



Fetal Telomere Programming

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INTRODUCTION

- Telomeres are ribonucleoprotein structure containing **TTAGGG** repeats that cap the end of chromosomes to ensure genome stability and act as biological markers of ageing.
- The relative telomere length (RTL) has been found highly variable among individuals under the influence of multiple risk factors and may cause health disparities.
- It is anticipated that during fetal life, telomeres undergo reprogramming and may cause genetic remodeling

AIM OF THE STUDY

- The purpose of this study was to find an association between maternal parameters and risk factors like socioeconomic status (SES), hemoglobin, obesity and RTL of newborn(cord blood).

METHODS

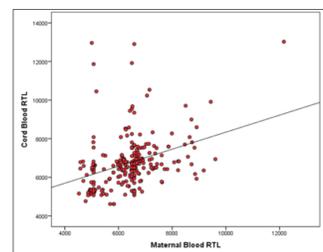
- A cross sectional study on 250 mother-newborn dyads (18 -35 years and gestational age ≥ 37 weeks).
- RTL in blood samples was measured by Quantitative Real-time Polymerase chain reaction (qPCR).
- **T/S ratio =ct telomere/ ct single copy gene**
- **RTL= (3274 + 2413 xT/S)**
- Association among maternal parameters, RTL and cord RTL was analyzed by spearman correlation.
- P value ≤ 0.05 was considered statistically significant at 95% confidence level.

ACKNOWLEDGEMENTS

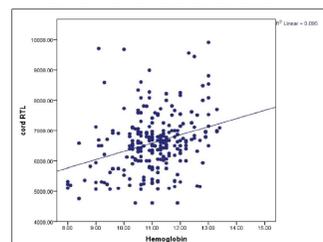
The corresponding author would like to acknowledge the participants, supporting staff, colleagues and Ziauddin University for their immense support and partially funding the research study.

RESULTS

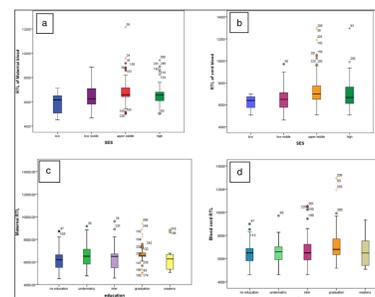
- A positive association was found between maternal and cord telomere length(RTL) ($r = 0.396$, $p < 0.05$).
- The telomere length(base pairs) was higher in cord blood (6765 ± 1350 bp) compared to maternal blood (6432 ± 1350 bp) of all Socioeconomic status(SES).
- Shortest cord telomere length ($6485\text{bp} \pm 1015$) was observed in the newborns of obese females ($p < 0.597$).
- A positive association was found between maternal low hemoglobin and newborn telomeres($r=0.806$)
- Newborn boys had longer telomeres ($7509\text{bp} \pm 830$) and had mothers with overweight 82(55%) ($p=0.06$).



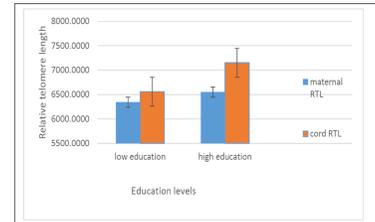
Strong association between mother and cord blood RTL



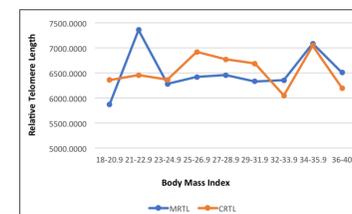
Strong association between hemoglobin and cord blood RTL



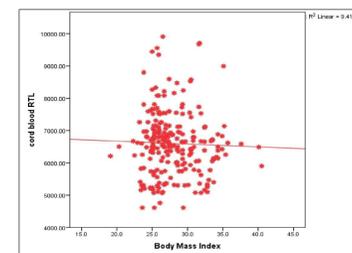
Mean difference between and maternal and cord blood RTL and SES and education



low and high educational groups



Difference between the three groups of Body Mass Index (BMI) of mother and cord RTL.



No association between BMI and cord telomere length.

PUBLICATIONS

- Farrukh S, Baig S, Sani AI. Exploring Modifications in Fetal Telomere Programming in Mothers Exposed to Multiple Risk Factors. *Current Women's Health Reviews*, 2021.17(3):280-288. <https://doi.org/10.2174/1573404817666210105151227>
- Farrukh, S., Baig, S., Hussain, R., Shahid, A. and Khan, S.T., 2019. Telomere reprogramming during fetal life in low socioeconomic mothers. *Egyptian Journal of Medical Human Genetics*, 20(1), pp.1-10.
- Farrukh, S., Baig, S., Hussain, R. and Lucky, M.H., 2019. ASSOCIATION OF CORD BLOOD TELOMERE BIOLOGY WITH MOTHER'S EDUCATION. *International Journal of Biochemistry Research & Review*, pp.1-9.
- Farrukh, S., Baig, S., Hussain, R., Rajani, H. and Ibad, Z., 2019. ASSOCIATION OF MOTHER'S BLOOD GROUP WITH CORD BLOOD RELATIVE TELOMERE LENGTH. *The Pakistan Journal of Medicine and Dentistry*, 8(2), p.3-9.

E POSTER PRESENTATION

- Research paper selection for E poster presentation at 10th International Symposium on Diabetes and pregnancy, Florence Italy.



CONCLUSION

- This study confirms the fetal telomere programming due to longer newborn telomeres among different levels of SES and educational levels in targeted population of Karachi
- Among all risk factors, low hemoglobin was found as a significant risk factor for the modification of RTL but not BMI.
- This study highlights the calculation of telomeres in base pair from T/S ratio telomere length, which is rarely found in the literature.

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