Vertical transmission of extended-spectrum beta-lactamase-producing Enterobacteriaceae during preterm delivery: A prospective study

Maya Frank Wolf [1,2*], **Raneen Abu Shqara** [1,2*], Karina Naskovica [1,2], Inna Amdur Zilberfarb [1,2], Inshirah Sgayer [1,2], Daniel Glikman [2], Hagai Rechnitzer [2,3], Vered Fleisher Sheffer [2,4], Jacob Bornstein [1,2]

1 Department of Obstetrics and Gynecology, Galilee Medical Center, Nahariya, [2]Azrieli Faculty of Medicine, Bar Ilan University, 1311502 Safed,

[3]Clinical Microbiology Laboratory, Galilee Medical Center, Nahariya, [4]Neonatal Intensive Care Unit, Galilee Medical Center, Nahariya, Israel.

Introduction

Maternal carriage of extended-spectrum beta-lactamase-producing (ESBL) E.coli and K.pneumoniae is a cause for serious adverse sequel in pregnancy. E.coli is the second most frequent cause of neonatal sepsis after Group B Streptococccus (GBS) and the most frequent cause in pre-terms. In pre-terms, E.coli isolates have higher rates of ESBL phenotype. In contrast to GBS, for which prevention of vertical transmission guidelines exist, no guidelines are available for maternal carriage of ESBL.

Objective

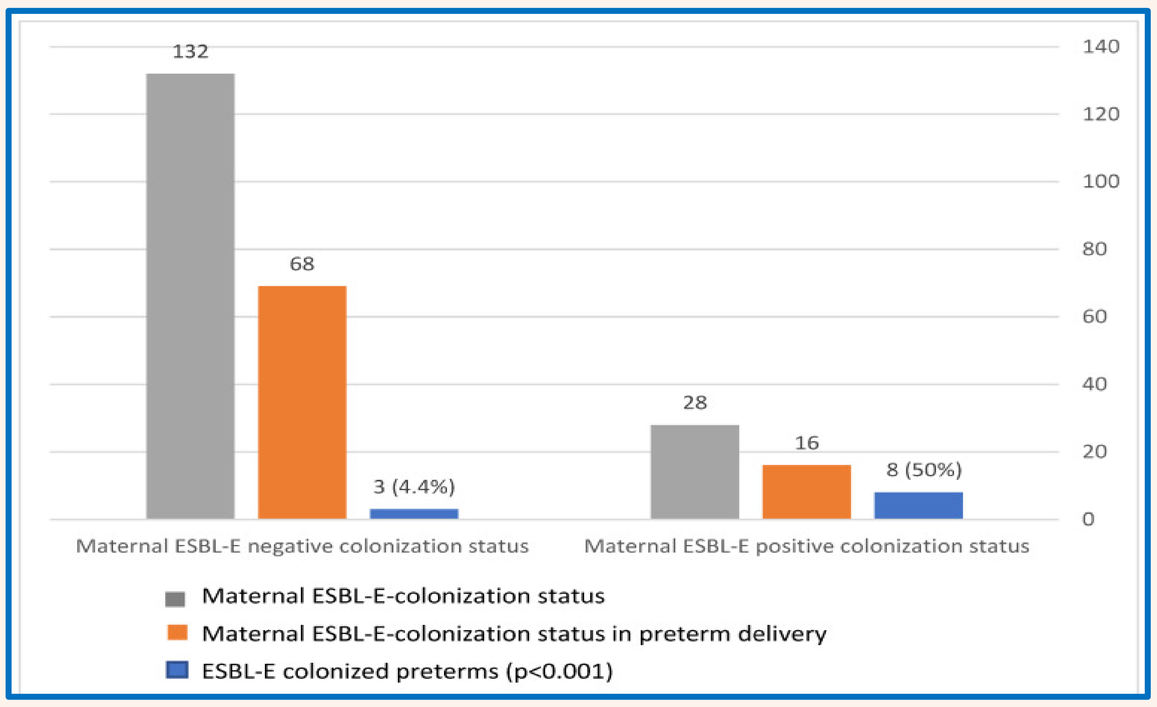
This study aimed to evaluate the rate of ESBL colonization among women in preterm labor and women with preterm premature rupture of membranes (PPROM), incidence of maternal vertical transmission, intrauterine inflammation, and the clinical significance of ESBL in preterm infants. We assumed that ESBL -colonized infants would be delivered at an earlier gestational age (GA) and develop more prematurity-related complications

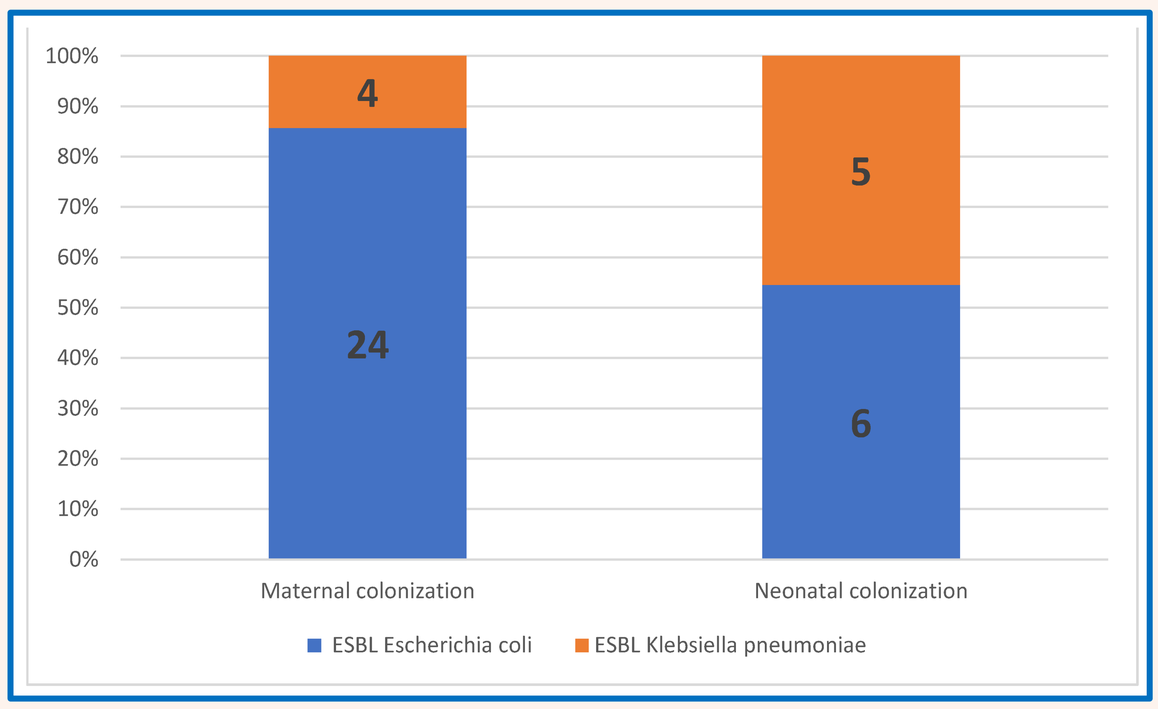
Methods

A prospective case-control study 01,2017 - 12,2019. Recto-vaginal ESBL colonization surveillance was performed in women with PPROM or pre-term labor. Maternal-neonatal transmission rate was calculated and risk factors for maternal carriage, maternal-neonatal vertical transmission and neonatal outcome were analyzed.

Results

The study included 160 women with threatened pre-term labor (43%) or PPROM (57%);85 women (53%) had pre-term delivery and pre-terms admitted to the neonatal intensive care unit were screened for ESBL. Maternal and neonatal carriage rates were 18% and 13%, respectively. E. coli was isolated from most women with ESBL colonization (85.7%, n = 24/28), followed by ESBL K. pneumonia. ESBL K. pneumoniae colonization was more prevalent in the preterm infants than in the mothers (figure 2). ESBL carriage rate in pre-terms was higher after PPROM (15.6% vs. 4.8% respectively). The transmission rate was 50% for ESBL-colonized gravidas. In maternal ESBL-colonization the risk of newborn carriers increased 12-fold (50% vs. 4.4%) ($p<0.001$, Figure 1). ESBL-colonized infants were delivered at an earlier gestational age compared with ESBL-negative infants and were more likely to have complications ($p=0.023$) including need for ventilator support ($p=0.056$). One infant died of ESBL early-onset sepsis (EOS). In contrast, 15.8% of women were GBS-carriers; no GBS EOS occurred.





Conclusions

A relatively high ESBL-carriage rate in women with threatened pre-term delivery and in offspring are evident, with significant transmission rate (50%). These emphasize the importance of maternal-neonatal ESBL-colonization surveillance and active measures to prevent EOS mortality, such as suitable intrapartum antibiotics and appropriate empiric antibiotics for ESBL-colonized neonates

Currently. prospective study examining ESBL carriage rate among term pregnancy compared with pre-term pregnancies is performed in our department.