين بالدراسة وقد تم تحديد نوع الاحياء المجهرية المسببة للمرض عن طريق زرع الدم فوجد انها, بالدرجة الاساس الى عائلة البكتريا المعوية والتي شملت تعود , **Enterobacter , Serratia , S.typhi , Klebsiella , E.coli, Pseudomonas)**

وتم ايضا عزل أنواع بكتيرية لا تعود الى العائلة المعوية مثل **Streptococcus pneumonia** _ hemolytic streptococci. , **Staphylococcus aureus , Staphylococcus epidermidis** ,

بالنسبة الى عامل العمر أظهرت النتائج اان الفئة العمرية (1 يوم -12) شهر كانت ألاكثر عرضة للأصابة بنسبة بلغت 64,89 % تلتها الفئة العمرية الاكبر قليلا (12 -36 شهر) بنسبة بلغت 15,95% فيما كانت الفئة العمرية (37 شهر– 60شهر) ألاقل عرضة للأصابة بنسبة بلغت 6,38%

كل السلالات البكتيرية المعزولة تم أخضاعها للأختبار الحساسية لتقدير مدى أستجابتها لأنواع مختلفة من مضادات الحياة وقد أظهرت النتائج أن كل سلالة استجابت بشكل مختلف عن غيرها من السلالات وتم الحصول على مدى واسع من ألاستجابات للأنواع المستعملة في هذه الدراسة .