Serological study to streptococci was caused urinary tract infection in infant in Babylon maternity and children hospital

دراسة مصلية لجنس المكورات المسبحية المسببة لخمج السبيل البولي عند الاطفال الرضع في مستشفى بابل للولادة والاطفال

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Abstract

In this study about 112 urine samples were collected from infants with age from 1 – 12 months who suffering from UTI in Babylon Maternity and Children Hospital and these samples were studded to detect the streptococci according to its serotype and the following results were obtained. *Streptococcus A* were found to be the most causative agent among the serotype which isolated (66 samples , with 58.92 %) followed by *Streptococcus F* (22 samples , about 19.64 %) , *Streptococcus G* (16 samples , about 14.28 %) and *Streptococcus D* (8 samples , with 7.14 %) .

Also 26 antibiotics were used to detect the antimicrobial sensitivity of the species which isolated from the samples. *Streptococcus* A showed sensitivity to Amikacin (AK) , Amoxicillin (AX) , Cephalexin (CL) and Chloromphinicol (C). *Streptococcus F* shows sensitivity toward Cefodizime (CDZ) only while *Streptococcuys G* was sensitive to Azithromycin (AZM) , Cephalexin (CL) and finally *Streptococcus D* shows sensitivity to Azithromycin (AZM) , Chloromphinicol (C) , Erythromycin (E) , Gentamycin (CN) , Nitrofurantoin (F) , Ofloxicin (OFX) and Oxacilin (OX) .

الخلاصة

في هذه الدراسة تم جمع 112 عينة إدرار من أطفال بعمر 1 – 12 شهرا في مستشفى بابل للنسائية و الأطفال والذين يعانون من التهاب المجاري البولية وقد درست هذه العينات لتشخيص المسبب المرضي التابع إلى جنس المكورات المسبحية وحسب الأنماط المصلية وقد وجد إن الجنس *Streptococcus A* هو الأكثر انتشارا من بين الأنماط التي عزلت حيث كان عدد العينات لهذه النمط 66 عينة و بنسبة مئوية حوالي 59 % يليه النمط *Streptococcus F* (22 عينة وبنسبة مئوية حوالي 20 %) ثم النمط *Streptococcus G* (16 عينة والنسبة المئوية له هي حوالي 14 %) وأخيرا النمط *Streptococcus D* حيث كان عدد العينات 8 ونسبته المئوية 7 % تقريبا .

تم إجراء فحص الحساسية تجاه 26 مضاد حيوي وكان النمط A حساسا للمضادات الحياتية التالية Amikacin (AK) , Amoxicillin (AX) , Cephalexin (CL) and Chloromphinicol (C) . أما النمط F فكان حساسا تجاه Cefodizime (CDZ) فقط والنمط G اظهر حساسية تجاه Azithromycin (AZM) و Cefalexin (CL) وأخيرا النمط D الذي اظهر حساسية تجاه عدد من المضادات المستخدمة وهي (AZM) Azithromycin , (C) Chloromphinicol , (E) Erythromycin , (CN) Gentamycin , (F) Nitrofurantoin , (Ofloxicin)(OFX و (OX) Oxacilin.

Introduction

Urinary Tract Infections (UTI) are a common bacterial infection in children. UTIs are also the most common hospital acquired infection, accounting for as many as 35 % of nosocomial infections [12]. The diagnosis of UTI is very often missed in young children due to minimal and non-specific symptoms. The developing renal cortex in young children is vulnerable to renal scarring resulting in hypertension and chronic renal failure [2].UTI is often associated with vesicoureteral reflux or urinary tract obstruction [3], conditions associated with a higher risk of recurrent UTI [4]. The presence of vesicoureteral reflux (VUR) in an infant with urinary tract

infection (UTI), does not necessarily lead to an acquired renal injury. Only serious reflux can be a factor in fostering its appearance [8]. Urinary tract infection (UTI) is one of the most common bacterial infections in infancy, its prevalence being 5% in febrile infants (2 to 24 months of age). 10 to 20% of febrile UTIs may result in permanent renal damage (scar), whose long-term significance (hypertension or proteinuria) in previously normal kidneys remains unclear[10] .The presumptive diagnosis of UTI in children is often based on the results of microscopic urinalysis (UA), and most infections remain undiagnosed if tests are not performed routinely to detect them. [5, 6]. About 10 % of humans will have a UTI at some time during their live. The exact prevalence of UTIs is age and sex dependent. During the first year of life , UTIs are less than 2% in males and females and the incidence of UTIs among males remain relatively low after 1 year of age and until approximately 60 years of age when enlargement of the prostate interferes with emptying of the bladder. Therefore, UTI is predominantly a disease of female [1].

Material and methods

The midstream urine samples (112) were taken from infants from 1 – 12 months who had UTI and enter the Babylon Maternity and Children Hospital. The specimens were collected by clean containers with parent's assistance and supervision of physician. Urine specimens were cultured using standard media (nutrient agar, blood agar, chocolate agar) and techniques. Quantitative urine cultures were performed in the microbiology laboratory. A loop calibrated to deliver 0.01 mg was used to inoculate plates containing blood agar, nutrient agar, and all plates were incubated at 37°C and examined at 24 to 48 hours for colony count and bacterial identification. [7].

The urine culture was examined with biochemical tests to certificate the bacterial identification of streptococci. These tests include coagulase test, catalase test, bacitracin test, bile esculin agar test and camp test [1]. The serotype detection was done by using specific kit called (Streptex) which produced by (Remel Company, USA). Streptex is a rapid latex test system for use in the qualitative detection and identification of the Lancefield group of streptococci.

Procedure:

1- Dispense 400 micron extraction enzyme into an appropriately labeled test tube for each culture to be grouped.
2- Using a bacteriological loop, make a light suspension of culture in a tube of the enzyme solution . A single sweep of growth should be sufficient: it is frequently possible to obtain a result by picking as few as 5 large colonies to emulsify in the enzyme, if they adhere adequately to the loop. If the culture is not pure, it is recommended that streptococcal colonies should be picked from an area which contains as few contaminants as possible.
3- Incubate the suspension at 37 C in a water bath (or in a beaker of water equilibrated to 37 C in an incubator) for a minimum of 10 minutes or any time up to 1 hour. Shake the tube after 5 minutes incubation.
4- Resuspend each of the latex suspensions by shaking vigorously for a few second. Hold the dropper bottle vertically and dispense one drop (20 micron) of each latex suspension onto a separated circle on a reaction card.
5- Using a pipette, place one drop (40 micron) of extraction in each of the six circles on the reaction card.
6- Mix the contents in each circle in turn with a mixing stick, and spread to cover the complete area of the circle. Use a separate stick for each circle and discard it for safe disposal after use.
7- Rock the card gently for a maximum of one minute. The card should be held at normal reading distance (25 to 35 cm) from the eyes. Do not use a magnifying lens. The patterns obtained are clear cut and can be recognized easily under all normal lighting conditions.
8- Discard the used reaction card for safe disposal.
9- Ensure that the reagents are returned to the refrigerator (2 to 8C), using the storage rack provided.

Results and discussion

In this study, an investigation creates to determine the UTI infection caused by streptococci in children less than one year of age and the following results obtained as shown in table (1).

Table 1: Percentage of etiological streptococci agents causes UTI in infants.

Etiological Streptococci agents causes UTI	No.	%
Streptococcus A	66	58.92
Streptococcus D	8	7.14
Streptococcus F	22	19.64
Streptococcus G	16	14.28
Total	112	1

In the table above, we note that the high number of cases was caused by *Streptococcus A* serotype with percentage of 58.92 % and followed by *Streptococcus F* serotype (19.64 %), *Streptococcus G* serotype found to be cause 14.28 % of cases and finally *Streptococcus D* serotype with percentage of 7.14 %. Andrew found that the vast majority of UTIs are caused by bacterial agents, the most important of which are the Enterobacteriaciae, a family of gram-negative bacilli. *Escherichia coli* accounts for more than 80% of acute UTIs in children. The rest of the cases are distributed primarily among *Proteus mirabilis*, *Klebsiella pneumonia*, and *Pseudomonsa aeruginosa*. Less common infectious agents include gram-positive cocci, such as *Enterococcus* and *Staphylococcus*. [14]

Also comparism was done according to the gender as shown in the table number 2. There is no significant difference between male and female in all age group and all serotypes except in the serotype A (p value is 0.03) and this result is agree with those obtained by Rai and Adukuaskiene [9 and 13]. The following table explains these results.

Table 2: Age and gender wise distribution and frequency of UTI causes isolated from infants.

UTI Causes	Sex	Age group					
		< 1	1-4	5-8	9-12	Total	
Streptococcus A	Male	5	4	2	13	24	66
	Female	11	8	2	21	42	
Streptococcus D	Male	-	1	-	1	2	8
	Female	2	-	-	4	6	
Streptococcus F	Male	-	3	-	1	4	22
	Female	1	9	-	8	18	
Streptococcus G	Male	1	-	1	4	6	16
	Female	-	-	8	2	10	
Total		**20**	**25**	**13**	**54**	**112**	

The effect of residence factor were studded and also there in no significant difference was recorded between rural and urban area as mentioned in the table 3 below. There was no difference between those who did or did not have urine cultures obtained with regard to sex, race, and presence of another potential source of fever, city residence, or insurance type [16].

Table 3: Residential and gender wise distribution and frequency of UTI causes isolated from infants.

UTI Causes		Age group					
		< 1	1-4	5-8	9-12	Total	
Streptococcus A	Rural	12	9	1	28	50	66
	Urban	4	3	3	6	16	
Streptococcus D	Rural	1	1	-	5	7	8
	Urban	1	-	-	-	1	
Streptococcus F	Rural	1	10	-	6	17	22
	Urban	-	2		3	5	
Streptococcus G	Rural	-	-	5	6	11	16
	Urban	1	-	4	-	5	
Total		**20**	**25**	**13**	**54**	**112**	

The antibiotic susceptibility was done to estimate the response of the four serotypes isolates to the antibiotics which used. The results are mentioned in the table 4 below. The number of antibiotics used is 26 antibiotics and we note that the *Streptococcus A* serotype show high response to chloromphinicol, ofloxacin, gentamycin, cephalixin, erythromycin, kanamycin, amikacin, amoxicillin, nitrofurantoin . *Streptococcus D* shows sensitivity to azethromycin, cephalexin, erythromycin, gentamycin, kanamycin, nitrofurantoin, ofloxacin and oxacillin.
Streptococcus F show sensitivity to cefodizine only and finally *Streptococcus G* show just low sensitivity to amikacin and cephalexin. A previous studies show that there is a difference in antibiotic susceptibility between first and recurrent urinary tract infections [11]. Also there is a difference in resistance rates from country to country. Overall, isolates from Latin American countries show the lowest susceptibility rates to all antimicrobial agents followed by Asian-Pacific isolates and European strains. Strains from Canada exhibit the best global susceptibility testing results [15].

Table 4: Antimicrobial potency and spectrum for 13 selected antimicrobial agents tested against most frequently occurring UTI pathogens.

Microorganism	Antimicrobial agent / % sensitive strains												
	AK	AX	AMC	AZM	B	PY	CDZ	FOX	ZOX	CL	C	CLR	DA
Streptococcus A	75	55	25	20	-	-	-	-	-	80	90	-	20
Streptococcus D	20	10	10	90	20	-	-	-	-	85	-	-	-
Streptococcus F	10	15	20	10	10	5	55	-	-	30	10	-	10
Streptococcus G	40	10	20	20	15	-	-	-	-	35	20	-	-

AK \Amikacin, AX \Amoxicillin, AMC \Amoxicillin + Clavulanic acid, AZM \Azithromycin, , B \Bacitracin, PY \Carbenicillin, CDZ \Cefodizime, FOX \Cefoxitin, ZOX \Ceftizoxime, CL \Cephalexin, C \Chloromphenicol, CLR \Clarithromycin, DA \Clindamycin

Table 4(Cont) : Antimicrobial potency and spectrum for 13 selected antimicrobial agents tested against most frequently occurring UTI pathogens.

Microorganism	Antimicrobial agent / % sensitive strains												
	E	CN	K	L	ME	F	NOR	OFX	OX	T	P	PRL	RA
Streptococcus A	80	90	85	-	-	75	-	95	65	15	20	10	-
Streptococcus D	90	90	45	20	-	65	-	95	85	20	20	20	10
Streptococcus F	20	10	5	20	-	10	-	20	10	5	5	-	5
Streptococcus G	10	5	20	-	-	20	-	20	10	-	10	10	-

E \Erythromycin, CN\Gentamycin, K\Kanamycin, L\Lincomycin, ME\Methicillin, F\Nitrofurantoin, NOR\Norfloxacin, OFX \Ofloxacin, OX\Oxacillin, T\Oxytetracyclin, P\Penicillin G, PRL \Piperacillin, RA\Rifampim.

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