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Assessing Sero Prevalence Of Igg Antibodies Against Bordetella Pertussis Toxin In Antenatal Women – Need For Tdap Vaccination In Pregnancy.

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Abstract
Whooping cough is a highly contagious bacterial infection of the respiratory tract, caused by Bordetella pertussis*. It is most severe in unvaccinated infants. The whole cell vaccine against pertussis, combined with diphtheria and tetanus toxoids, has long been part of the standard immunization schedule for infants and young children. Since the early 1990s, an acellular vaccine has been introduced in many countries. Although the acellular vaccine is highly effective, it is less effective in preventing the spread of the disease. Evidence is increasing that* B. pertussis *infections occur more frequently in older children and adults in vaccinated populations than has been commonly recognized. These individuals may play an important role in the transmission to infants too young to be vaccinated . In this regard this study has been conducted to know the seroprevalence of IgG antibodies against Pertussis toxin.*
Materials and Methods: *A total of 180 antenatal women were included in the study. After obtaining informed consent 5ml of blood collected and serum separated and ELISA was performed.*
Results: *Out of total 180 women tested , 125 mothers were* ***Sero Negative/ Undetectable(69.4%)*** *27 mothers (Insufficient)(15%) 28 mothers* ***(Protective)(15.6%).***
Conclusion: *In the present study majority of antenatal women were seronegative. It may be advised for vaccination against Pertussis to the antenatal women to protect the new born babies.*

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Pertussis is a highly contagious respiratory illness caused by Bordetella pertussis. Infection results in a wide spectrum of clinical manifestations ranging from mild to severe cough, illness accompanied by marked leukocytosis and the hallmark inspiratory whoop and posttussive emesis[1]. Despite high vaccine coverage, pertussis remains endemic in many countries. Newborns and infants too young to be fully vaccinated are at the highest risk of severe complications. During pregnancy, maternal immunoglobulin G (IgG) antibodies are actively transferred across the placenta, mediated by the neonatal Fc receptor expressed on syncytiotrophoblast cells. This saturable process initiates at approximately 13 to 17 weeks' gestation and increases throughout gestation. Around 33 to 36 weeks' gestation, fetal IgG antibody levels exceed maternal IgG serum levels and increase to 150% of maternal levels near the due delivery date[2].

I. Materials And Methods:

This prospective cross sectional study has been conducted in the department of Microbiology, Guntur Medical College, Guntur for a duration of two months. A total of 180 antenatal women visiting Govt General Hospital, Guntur were enrolled in the study. They were in the age group of 17-35 years. 5ml of blood is collected from the antenatal women after obtaining consent. Serum was separated and stored at -20^{0}C until testing. ELISA was performed with Euro immune kit following the manufacturers protocol for detecting IgG antibody levels against Pertussis toxin antigen. Results were interpreted using the calibrators tested.

II. Interpretation Of Results:

<5 IU/mL: **undetectable/seronegative.**
>5IU/ml to <40 IU/mL: **borderline.**
>40 IU/mL: **Protective**

Fig 1. ELISA Testing by Euroimmun kit

Results: Out of total 180 women tested , 125 mothers were **Sero Negative/ Undetectable(69.4%)** with <5 IU/ml, 27 mothers were with: >5IU/ml to < 40 IU/ml (Insufficient)(15%) and 28 mothers were having **> 40 IU/ml (Protective)(15.6%).**

Antibody titres according to the age :

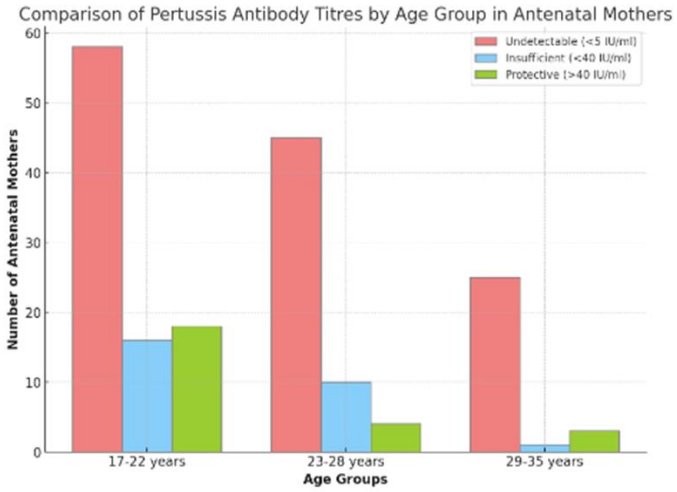

Fig 2 Antibody titres according to age

Antibody titres also calculated according to the trimester wise in the following table

Trimester	1st Trimester (n = 28)	2nd Trimester (n = 52)	3rd Trimester (n = 100)
Sero-negative/Undetectable (< 5 IU/ml)	19 (67.9%)	32 (61.5%)	74 (74.0%)
Insufficient (< 40 IU/ml)	4 (14.3%)	10 (19.2%)	13 (13.0%)
Protective (> 40 IU/ml)	5 (17.9%)	10 (19.2%)	13 (13.0%)

III. Discussion:

During pregnancy, maternal immunoglobulin G (IgG) antibodies are actively transferred across the placenta, mediated by the neonatal Fc receptor expressed on syncytiotrophoblast cells. This saturable process initiates at approximately 13 to 17 weeks' gestation and increases throughout gestation. Fetal IgG antibody levels exceed maternal IgG serum levels and increase to 150% of maternal levels near the due delivery date.

Maternal tetanus, diphtheria, and acellular pertussis (Tdap) vaccination protects newborns against severe pertussis. Data on transplacental antibody transfer on Tdap vaccination before 24 weeks' gestation remain scarce and are particularly relevant for preterm infants to increase the time interval for maternal antibody transfer[4].

Unimmunised neonates and partially immunised infants remain the most vulnerable to pertussis and at risk of life-threatening complications. Maternal immune status plays an important role in determining neonatal susceptibility to pertussis. In the present study, we estimated the seroprevalence of antibodies to PT in pregnant women. It is found to be 15.6%. This is in correlation with studies of Vishwanathan R et al[5] and Srinivas N et al[6]. As the age advances the levels of protection also decreases. As the gestational age advances also the serpositivity is decreasing. The antibody, anti-PT IgG, is specific to *Bordetella pertussis*, commonly evaluated in infection and vaccine efficacy studies and correlated with clinical protection against pertussis. Pertussis maternal antibodies cross the placenta and provide the newborn with protection against pertussis in early life . In 2012, in an effort to ensure high levels of maternal antibodies, the United States Advisory Committee on Immunization Practices (ACIP) recommended a dose of pertussis-containing vaccine for pregnant women between 27 and 36 weeks gestation at every pregnancy[7].We observed that majority of the antenatal women are having less protection against Pertussis making the newborns at risk of infection.

It may be advised that antenatal women may be advised of vaccination regarding pertussis along with Diphtheria and Tetanus to protect the preterm and low birth weight and vulnerable babies.

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Conflicts of interest: Nil

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