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Early Onset Neonatal Sepsis: Bacteriological Antimicrobial Susceptibility Study in Duhok Province, Iraq

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Abstract

Early neonatal infection is obvious problem resulting in significant morbidity and mortality especially preterm neonates, therefore rapid diagnosis and early treatment paramount to avoid death. The current study was design to determine the frequency of bacterial isolates causing early onset neonatal sepsis and their susceptibility patterns in Duhok province, in which carried out on newborns were admitted to the preterm unit and intensive care unit (ICU) in Maternity & Obstetric Hospital in Duhok/ Iraq, from November 2015 to December 2016. Patients were classified in to two groups (proven and clinical sepsis) according to the clinical signs and blood culture.

Collected blood samples were cultured in Brain Heart Infusion broth and check daily for 3 days for presence of visible microbial growth. Then all purified isolates were confirmed by using BD- Phoenix™ identification and susceptibility testing system provides rapid, accurate and reliable detection of known and emerging antimicrobial resistance. All data obtained, were analyzed by SPSS version 23 windows and Microsoft Excel (2013). One-hundred twenty neonates were studied and the proven sepsis was found in 91(75.8%) cases, while 29 (24.1%) cases reported as negative blood culture. Gram negative bacteria were responsible for most cases of neonatal sepsis 62(68.1%) while Gram positive bacteria were 29(31.9%). The most frequent isolated pathogens were *Klebsiella pneumoniae* 30(33%), Coagulase negative *Staphylococcus* 24(26.4%), *Escherechia coli* 19 (20.9%), *Pseudomonas aeruginosa* 9 (9.9%), followed by *Enterobacter aerogenes* and *Streptococcus agalactiae* 3(3.3%), *Enterococcus faecalis* 2(2.2%), and one isolate of *Shigella dysenteriae* (1.1%). **In conclusion:** EOS mainly associated with gram negative bacteria, *Klebsiella pneumoniae* found to be the predominant pathogens. The result of our study reveals that all isolates (both gram negative and gram positive bacteria) were multidrug resistant.

Keywords: Neonatal sepsis, Early onset sepsis, MDR, Bacteriological study.

Introduction

Early onset sepsis (EOS), remain a major cause of morbidity and mortality, particularly among preterm, very low body weight neonates, [1] with total death 5/1000 live birth in developed countries and 34 per 1000 live births in developing countries[2]. According to timing and transmission of the infection, neonatal sepsis is classified into early-onset sepsis (EOS) and late-onset sepsis (LOS)[3]. EOS refers to infection occurring in ≤ 7 days due to vertical transmission of pathogens during the intra-partum period from mothers to neonates, associated by Gram-negative bacteria[4] While LOS,

occurs by horizontal transmission ≥ 7days acquired after delivery, mostly caused by Gram-positive bacteria[5]. The spectrum of causative organisms responsible for neonatal sepsis persistently changing, and the frequent advent of multidrug resistant, and convoluted the management of neonatal sepsis[6]. The most predominant organisms associated with neonatal sepsis are gram negative bacteria and (CoNS) in developing countries; while Group B *Streptococcus* (GBS), *E coli* and *Listeria monocytogenes* in developed countries[7].

Patients & Methods

I. Sample collection

During a period from November 2015 to December 2016, a total of one hundred twenty neonates who were admitted to the preterm unit and intensive care unit (ICU) in Maternity & Obstetric Hospital in Duhok/Iraq, were investigated for EOS according to neonatal clinical data. Sample collection conducted under medical staff supervision. Blood samples were collected in the early hours after birth (before antibiotic administration) aseptically using combination of povidone iodine/70% ethyl alcohol [8,9] by clinicians using sterile syringe and needle by venipuncture, (2ml) immediately and carefully transferred into pediatric blood culture bottle containing Brain Heart Infusion (BHI) broth, which used within the daily routine laboratory in our NICU, then labeled with the patient's name, identification number, date, time of collection, age and gender. Studied neonates were classified into preterm (gestational age ≤ 33 weeks), late preterm (gestational age34-36 weeks), and full term (gestational age≥37 weeks) according to gestational age.

II. Culture & identification

All blood cultures were incubated in BHI broth at 37°C aerobically and anaerobically, and inspected daily for three days for presence of visible microbial growth by observing any of the following: turbidity, air bubbles (gas production) and coagulation of broth, otherwise the results were considered negative for microbial growth. Subcultures were made into blood agar; MacConkey's agar and chocolate agar (were prepared according to the manufacture's instruction on their containers). Growth obtained was identified by standard methods: gram stain and biochemical tests[10]. Purity plates were prepared for all isolates, then confirmed with the use of BD-Phoenix™ Automated Microbiology System at the Bacteriological Laboratory/Azadi teaching Hospital\ Duhok. Isolates were considered Multi Drug Resistant (MDR) if they showed resistance to the three or more classes of antibiotics.

Identification and Antibiotic Susceptibility of microorganisms Using BD Phoenix Apparatus

The system comprises: software, an instrument, disposable panels, broths for ID and AST, and a susceptibility testing indicator. The Phoenix panel contains 45wells with dried biochemical substrates with two fluorescent control wells ID side, while AST side contains 84 wells with dried antimicrobial agents with one well growth control. ID broth was inoculated with pure culture of bacterial colonies adjusted to (0.5-0.6) McFarland standards ($5x10^5$ cfu/mL) using a BD Phoenix Spec™ Nephelometer (BD Diagnostic). Preparation of the Phoenix AST broth requires adding a drop of Phoenix AST indicator (resazurin based dye) before inoculation of 25 µL of the broth aliquot from the standardized ID suspension. After addition of the ID broth suspension, the tube was mixed by inverting several times. Then labeled, logged and loaded into the instrument then incubated at 35°C, and obtained the results within 24 hours.

III. Statistical Analysis

All statistical analyses were performed using IBM SPSS statistical program (version 23 for Windows) and Microsoft Excel (2013) were used to present data in tables and figures.

Results

In the present study, a total of one hundred twenty neonates with suspected cases of sepsis were studied. The sepsis was confirmed in 91 (75.8%) cases by blood culture and classified as proven sepsis. While 29 (24.1%) of clinically suspected sepsis were negative by blood culture and classified as clinical sepsis. There were 52 (57.1%) preterm, 26 (28.6%) late preterm and 13(14.3%) term neonates. Among 91 neonates with proven sepsis, 62 (68.1%) were males and 29 (31.9%) females, resulting in male to female ratio of 2.1:1.

I. Isolated pathogens

Gram negative bacteria were responsible for most cases of EOS, 62 (68.1%) and 29(31.9%) of Gram positive bacteria. The most common organisms to be isolated were *Kl. pneumoniae* 30 (33%), CoNS 24 (26.4%), *E. coli* 19(20.9%), *P. aeruginosa* 9 (9.9%), followed by *Ent. aerogenes* and *Str. agalactiae* 3 (3.3%), *E. faecalis* 2 (2.2%), and one isolate of *Sh. dysenteriae* (1.1%), as shown in (Fig 1). As for anaerobic culture, no bacteria were isolated.

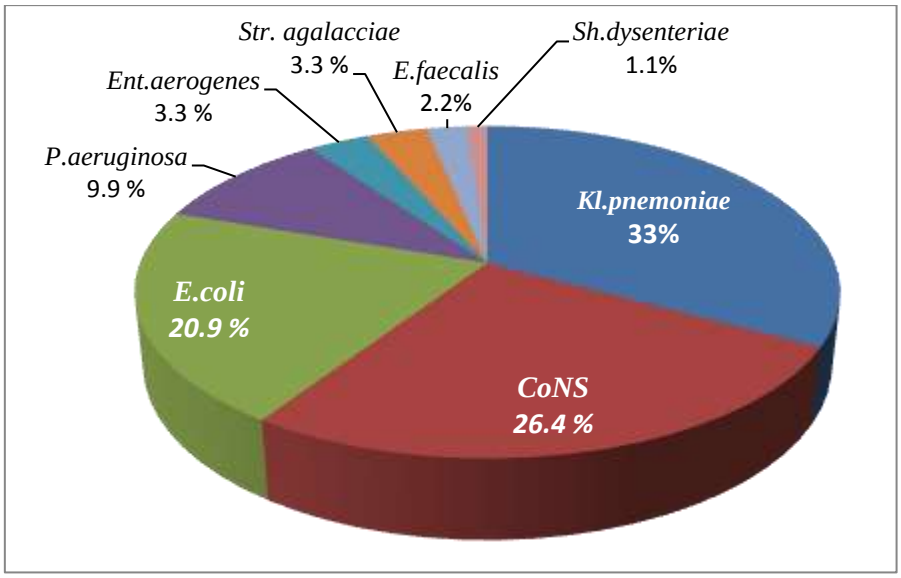

Figure (1) : Shows the distribution of bacterial isolates from blood cultures.

II. Antibiotic Susceptibility Pattern

1. Gram-negative Bacteria:

In Gram negative group, best overall sensitivity was to Colistin 62(100%), Meropenem 61(98.3%), Imipenem 60 (96.7%), Amikacin 59 (95.1%) and Tigecycline 52 (83.8%). Only 6.6% of *Kl. pneumoniae* were resistant to Imipenem, all *P. aeruginosa* isolates were resistant to Tigecycline (100%), and *Sh. dysenteriae* isolate was resistant to Amikacin (100%). While all Gram negative isolates, showed highly resistance 62 (100%) to Ampicillin, as shown in (Fig. 2 and Fig. 3)

Fig.2and table (4) showed the pattern of susceptibility of Gram negative organisms to various antibiotics as follows: *Kl. Pneumoniae* isolates were highest sensitivity (100%) to Colistin and Tigecycline, followed by Meropenem 96.6% (29/30), Amikacin, Ertapenem, and Imipenem 93.3% (28/30); while 63.3% (19/30) to Piperacillin Tazobzctam; and low 26.6% (8/30)to Trimethoprim, Ciprofloxacin 23.3% (7/30), Netilmicin 20% (6/30), Gentamicin 16.6% (5/30) ;and 10% (3/30) to Cefuroxime, Ceftriaxone, Ceftazidim, Cefepime, Azteronam, Piperacillin and Amoxicillin.

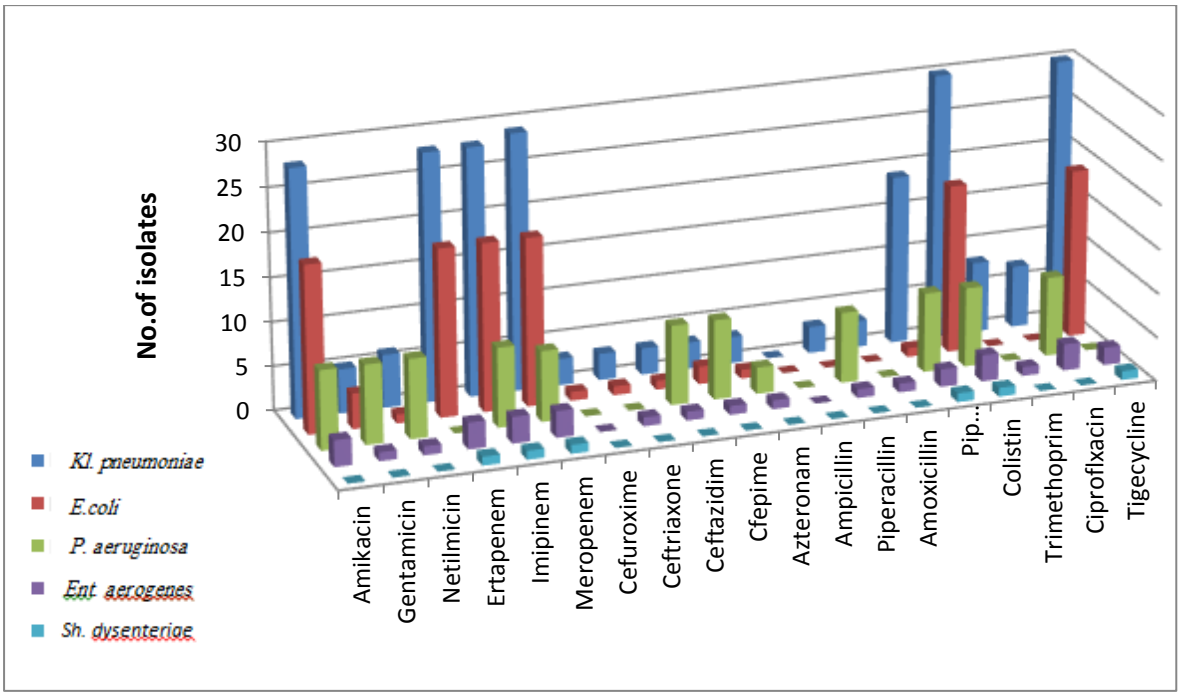

Figure (2): Antibiotic sensitivity pattern of gram negative bacteria isolated from EONS

In present study, *E.coli* isolates were frequently found to be highest susceptible100% to Amikacin, Ertapenem, Imipenem, Meropenem, Colistin and Tigecycline; while 21.5% (4/19) to Gentamicin, and less susceptible 10.5% (2/19) to Cefepime; and 5.2% (1/19) to Netilmicin, Cefuroxime, Ceftriaxone, Ceftazidim, Azteronam, and Piperacillin Tazobzctam. *P. aeruginosa* isolates were highest sensitive 100% (9/9) to Amikacin, Gentamicin, Netilmicin, Imipenem, Ceftazidim, Cefepime, Piperacillin Tazobzctam, Colistin ,and Ciprofloxacin; 88.8% (8/9) to Meropenem and Piperacillin; and less susceptible 33.3% (3/9) to Azteronam. *Ent. aerogenes* isolates were 100% (3/3) sensitive to Amikacin, Ertapenem, Imipenem,Meropenem, Colistin, and Ciprofloxacin; 66.6% (2/3) to Piperacillin

Tazobzctam and Tigecycline; and less susceptible 33.3% (1/3)to Gentamicin, Netilmicin, Cefuroxime, Ceftriaxone, Ceftazidim, Cefepime, Azteronam, Piperacillin, Amoxicillin clavunate and Trimethoprim.*Sh. dysenteriae* isolate was highly sensitive 100% to Ertapenem, Imipenem, Meropenem, Piperacillin Tazobzctam, Colistin and Tigecycline .

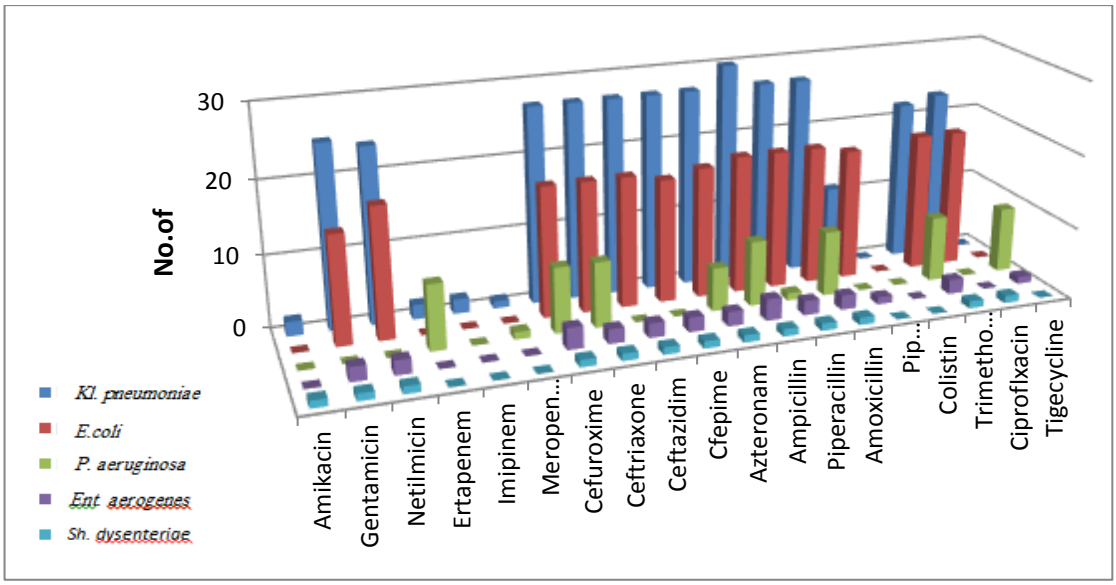

Figure (3): Antibiotic resistance pattern of gram negative bacteria isolated from EOS

Fig.3 and table (4) showed the resistance pattern of gram negative organisms to various antibiotics as follows:

Kl. Pneumoniae isolates were high resistance 100% (30/30) to Ampicillin, while 90% (27/30) to Cefuroxime, Ceftriaxone, Ceftazidim, Cefepime, Azteronam, Piperacillin, and Amoxicillin clavunate; 83.3% (25/30) to Gentamicin, 80% (24/30) to Netilmicin, 76.6 % (23/30) to Ciprofloxacin, 73.3% (22/30) to Trimethoprim, 36.6% (11/30) to Piperacillin Tazobzctam, and less resistant 6.6% (2/30) to Amikacin, Ertapenem, and Imipenem; and 3.3% (1/30) to Meropenem. *E. coli* isolates were frequently found to have the highest resistant 100% (19/19) to Piperacillin, Ampicillin, Amoxicillin clavunate, Trimethoprim and Ciprofloxacin; while 94.7% (18/19) to Netilmicin, Cefuroxime, Ceftriaxone, Ceftazidim, Azteronam, and Piperacillin Tazobzctam; and 89.4% (17/19) to Cefepime *P. aeruginosa* isolates were 100% (9/9) resistant to Ertapenem, Cefuroxime, Ceftriaxone, Ampicillin, Amoxicillin clavunate, Trimethoprim and Tigecycline; and 66.6% (6/9) to Azteronam ; and less resistant 11.11% (1/9) to Meropenem and Piperacillin.

All *Ent. aerogenes* isolates were 100% resistant to Cefuroxime,and Ampicillin, 66.6% (2/3) to Gentamicin, Netilmicin, Ceftriaxone, Ceftazidim, Cefepime, Azteronam, Piperacillin, Amoxicillin clavunate and Trimethoprim; and less resistant 33.3% (1/3) to Piperacillin Tazobzctam and Tigecycline. *Sh. dysenteriae* isolate was 100% resistant to Amikacin, Gentamicin, Netilmicin, Cefuroxime, Ceftriaxone, Ceftazidim, Cefepime, Azteronam, Ampicillin, Piperacillin, Amoxicillin clavunate, Trimethoprim and Ciprofloxacin.

2. Gram-positive Bacteria:

Fig.4 and table (5) showed the pattern of susceptibility of Gram positive organisms to various antibiotics as follows:

All Gram positive isolates except *E. fecalis* and CoNS were 100% resistant to Cefoxitin, Penicillin G, Ampicillin, Oxacillin, Amoxicillin clavunate, and Rifampin. All *E. fecalis* isolates were 100% sensitive to Ampicillin and amoxicillin, while two isolates of CoNS were 8.3% sensitive to Cefotoxin. CoNS isolates were 100%(24/24) resistant to Penicillin G, Ampicillin, ,Oxacillin, Amoxicillin clavmate and Rifampin; while 91.6%(22/24) to Cefoxitin,83.3% (20/24) Fucidic Acid; 50% (12/24) to Erythromycin; and less resistant 29.1% (7/24)to Gentamicin, Tobramycin, and Tetracycline; 25% (6/24) to Fosfomycin;16.6% (4/24) to Daptomycin , and Levofloxcin ;12.5% (3/24) Ticoplanin,Quinopristin , and Ciproflxacin; 8.3% (2/24) Vancomycin, Clindamycin, and Linezolid.

All *Str. agalactiae* isolates were 100% (3/3) resistant to Tobramycin, Cefoxitin, Ampicillin, Penicillin G, Oxacillin, Amoxicillin clavmate, Daptomycin, Ticoplanin, Vancomycin, Clindamycin, Erythromycin, Quinopristin, Fucidic Acid, Linezolid, and Rifampin. *E. fecalis* were 100% (2/2) resistant to Gentamicin, Tobramycin, Cefoxitim , Penicillin G, Oxacillin, Daptomycin, Trimethoprim, Clindamycin, Erythromycin, Quinopristin, Fucidic Acid, Fosfomycin, Ciproflxacin, Levofloxcin and Rifampin.

Isolated bacteria		AN	GM	NET	ETP	IPM	MEM	CXM	CRO	CAZ	FEP	ATM	AM	PIP	AXC	TZP	CL	SXT	CIP	TGC
Kl. pneumoniae	R	6.6	83.3	80	6.6	6.6	3.3	90	90	90	90	90	100	90	90	36.6	0	73.3	76.6	0
	S	93.3	16.6	20	93.3	93.3	96.6	10	10	10	10	10	0	10	10	63.3	100	26.6	23.3	100
E. coli	R	0	78.94	94.7	0	0	0	94.7	94.7	94.7	89.4	94.7	100	100	100	94.7	0	100	100	0
	S	100	21.05	5.2	100	100	100	5.2	5.2	5.2	10.5	5.2	0	0	0	5.2	100	0	0	100
P. aeruginosa	R	0	0	0	100	0	11.11	100	100	0	0	66.6	100	11.11	100	0	0	100	0	100
	S	100	100	100	0	100	88.8	0	0	100	100	33.3	0	88.8	0	100	100	0	100	0
E. aerogenes	R	0	66.6	66.6	0	0	0	100	66.6	66.6	66.6	66.6	100	66.6	66.6	33.3	0	66.6	0	33.3
	S	100	33.3	33.3	100	100	100	0	33.3	33.3	33.3	33.3	0	33.3	33.3	66.6	100	33.3	100	66.6
Sh. dysenteriae	R	100	100	100	0	0	0	100	100	100	100	100	100	100	100	0	0	100	100	0
	S	0	0	0	100	100	100	0	0	0	0	0	0	0	0	100	100	0	0	100

Table 4 : Pattern of susceptibility of Gram negative organisms to various antibiotics

Types of Antibiotics

R :- Resistant S:- Sensitive

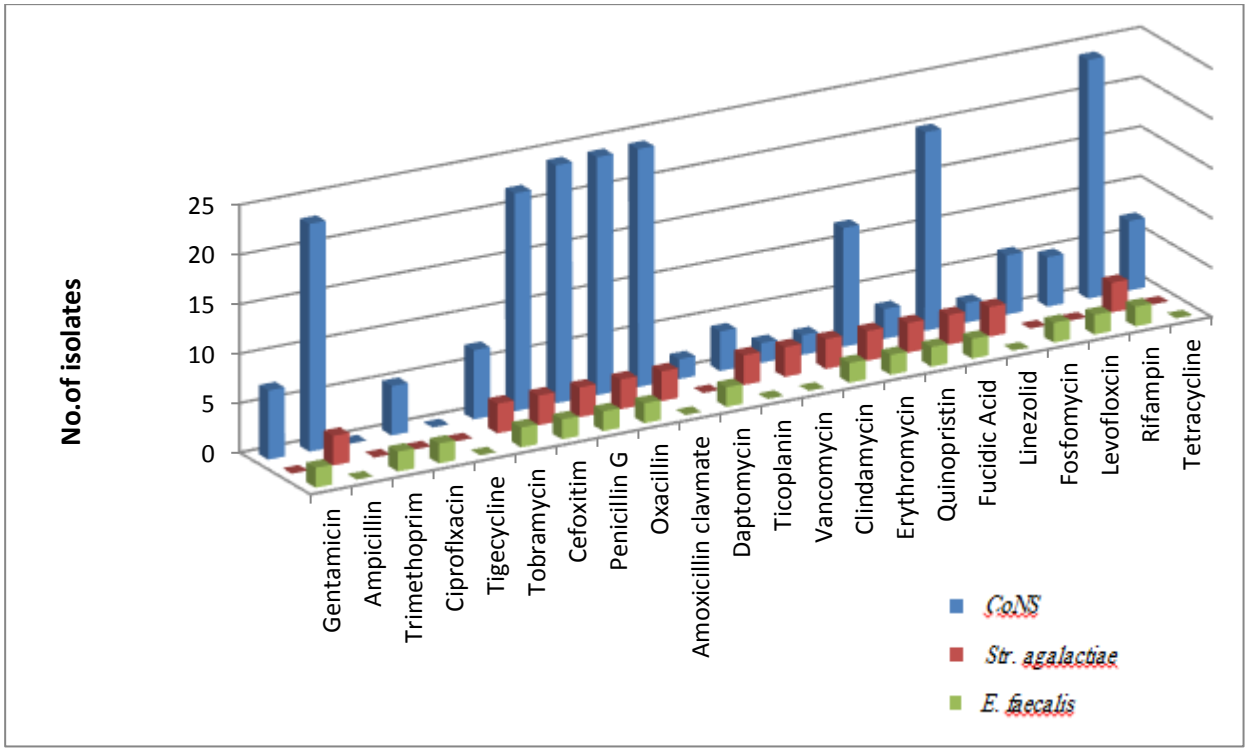

Figure (4) : Antibiotic resistant pattern of gram positive bacteria isolated from EOS

Fig.5and table (5) showed the pattern of Gram positive bacteria sensitivity to various antibiotics as follows: CoNS isolates were highly susceptible 100% (24/24) to Trimethoprim, Tigecycline; while 91.6%, (22/ 24) to Vancomycin, Clindamycin, and Linezolid, 87.5% (21/24) to Ticoplanin, Quinopristin ,and Ciproflxacin , 83.3% (20/24) to Daptomycin, and Levofloxcin; 75%(18/24) to Fosfomycin; 70.8% (17/24) to Gentamicin, Tobramycin, and Tetracycline, and less susceptible 50% (12/24) to Erythromycin; 16.6 (4/34) to Fucidic Acid; 8.3% (2/24) to Cefoxitim. All *Str. agalactiae* isolates were 100% (3/3) susceptible to Gentamicin, Trimethoprim, Fosfomycin, Ciproflxacin, Levofloxcin, Tetracycline and Tigecycline. While all *E. fecalis* isolates were100% (2/2) susceptible to Ampicillin, Amoxicillin clavmate, Ticoplanin , Vancomycin, Linezolid, Tetracycline and Tigecycline.

Table 5 : Pattern of susceptibility of Gram positive organisms to various antibiotics

Types of Antibiotics

		GM	NN	FOX	AM	P	OX	AMC	DAP	SXT	TEC	VA	CC	E	SYN	FA	LZD	FF	CIP	LVX	RA	TE	TGC
CoNS	**R**	**29.1**	**29.1**	**91.6**	**100**	**100**	**100**	**100**	**16.6**	**0**	**12.5**	**8.3**	**8.3**	**50**	**12.5**	**83.3**	**8.3**	**25**	**12.5**	**16.6**	**100**	**29.1**	**0**
	S	**70.8**	**70.8**	**8.3**	**0**	**0**	**0**	**0**	**83.3**	**100**	**87.5**	**91.6**	**91.6**	**50**	**87.5**	**16.6**	**91.6**	**75**	**87.5**	**83.3**	**0**	**70.8**	**100**
Str.agalactiae	**R**	**0**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**0**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**0**	**0**	**0**	**100**	**0**	**0**
	S	**100**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**100**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**100**	**100**	**100**	**0**	**100**	**100**
E. faecalis	**R**	**100**	**100**	**100**	**0**	**100**	**100**	**0**	**100**	**100**	**0**	**0**	**100**	**100**	**100**	**100**	**0**	**100**	**100**	**100**	**100**	**0**	**0**
	S	**0**	**0**	**0**	**100**	**0**	**0**	**100**	**0**	**0**	**100**	**100**	**0**	**0**	**0**	**0**	**100**	**0**	**0**	**0**	**0**	**100**	**100**

R :- Resistant
S:- Sensitive

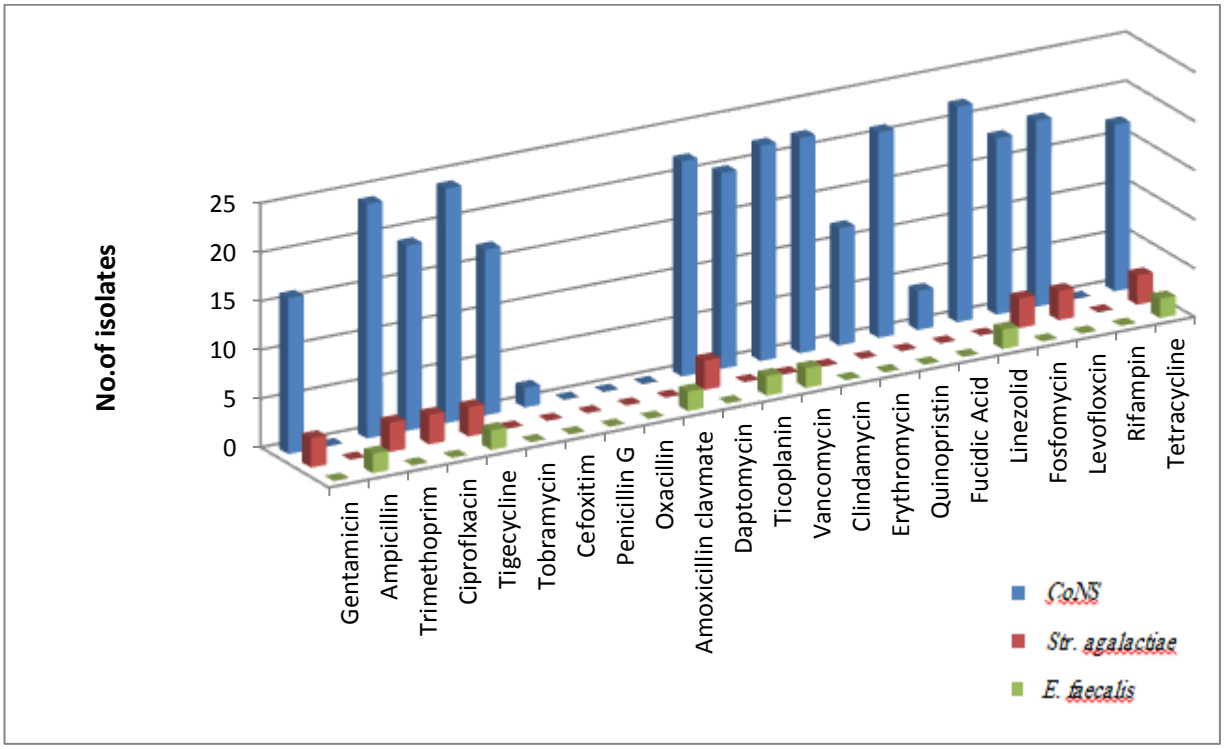

Figure (5): Antibiotic sensitivity pattern of gram positive bacteria isolated from EOS

Discussion

The results of a current study indicated that the EONS was detected in 91 (75.8%) of the neonates admitted to NICU. This finding was almost dissimilar to the results recorded by [11,7,12-16]. 66.9%, 64.7%, 58%, 54.5 %, 46%, 31.8%, 29.2% respectively. These differences may be attributed to the variations in geographical location, population characteristics and in predisposing factors, and also could vary from hospital to hospital. In our study the males are affected more than females with ratio 2.1:1 as reported by other studies; [17,7,18]. the reason of susceptibility to sepsis is unknown or it may be attributed to sex-linked immuno-regulatory genes. According to our results, the prematurity contributes in an increased risk of EONS that may be due to an immature development of immune system; and this is in accordance with McKenney [19] and Rawat *et.al.* [5].

The pathogens most involved in neonatal sepsis in developed countries differ from those in developing countries. Revealed that Gram negative organism is most common and represented by *E. coli*, *Klebsiella*, *Salmonella* and *Pseudomonas*[20]. While Gram positive bacteria, CoNS, *Staph. aureus*, *Str. Pyogenes* and *Str. pneumoniae* are most commonly isolated [21-23].

Anaerobic bacteria were not isolated in present study, this was similar to other studies, [24-27] and it might be due to the anaerobic bacteremia is infrequent in EONS and the difficulty in isolating and identifying these bacteria.

In this study the most common pathogens associated with EONS, was gram negative bacteria (68.1%), this can be attributed to the high incidence and virulence factors of Gram-negative bacteria in our country and also because new strains can be developed. Similar findings were reported in Iraq by Sadiq and Al-Anee, [13] Naher and Khamael, [12]. and other neonatal units in developing countries such as Egypt, Pakistan, [28, 29] India [30] and Iran[17].

Among isolated Gram negative bacteria *Kl. pneumoniae* was the predominant pathogens followed by *E. coli*, and this can be explained by the sources of infection for early-onset sepsis that comes from maternal obstetric factors, or hospital environmental delivery. A similar pattern has been reported by Sadiq and Al-Anee [13] in Kirkuk Pediatric Hospital. Fahmey [29] observed that *Kl. pneumoniae* was the predominant bacteria of EONS followed by *Enterobacter* and *E. coli*. While,Behrman *et.al.* [31] found the predominant pathogens for both EOS and LOS was *Klebsiella* infection followed by *E. coli*. Begum and Fatema [32] found *Klebsiella* was the most frequent causative organism followed by *Enterobacter* in both EOS and LOS.

In contrast, predominant Gram-positive microorganism associated with EOS had been reported by Shehab El-Din *et al.*, [33] Stoll and Fanaroff [34] studies, showing CoNS was the most common microorganism in both EOS and LOS; while Toson and Speer [35] reported that the CoNS and *Staph. aureus* being the most common organisms responsible for neonatal sepsis in Saudi Arabia, Bahrain and Kuwait. Dissimilar to a recent study, illustrated that CoNS was the second most predominant isolates in EONS. Although CoNS tends to be normal flora of the skin, it can be considered a pathogen, if the organism was isolated within 24–48 hours from the blood culture in association with two or more clinical and/or laboratory features of sepsis.

The current study indicated a low incidence of the GBS, this finding were similar with Al-Zwaini, [36] Shahian *et al.*, [37] and Karambin and Zarkesh. [17] However, this organism was the commonest pathogen causing EOS in North America and Europe. A low rate of *E. faecalis* isolates 2.2% was reported in the current study, which is similar to that found by Al-Zwaini [36] and Bhat *et al*. [38] Only one isolate of *Sh. dysenteriae* found in this study, it may be attributed to that *Shigella* bacteremia is a rare condition, occurring mostly in children and immune-compromised adults [39,40].

The antibiotic resistance is increasing worldwide and has become a serious health problem in hospitals and the community. The results of our study reveal that all isolates (gram negative and gram positive bacteria) were multidrug resistant (MDR), therefore routine bacterial surveillance and study of their resistance patterns should be an essential component of our neonatal care. Other studies reported similar findings. [7, 41,32]

In this study revealed that all Gram negative bacteria and most gram positive bacteria were resistant to Ampicillin and Amoxicillin clavunate, suggesting that the use of these antibiotics alone may be ineffective. Overall gram positive and gram negative bacteria in present study, showed highest sensitivity (100%) to Tigecycline and

Colistin, this might be attributed to the less frequent use of these drugs in the general practice because of the un sustained availability in local markets and hospitals. Except *P.aeruginosa* isolates were resistant to Tigecycline. According to our data, a high incidence of resistance to Cephalosporins' class of antibiotics (Unlike most third and fourth generation agents they active against *P.aeruginosa*) and Gentamicin was noted among most gram negative organisms whereas Amikacin, Imipenem and Meropenem found to be the most effective drug against Gram-negative isolates. This observation was similar to a study done by Begum and Fatema, [32] and Roy *et al*. [42]

Conclusions

Our results showed high incidence of neonatal EOS compare with other studies in our country. Neonatal sepsis in our NICU, mainly associated with Gram negative bacteria, among this group *Kl. pneumoniae* found to be the predominant pathogens followed by *E. coli*, and CoNS found to be the second most common isolated in EOS. All isolates (gram negative and gram positive) were developing resistance to commonly used antibiotics**,** signify that the use of these antibiotics alone may be inefficient. Our study suggests that Amikacin, Imipenem and Meropenem are the most effective drugs for the treatment of EONS in accordance with *in vitro* susceptibility results.

Recommendations

Early onset sepsis is identified as paramount concern of a common and serious problem in neonates**;** we recommend by:
Evaluated the causative agents and their antimicrobial susceptibilities periodically in our NICU to determine appropriate therapy for neonatal sepsis and to prevent serious and life-threatening complications. The most pathogens leading to neonatal sepsis are acquired from the mother's genital tract; we recommended routine screening of pregnant women to determine appropriate treatment for positive cases before delivery.

Conflict of Interests.
There are non-conflicts of interest .

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الخلاصة

تعد العدوى المبكرة لحديثي الولادة مشكلة واضحة مؤدية إلى المراضة والوفيات وخاصة في الاطفال الخدج . لذا استوجب الوصول الى التشخيص والعلاج المبكر لتجنب الوفيات . وصممت الدراسة الحالية لتحديد معدل حدوث الانتان الوليدي المبكر والعزلات البكتيرية وانماط قابليتها للحساسية. اجريت الدراسة على 120 من حديثي الولادة والذين ادخلوا لوحدة العناية المركزة للاطفال الخدج في مستشفى الولادة في دهوك \ العراق , للفترة مابين تشرين الثاني 2015 الى كانون الاول 2016. وتم تصنيف البيانات المدروسة إلى الانتان السريري والمؤكد وفقا للعلامات السريرية و فحوصات الدم. تم استزراع عينات الدم المجمعة في وسط مرق نقيع القلب والدماغ ويفحص يوميا على مدى ثلاثة ايام للتحقق من ظهور النمو الجرثومي. ومن ثم تم تعزيز التشخيص فضلا عن اختبارات فحص الحساسية للمضادات الحياتية. BD– Phoenix™ التمهيدي لهذه الجراثيم باستخدام Microsoft Excel, SPSS version windows 23تم تحليل جميع البيانات احصائيا باستخدام من 120 طفل حديث الولادة ,اظهرت النتائج 91(75.8%) من الحالات ذات نتيجة موجبة لزرع الدم بينما 29 (24.1%) كانت سلبية. وكانت البكتيريا السالبة الجرام مسؤولة عن معظم حالات الإنتان الوليدي (68.1%) و (31.9%) من البكتيريا موجبة الجرام. وشملت المسببات المرضية الأكثر شيوعا التي تم عزله في الدراسة الحالية الكلِبْسيلَّةُ الرَئَوِيَّة (33%) و المُكَوَّراتّ العُنْقودِيَّة السالبة للكواغولاز (26.4%) و الإشريكية القولونية (20.9%)و الزَّائِفَةُ الزِّنْجارِيَّة (9.9%) و الأَمْعائِيَّةُ المِرْياحَة و العِقْدِيَّةُ القَاطِعَةُ للدَرّ (3.3%) وا لمكَوَّرَةٌ المِعَوِيَّة البرازية (2.2%) و الشِّيغِيلَّةُ الزُّحارِيَّة 1.1%. ونستنتج من هذه الدراسة ان البكتيريا السالبة الجرام تعد العامل المسبب الرئيسي للانتان الوليدي المبكروكانت الكلِبْسيلَّةُ الرَئَوِيَّة من المسببات المرضية الأكثر شيوعا في وحدات العناية المركزة للخدج لدينا. ووفقا للنتائج اظهرت جميع العزلات(السالبة والموجبة الجرام) مقاومة للعديد من المضادات الحيوية.