Evaluation of global coagulation assays for assessment of clotting function and risk of venous thromboembolism in pregnancy

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BACKGROUND

- Women are at higher risk of venous thromboembolism (VTE) in pregnancy and postpartum, which is a significant cause of morbidity and mortality[1].
- Current routine coagulation tests cannot discern the physiological hypercoagulability of pregnancy.
- Current methods of assessing risk of VTE are limited to risk factor-based stratification drawn from case-control studies and consensus opinion.
- Global coagulation assays (GCA) include:
  - Thromboelastography **(TEG)**
  - Calibrated automated thrombography **(CAT)** – measuring thrombin generation
  - Overall haemostatic potential assay **(OHP)** – measuring fibrin generation
- GCA results may be more representative of the coagulation process and may be used clinically as an adjunct to predict the risk of VTE.

AIMS & OBJECTIVES

To evaluate the ability of global coagulation assays to:

1. Detect the hypercoagulability of pregnancy
2. Differentiate coagulability amongst pregnant women of varying VTE risk profile, in particular women of varying BMI.

METHODS

- This was a pilot prospective observational study conducted at Northern Health.
- Pregnant women at term undergoing elective Caesarean section at the Northern Hospital provided a single pre-operative blood sample.
- TEG was performed using citrated whole blood. CAT and OHP were performed using platelet-poor plasma, obtained by double centrifugation.
- Data from 47 healthy non-pregnant women aged 18-45 years from a concurrent study database were used as the control group[2].

CONCLUSIONS

- Pregnant women were significantly more hypercoagulable on most GCA parameters, compared with non-pregnant women.
- GCA results were significantly correlated with overweight and obesity in the pregnant population across all BMI groups.
- Larger studies are required to further investigate potential associations between GCA parameters and clinical risk factors for VTE in pregnancy and postpartum.

REFERENCES

RESULTS

Sixty women with term singleton pregnancies were included. 41.7% (n=25) were obese (≥30kg/m2) at booking and 88.3% (n=53) were multiparous.

COMPARISON OF GCA RESULTS IN PREGNANT VS NON-PREGNANT WOMEN

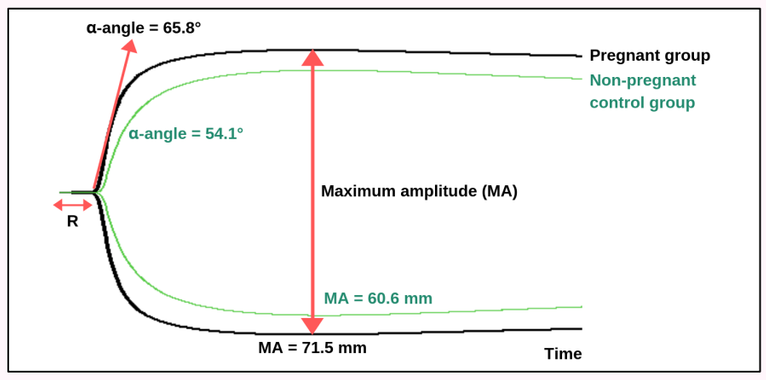

Figure 1. TEG showed hypercoagulability in pregnant women with increased alpha-angle (rate of clot formation, p<0.001), increased maximum amplitude (maximum clot strength, p<0.001), decreased LY30 (a measure of fibrinolysis, p<0.001) and decreased R value (time until clot formation, p=0.013).

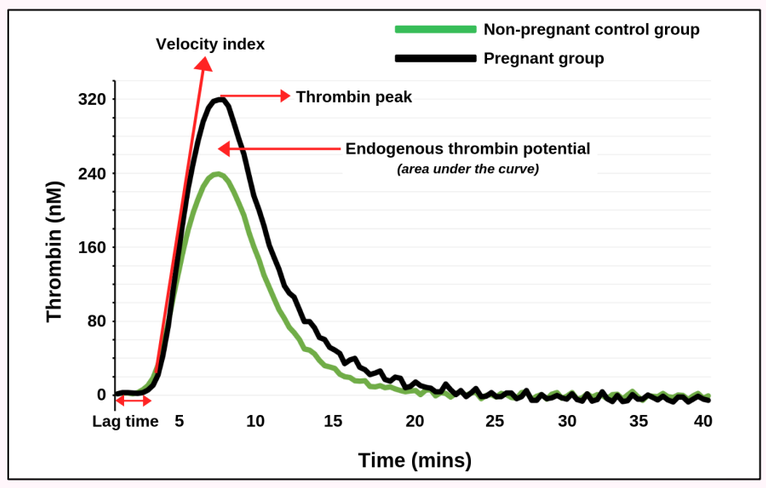

Figure 2. CAT showed hypercoagulability in pregnant women with increased endogenous thrombin potential (amount of thrombin generated, p<0.001), increased thrombin peak (maximum concentration of thrombin, p<0.001) and increased velocity index (rate of thrombin generation, p=0.001).

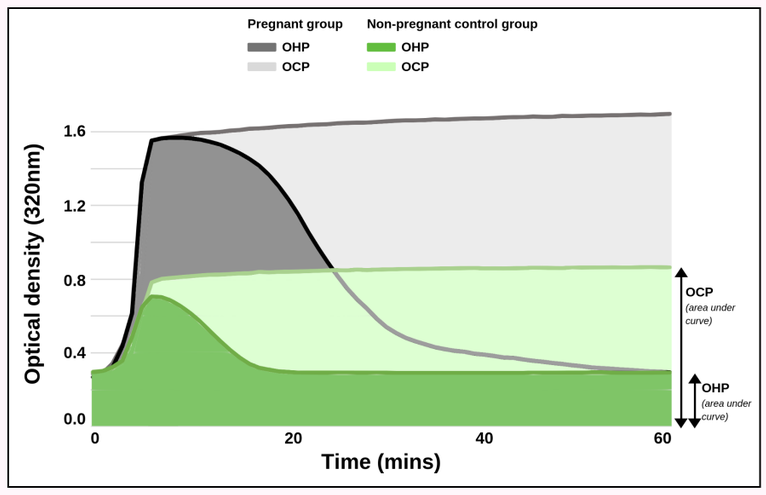

Figure 3. OHP assay showed hypercoagulability in pregnant women with increased overall coagulation potential (amount of fibrin generated, p<0.001) and increased overall haemostatic potential (p<0.001), indicating there was greater fibrin generation than fibrinolysis.

COMPARISON OF GCA RESULTS WITHIN PREGNANT COHORT

- Women who qualified for antenatal or postpartum thromboprophylaxis based on a clinical VTE risk assessment did not have significantly different GCA results to those who did not qualify[3].
- Women who were obese at booking (≥30kg/m^2, n=24) had a **higher clot strength** (maximum amplitude) compared to those of normal BMI (18.5-24.9kg/m^2, n=13) (p<0.001).
- When comparing all BMI groups, there was a significant increase in clot strength from normal BMI to all other groups (p<0.001) (Fig 4).

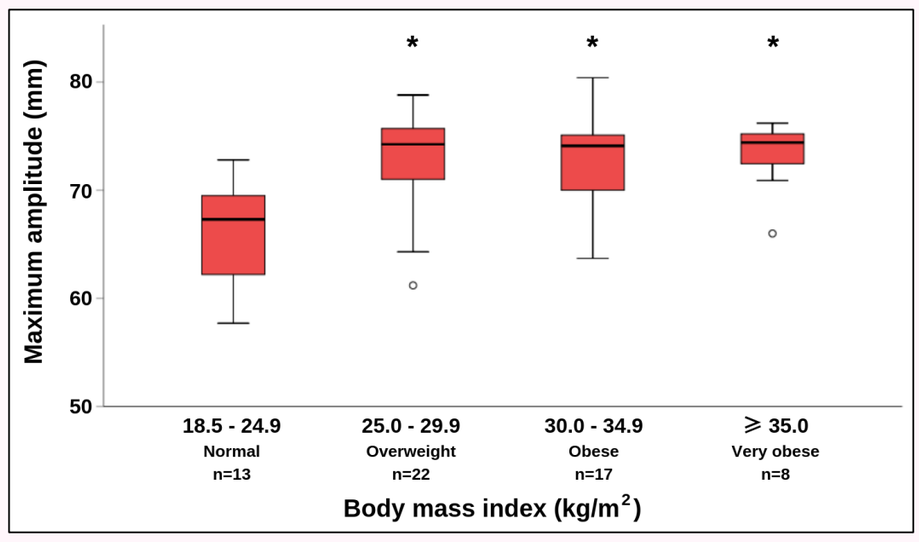

Figure 4. Changes in maximum amplitude (using TEG) with BMI category.
* : MA significantly different from normal BMI category 18.5-24.9kg/m^2 (p<0.001)
◦ : Outlier (1.5 x the IQR)
Box plots represent the range of data from 25th to 75th percentile; the middle bar represents the median value.

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