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Original Research Article

Assessment of Trimester Base Immunoglobulin M (IgM) Variation Amongst Pregnant Women Attending Antenatal Clinic in A Tertiary Health Facility

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Abstract

In view of complex immunological adaptations associated with the preservation of pregnancies up to term; immunoglobulin M (IgM) was assessed in subjects including control group of 20 non-pregnant and test group of 60 pregnant women in whom serum IgM levels for 1st, 2nd and 3rd trimesters was measured by chemiluminescent immunoassay (CLIA), using MAGLUMINO IgM test kit protocols. The results showed gradual decreasing order of mean serum IgM levels from the first (580.60 ± 70.91), second (495.87 ± 51.44) and third (455.81 ± 44.66) trimesters, in comparison to control (619.26 ± 65.10). However, this variation was not statistically significant ($p<0.05$); suggestive of an inverse relationship between trimester of pregnancy and IgM level that may require further investigations to provide more insight.

Keywords: *Pregnancy, Trimester, Imunoglobulin M, Serum, Immunoassay.*

INTRODUCTION

Pregnancy is a complex physiological state characterized by significant immunological adaptations to accommodate the developing fetus, while protecting the mother from infections (Weng *et al*., 2023). Immunoglobulins otherwise referred to as antibodies are proteins generated from B cells of immune system, having specialty of responding to foreign antigens including pathogens (Ciobanu *et al*., 2020). Generally, antibodies ensure the healthy state of cellular, tissue and organ activities as well as entire organism. During pregnancy, some specifically provide such defense for mother and fetus against diseases also supporting processes of immune tolerance (Ciobanu *et al*., 2020).

In the maternal – fetus relationship at pregnancy, the placenta and its barriers prevent pathogens from entry and harming of fetus; however, some antibodies such as Immunoglobulin G (IgG) may cross the placental barrier, and when it does, passive immunity is conferred to the fetus against certain antigens to which the mother had exposure (Ciobanu *et al*., 2020). Similarly, specific antibodies such as IgM act as first line of defense protecting the mother from infections that could potently harm for the fetus (Schroeder & Cavacini, 2010).

IgM are expressed by B lymphocytes as a transmembrane antigen receptor linked functionally to B-Cell receptor (BCR) which facilitates differentiation of progeny cells resulting in generation of memory B cells or antibody precursor plasma cells (Schroeder & Cavacini, 2010). Serum IgM half life is about five to ten days, with an average serum concentration of 1.5 mg/ml (Schroeder & Cavacini, 2010).

Since IgM plays a pivotal role in enhancement of early defense against pathogens, adequate knowledge of this across the trimesters of pregnancy is essential for maternal immune status and the implications in fetal health (Abu-Raya *et al.*, 2020).

The immunological profiling of women during pregnancy, with respect to this IgM is limited within some developing nations and regions such as south southern Nigeria (Addah *et al*., 2016). There are complications linked to immune dynamics among pregnant women that could be attenuated by comprehensive insight of these variations (Atyeo & Alter, 2021); as it remains a puzzle that, increased vulnerability to infections and abnormal immune regulation during pregnancy persists, amidst advancing prenatal care culture.

This investigation is therefore aimed at assessing IgM levels in the trimesters of gestation, with objectives to quantify IgM, and compare its association with gestational age or any clinical implications among pregnant women subjects attending prenatal care at Niger Delta University Teaching Hospital (NDUTH) located in Bayelsa, a south southern state of Nigeria.

MATERIALS AND METHOD

At the conceptualization of the study, ethical approval was obtained from the ethical committee on research of the NDUTH. Eighty (80) female subjects were the study population, from which 20 non-pregnant women was control and 60 pregnant women represented the test group; and Taro Yamane's formula was applied in sample size determination.

Standard venepuncture base venous blood collection was implored in obtaining 5mls from subjects. Clotted sample was centrifuged and stored until assayed. Standard protocol was applied to measure and analyze IgM (Hossesini *et al*., 2018). Statistical analysis was carried out using the student t – test to compare mean values of serum IgM levels between control and the test groups, while ANOVA test compared mean IgM within and among groups and P-value < 0.05 was considered significant.

RESULTS

The following are the results of the analysis;

Table 1: comparison of mean values of serum IgM levels between control and 1st trimester pregnancy

Parameter (ng/ml)	sample size	Control (X±SD)	1st Trimester	t-value	P-value	Rmk
IgM	20	619.3±65.10	580.6±70.91	0.333	0.743	NS

Serum IgM level in 1st trimester of pregnancy is slightly less than control, but not significant at p<0.05. NS = Not significant.

Table 2: comparison of mean values of serum IgM levels between control and 2nd trimester pregnancy

Parameter (ng/ml)	sample size	Control (X±SD)	2nd Trimester	t-value	P-value	Rmk
IgM	20	619.3±65.10	495.9±51.44	6.168	0.000	S

Serum IgM level in 2nd trimester of pregnancy is less than control, and significant at p<0.05. S = significant

Table 3: comparison of mean values of serum IgM levels between control and 3rd trimester pregnancy

Parameter (ng/ml)	sample size	Control (X±SD)	3rd Trimester	t-value	P-value	Rmk
IgM	20	619.3±65.10	455.8±44.66	2.011	0.049	S

Serum IgM level in 3rd trimester of pregnancy is less than control, and significant at p<0.05. S = significant

Table 4: comparison of mean values of serum IgM levels 1st, 2nd, and 3rd trimester pregnancy

Parameter (ng/ml)	sample size	1st Trimester (X±SD)	2nd trimester	3rd trimester	F-value	P-value
IgM	20	580.6±70.91	495.8±51.44	455.8±44.66	1.864	0.164

Serum IgM levels was observed in decreasing order from 1st, 2nd, and 3rd trimesters of pregnancy. However, this trend was not statistically significant at p<0.05. NS = significant

DISCUSSION

Comparison of serum IgM level between control group - non pregnant women (619.3±65.10) and test group - women in first trimester of pregnancy (580.6±70.91) reveals slight decreased trend associated with pregnancy, although not

significant at $p<0.05$; implying that first trimester may not have a substantial impact on IgM of serum in line with finding of Smith *et al.*, 2018).

Similarly, non pregnant women (control) had higher IgM levels in serum than the pregnant counterpart in second trimester (495.9±51.44) and this was significant at $p<0.05$, suggestive of potential immunological alteration during progression of pregnancy. This is corroborative of the study by Kovacs *et al* (2002), which reported immunological changes during second trimester of pregnancy. This trend was replicated for pregnant women in third trimester wherein the serum IgM level (455.8±44.66) was further lowered than control. A study carried out in china showed associated reduction in serum IgM level amongst pregnant women (Li et al., 2019); highlighting the potential implications of this trend for maternal and fetal health.

Moreover, the evaluation of serum IgM levels in the pregnant women across three trimesters showed a decreasing order from the first trimester (580.6±70.91) to second trimester (495.9±51.44) and third trimester (455.8±44.66) respectively; though this was not statistically significant ($p<0.05$). Comparably, a research report by Smith *et al*, (2018) observed a non significant serum IgM reduction all through pregnancy period. And these findings contribute to appreciation of dynamics involved in maternal immune during pregnancy.

CONCLUSION

The result indicates statistical difference in serum IgM level between second and third trimesters of pregnancy, and a general decreasing order of this from first to third trimester thus, making it conceivable that, further investigation perhaps with increased sample size may elucidate trends observed in serum IgM levels across trimesters; hence clinical monitoring of immunoglobulin concentrations across trimesters during antenatal care by health professionals may be a welcome development.

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