



# Impact of Maternal IgG Anti A&B Titres on the Clinical Outcome of Neonates in ABO HDFN

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# INTRODUCTION

- ▶ With the introduction of RhIG, the incidence of Rh incompatible HDFN has reduced.
- ▶ ABO incompatibility is now the leading cause of HDFN.
- ▶ This occurs in 15–25% of all pregnancies, but HDFN is reported only in 10%.
- ▶ Anemia is rare due to decreased antigenic (A & B) expression on neonatal red blood cells, but hyperbilirubinemia is striking.

# AIMS & OBJECTIVES

- ▶ To find out the incidence of ABO incompatible pregnancies.
- ▶ To find out the relation between severity of hyperbilirubinemia and maternal IgG antibody titers .
- ▶ To find out the association between maternal titer and treatment modality.
- ▶ To assess whether DAT has any role in determining the treatment modality.

# METHODOLOGY

- ▶ Prospective Cohort study.
- ▶ All O group mothers were included.
- ▶ Only infants with neonatal jaundice of Group A & B were included.
- ▶ Maternal samples of these babies were analysed for IgM & IgG antibody titres.

# METHODOLOGY cntd

## ▶ Inclusion criteria:

- ▶ Mothers of group O
- ▶ Babies of group A & B with jaundice
- ▶ Only term neonate (>36weeks)
- ▶ Newborns with neonatal jaundice only due to ABO incompatibility.

## Exclusion criteria-

- Preterm babies,
- G6PD deficiency,
- Cephalhematoma &
- Hyperbilirubinemia due to other reasons.

### Tests done on maternal samples:

- ▶ Abo grouping & Rh typing
- ▶ Antibody screening
- ▶ IgM and IgG titres

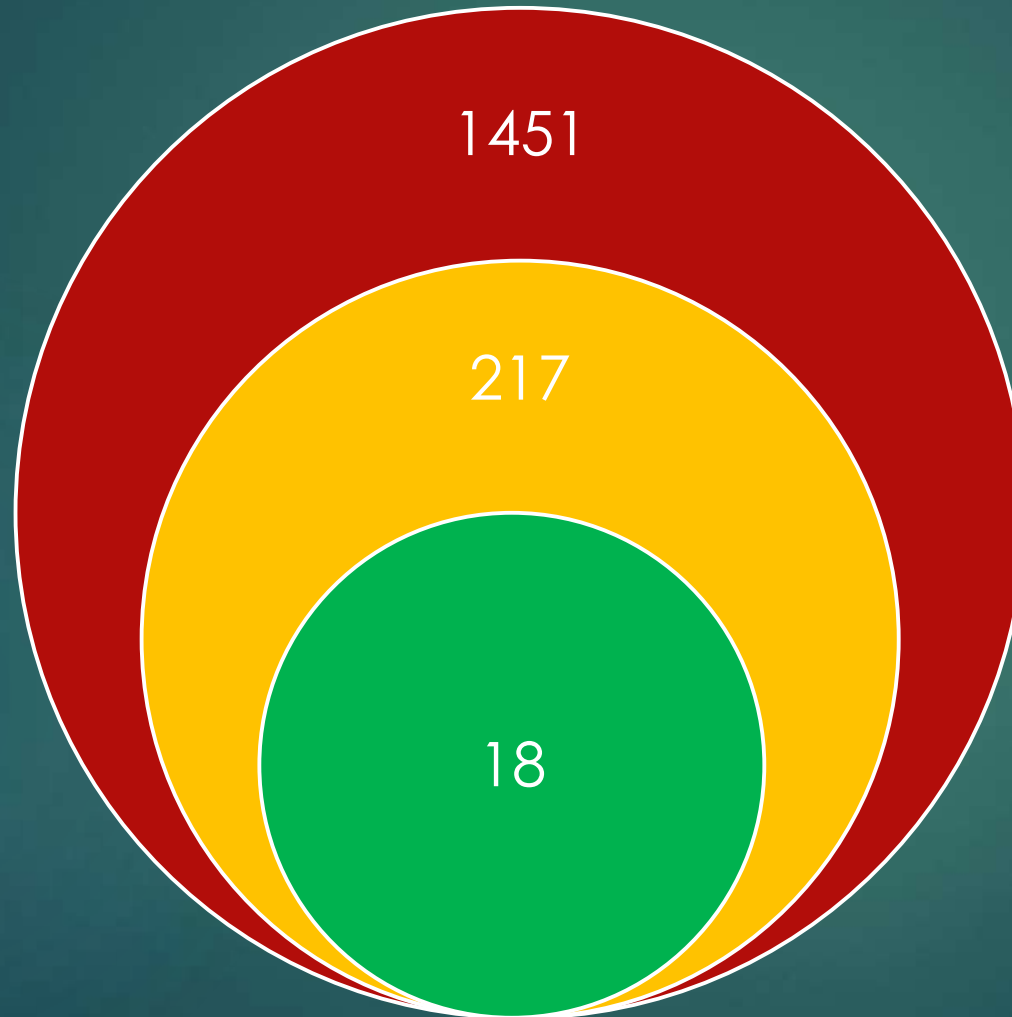
### Tests done on babies samples:

- ABO grouping and Rh typing
- DAT
- Hb, Hct
- TSB

- Titres were done on maternal sera by serial dilution methods using in house prepared pooled A & B cells.
- Neonate DAT was done by CAT using BioRad gel cards (IgG+C3d).
- Maternal antibody screening was done using BioRad 3 cell panels.

# RESULTS

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Total deliveries

ABO incompatible  
14.95%

ABO HDFN =  
8.75%

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## Age of Onset of Jaundice

Age	Case	%
<24hours	10	55.55
24-48 hours	7	38.88
>48 hours	1	5.55

## Mode of Treatment

Treatment	Number	%
ICU admission	18	100
Phototherapy	18	100
IvIg	4	22.22
Ex. Transfusion	3	16.66

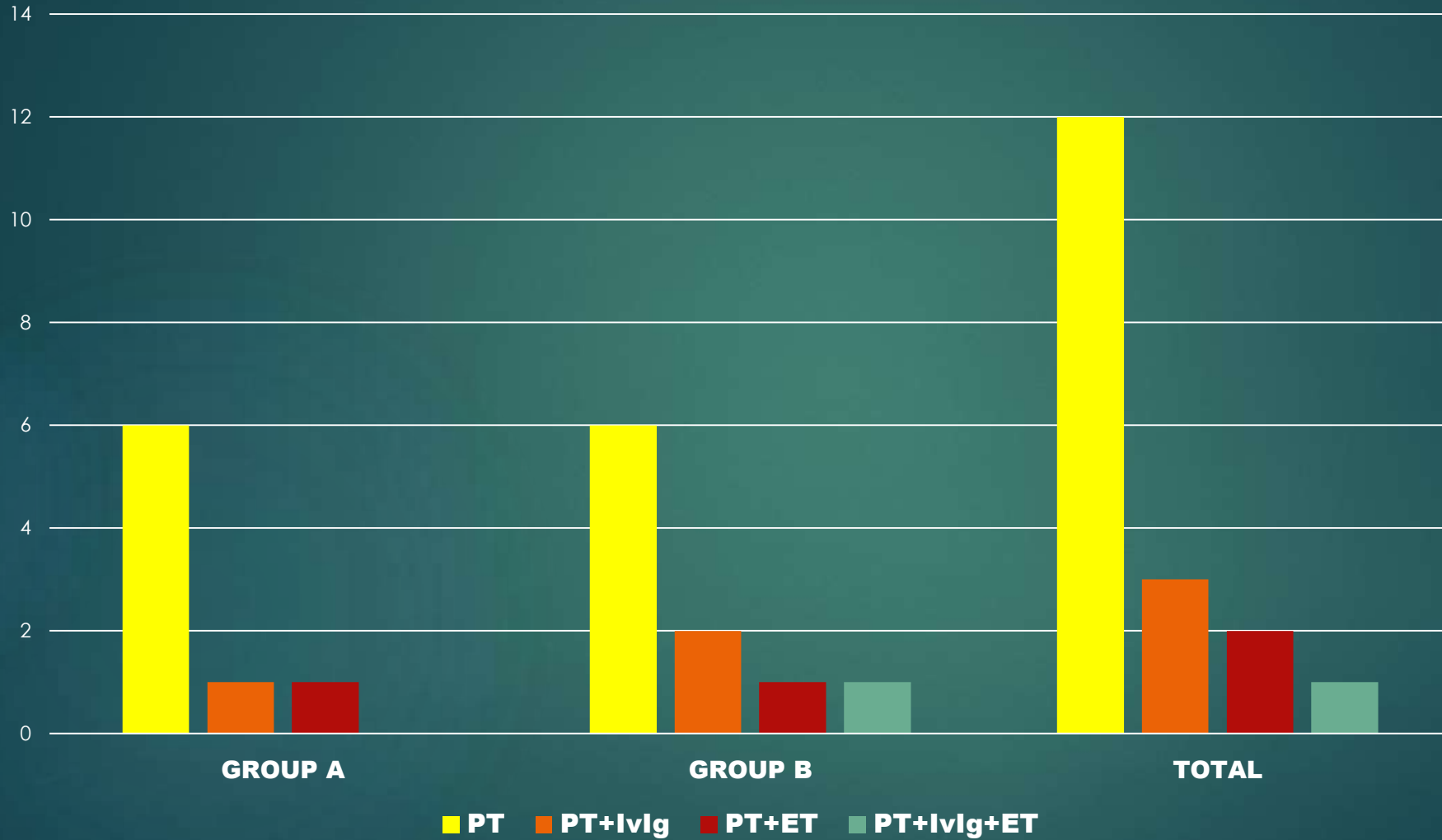


# Study Variables According To Blood Group

	Group A	Group B	Total
No of babies	8	10	18
Birth weight	3.1 ± 0.21	2.84 ± 0.282	3 ± 0.3
Hb	12.08 ± 1.71	11.99 ± 1.49	12 ± 1.6
HCt	35.06 ± 5.37	34.75 ± 4.61	34.9 ± 4.6
TSB	22.975 ± 4.98	24.06 ± 7.46	23.6 ± 6.3
IgM Anti A	64	8	
IgM Anti B	8	64	
IgG Anti A	256	8	
IgG Anti B	16	256	
Median LOS	3	3	3

# Treatment Type vs Blood Group

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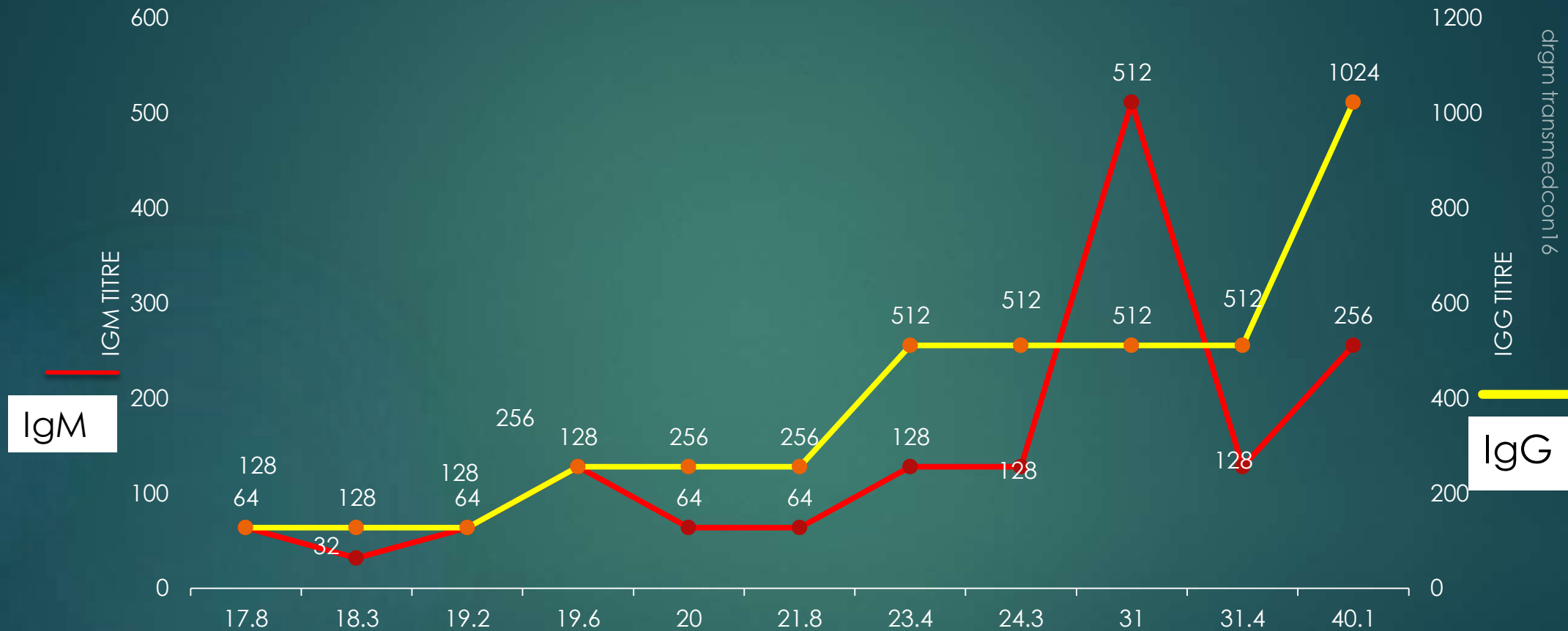
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# TITRE & DAT Vs Parameters Studied

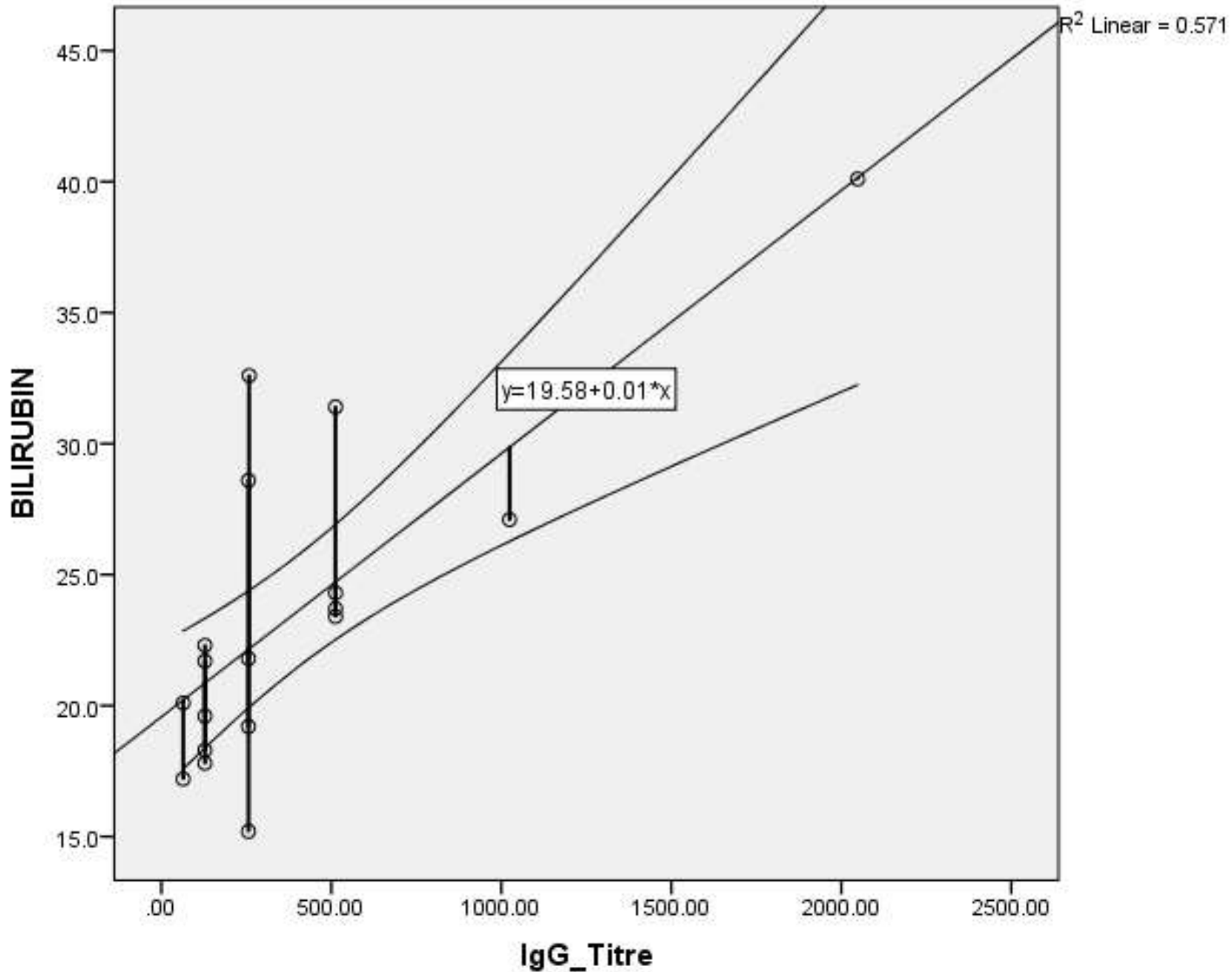
VARIABLES	IgG Titres		DAT	
	PEARSON CORELATION	P	PEARSON CORELATION	P
<b>LOS</b>	+ 0.557	0.016	+ 0.372	0.37
<b>TREATMENT TYPE</b>	+ 0.565	0.014	+ 0.439	0.063
<b>DAT</b>	+ 0.345	0.161	NA	NA
<b>Hb</b>	- 0.602	0.008	- 0.373	0.324
<b>TSB</b>	+ 0.758	0.003	+ 0.286	0.389

# Maternal Antibody Titer & Neonatal Bilirubin Levels:

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As Titer Value Increased, Neonatal Bilirubin Levels Were Also Increased

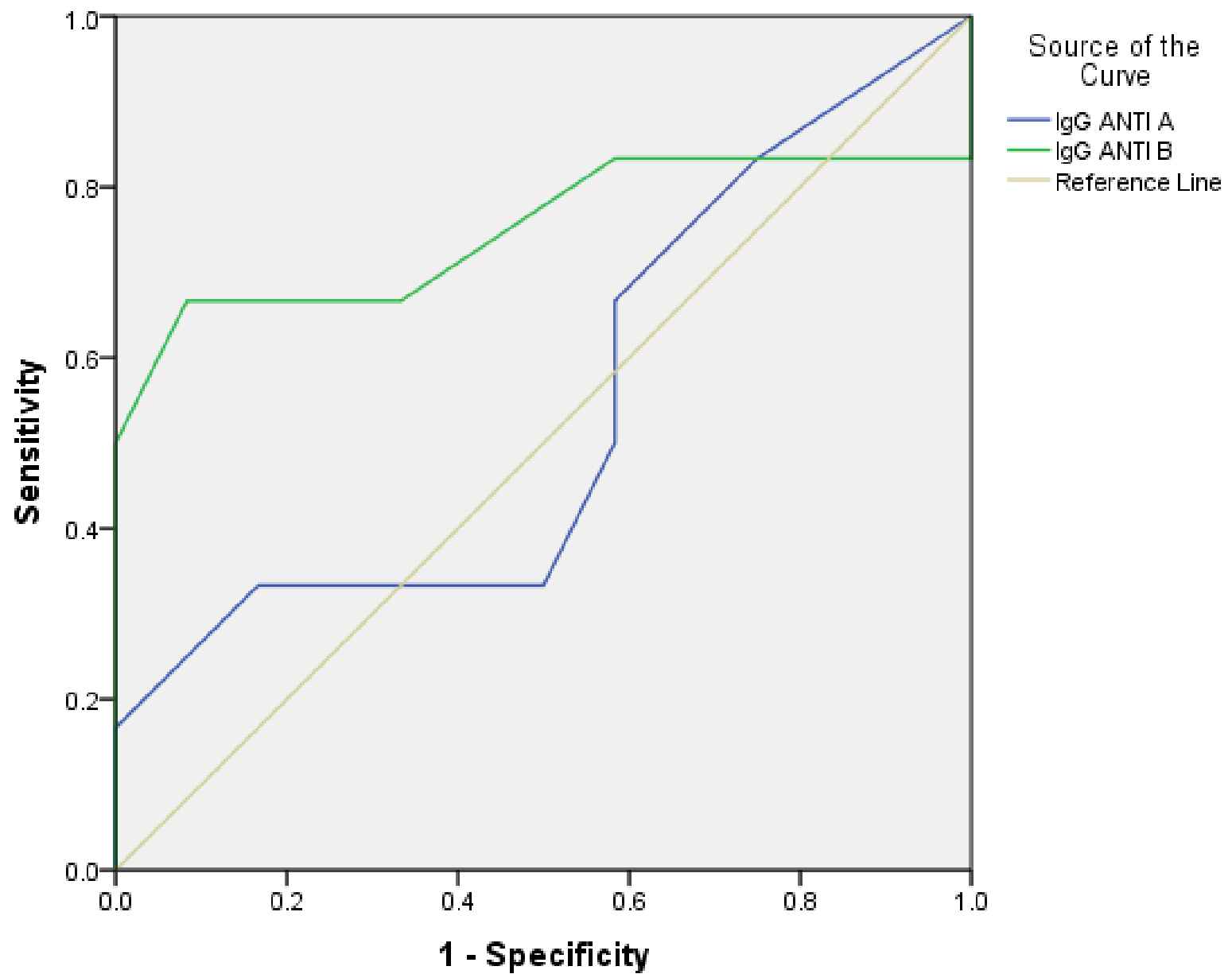


## Regression analysis:

Titre vs TSB showed  $r^2 = 0.571$  with a positive correlation.

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## ROC Curve



Diagonal segments are produced by ties.

Area under the curve:

IgG Anti A = 0.542

IgG Anti B = 0.750

# DISCUSSION

	<b>ABO incompatibility %</b>	<b>ABO HDFN %</b>
Current study	14.95	8.75
Usha et al (Kerala)		10.1
Garg et al (MH)		11.1
Vidal et al (Spain)		15.3
Han et al (Singapore)	15.61	3.7
Cariani et al (Venezuela)		8.57
Akanmu et al (Lagos)	14.3	4.3

- ▶ 44.44% and 55.55% new borns were group A & B respectively & corresponding mothers had IgG titre of >64.
- ▶ 55.55% babies presented on the first day itself.
- ▶ All the babies were admitted to ICU and required PT.
- ▶ Only 22.22% babies required IvIg and 16.66% babies required ET, total **38.88%** newborn required invasive treatment.
- ▶ Median Length Of Stay (LOS) in ICU was 3 days (1-7).



- ▶ There was no significant difference in group A & B in deciding treatment type as well LOS (  $P=0.638$  &  $P= 0.871$  )
- ▶ Reports says that hemolysis is more severe in group A babies (Chen *et al*)
- ▶ But we found that group B infants had more severe disease.
- ▶ Possibly due to B group is more common in our population, more number of B group babies in the study group and some group B infants got delayed onset of treatment.

# Impact Of Titre On Variables

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- ▶ All the parameters showed a positive correlation with IgG titre except Hb which showed a negative correlation.
- ▶ All parameters were significantly associated with titre except DAT.
- ▶ A titre value of **>256** was closely associated with invasive treatment from the ROC curve.
- ▶ Gupte *et al* had showed that TT vaccination increases the maternal titre and incidence of ABO HDFN in O group mothers.

- ▶ From regression analysis, we obtained a  $r^2$  value of 0.571, with a positive correlation of titre with TSB.
- ▶ Titre had a significant association with LOS as titre values increased, LOS increased with a maximum LOS of 7 days corresponding to a titre of 2048.
- ▶ As titre values increased, TSB also increased ( $r=0.753$ ,  $P=0.003$ ), similar to Bakkheim et al as they demonstrated association of titres and TSB ( $r= 0.68$ ,  $P<0.0001$ ).

# DAT vs VARIABLES

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- ▶ DAT was positive in 72.2% cases with varying strength of reaction (1+ - 4+).
- ▶ Various studies shows DAT positivity ranging from 10% to 70%.
- ▶ Depends on the DAT technique used.
- ▶ DAT failed to show any significant association with severity of jaundice ( $P=0.384$ ) but Dufor et al suggested that DAT positivity is an indicator of severity of the jaundice ( $P<0.0001$ ).
- ▶ All Babies who required invasive treatment were DAT positive ( $P=0.063$ ).
- ▶ The sensitivity of DAT in detecting jaundice is only 45% and specificity of 87%, concurrent with Han et al.

# Intention To Treat Analysis

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- ▶ From the ROC curve, Ant B titre had a more predictive value in determining babies who require invasive treatment (AUC = 0.750) compared to anti a titre (0.542).
- ▶ Maternal titre value  $> 256$  closely predicted the need of invasive management (P=0.001) and no babies required invasive treatment for titres  $< 256$ .
- ▶ Bakkheim et al got AUC = 0.93 with P<0.0001 on comparing maternal IgG titre and invasive treatment for titre  $> 512$ .
- ▶ Li et al in a meta analysis showed that titre  $> 512$  closely predicts the need of invasive treatment.

# LIMITATIONS

LIMITATIONS	2 <sup>ND</sup> PHASE
Other parameters like reticulocyte count and Peripheral smear examination could have been included.	
Need more sample size to assess the sensitivity, specificity and predictive values of the test.	
Following up the infants to identify any developmental abnormalities.	
Possible inclusion of pre term infants into the study population.	

# CONCLUSION

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- ▶ IgG titre  $> 256$  can be taken as a predictor of invasive management.
- ▶ Maternal IgG titre has a positive correlation with TSB of newborns.
- ▶ Titre values can predict the need of invasive management.
- ▶ Maternal antibody titre can predict the LOS in ICU.
- ▶ DAT positivity had no significant association with parameters studied.

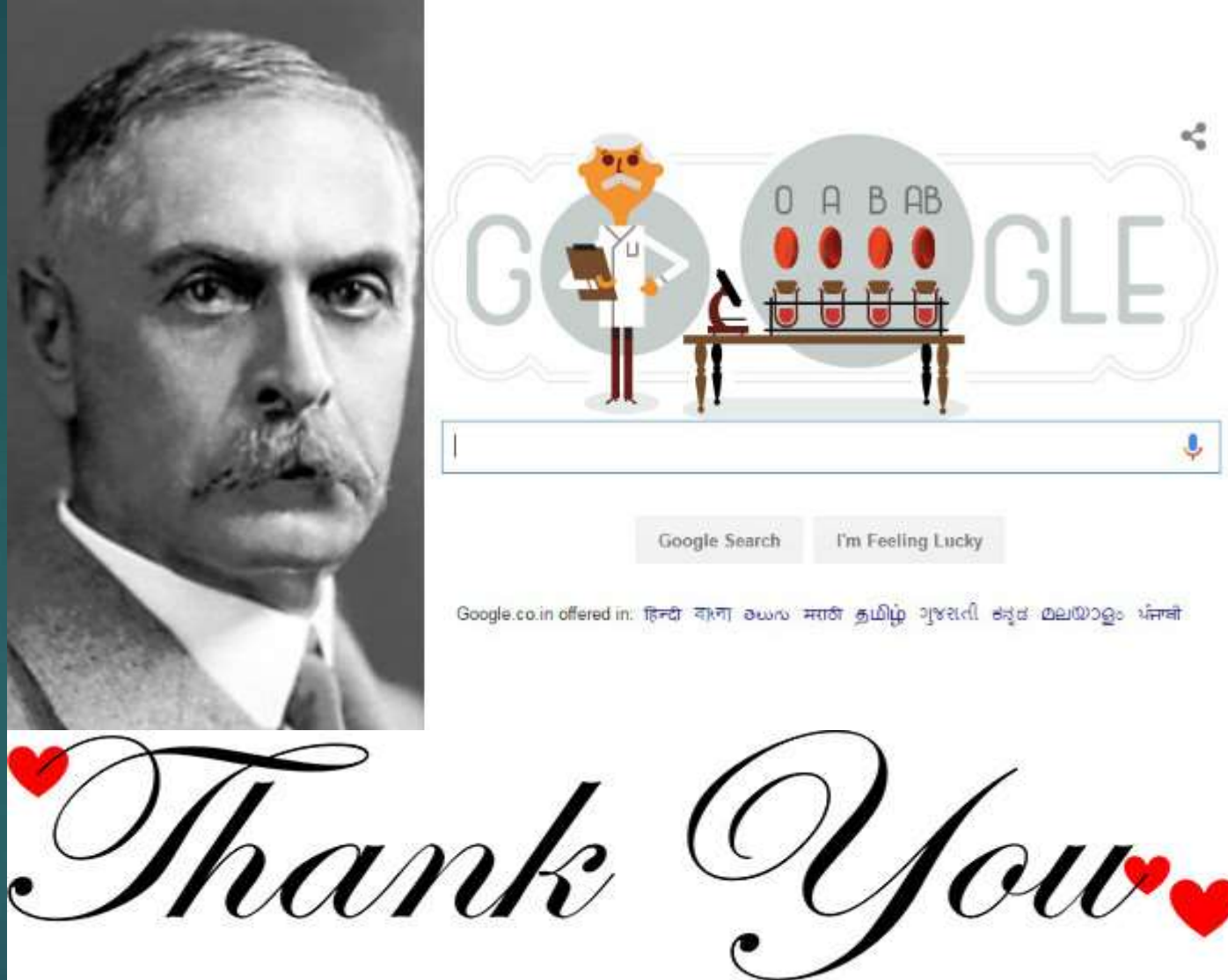
# TAKE HOME MESSAGE

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**Routine application of inexpensive maternal IgG titres in group O-mothers may be considered as an additional step in risk assessment of neonates and may be useful in the evaluation of the disease prognosis.**





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*Thank You*