**P2-85** **Impaired antioxidant defense leads to increased oxidative stress and altered membrane fatty acids: the causative factors of preeclampsia and associated IUGR**

S. Joshi[1]*, A. Kilari[1], K. Dangat[1], S. Mahadik[2], S. Mehendale[2]. *[1]Interactive Research School for Health Affairs, Bharati Vidyapeeth University, Pune 411043, India, [2]Medical College of Georgia, Augusta, USA, [3]Bharati Medical College Hospital, Bharati Vidyapeeth University, Pune 411043, India*
**E-mail:** srjoshi62@yahoo.com

**Aims:** Pre-eclampsia (PE) is the leading cause of maternal and fetal mortality and morbidity. We hypothesized that impaired antioxidant defense increases membrane lipid peroxidation and disturbs essential polyunsaturated fatty acids (EPUFA). These biomarkers of pathogenesis may provide the relevant and alternative means for amelioration of PE and prevention of IUGR.
**Study design:** Prospective study (2005–06).
**Subjects:** Healthy (n = 55) pregnant (control) and (n = 60) PE women were enrolled at the Bharati Medical Hospital Pune between 35–37 weeks of gestation.
**Outcome measures:** Maternal and cord blood samples were examined for RBC and plasma fatty acid profiles, antioxidants (vitamin E and C) and malondialdehyde levels (MDA, an index of oxidative stress).
**Results:** Higher MDA ($p < 0.05$), lower vitamin E ($p < 0.05$) and vitamin C ($p < 0.05$) levels, reduced plasma docosahexaenoic acid ($p < 0.05$) and increased ($p < 0.05$) n6/n3 ratio were found in PE patients compared to controls. Further, these changes were magnified in PE mothers who delivered IUGR babies. Similar trends were also observed in cord samples. MDA levels in PE mothers showed strong negative correlations with fetal birth weight, height and head circumference ($p < 0.05$).
**Conclusions:** Increased oxidative stress owing to decreased antioxidants may lead to PE and associated IUGR. Increased n6:n3 ratio in plasma and RBC of the cord are indicative of increased lipid peroxidation and disturbed cell membrane function with consequent IUGR. Supplementing women with antioxidants and EPUFA during pregnancy may counteract oxidative stress, normalize EPUFA status and prevent the onset of preeclampsia. This could have a significant impact on preventing fetal origin of adult diseases.

**P2-86** **Maternal folic acid supplementation alters fatty acid profile in gastric milk at birth in Wistar rat**

S. Joshi[1], A. Kulkarni[1]*, S. Dalal[2], S. Rao[2]. *[1]Interactive Research School for Health Affairs, Bharati Vidyapeeth University, Pune 411 043, India, [2]Biometry & Nutrition Unit, Agharkar Research Institute, Pune 411 004, India*
**E-mail:** srjoshi62@yahoo.com

**Aim:** To examine effects of varying levels of maternal folic acid (FA) supplementation on fatty acid profile in gastric milk and brain in Wistar rats.
**Study design:** Control group (C – 18% protein), 3 levels of FA supplementation (2 mg/kg – FA2, 4 mg/kg – FA4, 8 mg/kg – FA8) at marginal protein level (12%).
**Subjects:** Dams (8/group) and their pups.
**Outcome measures:** Fatty acid composition in gastric milk and brain of pups at birth, brain and liver weights.
**Results:** Significant reduction ($p < 0.05$) in docosahexaenoic acid (DHA), Arachidonic acid (AA), eicosapentaenoic acid (EPA) and total n3 levels in gastric milk for FA2 group were comparable with control despite protein restriction but decreased significantly in FA4 and FA8 groups and in a linear fashion for total n3 fatty acids (C – $2.50 \pm 0.26$, FA2 – $2.49 \pm 0.26$, FA4 – $2.31 \pm 0.25$, FA8 – $2.14 \pm 0.27$). There was no such trend in these brain fatty acids in both sexes at birth. Relative liver and brain weights of FA2 group was comparable with control but was reduced significantly in FA8 group in both the sexes.
**Conclusions:** Reduced DHA, AA, EPA and total n3 fatty acids seen in gastric milk only at higher levels of FA is more a combined effect of excess FA at marginal protein level than protein restriction *per se*. In view of the fact that excess FA also adversely affected liver and brain and that these fatty acids are critical for growth and cognition, our results indicate possible effects on functional parameters in adult offspring.

**P2-87** **Intergenerational influence of maternal vitamin B12 status**

H.G. Lubree[1]*, C.S. Yajnik[1], S.M. Joshi[1], L.V. Ramdas[1], A.A. Ganpule[1], S.S. Naik[1], S.R. Otiv[1], S.D. Chaugule[1], C.H.D. Fall[2], H. Refsum[3]. *[1]Diabetes Unit, King Edward Memorial Hospital & Research Centre, Pune, India, [2]MRC Epidemiology Resource Centre, Southampton, UK, [3]Institute of Basic Medical Sciences, University of Oslo, Norway*
**E-mail:** diabetes@vsnl.com

**Aim:** To investigate the relationship between maternal and offspring vitamin B12 status.
**Study design:** Two population-based longitudinal studies.
**Subjects:** Indian women and their offspring from rural and urban Pune. Ethical approval and consent was obtained.
**Outcome measures:** Maternal and offspring (birth and 6 y) plasma vitamin B12 concentrations.
**Results:** We measured maternal vitamin B12 during pregnancy and of the child at birth and 6 y of age in two separate studies. In both the studies maternal plasma vitamin B12 concentrations were low (median ~130 pM) and over 60% were deficient (<150 pM). Maternal plasma vitamin B12 was related to frequency of intake (FFQ) of non-vegetarian foods ($r^2 = 4.8\%$, $p < 0.001$), milk ($r^2 = 2.9\%$, $p < 0.01$) and vitamin supplements. Cord blood vitamin B12 concentration was 183 pM (IQR 130–296) and was significantly related to maternal vitamin B12 ($r^2 = 18\%$, $p < 0.001$, adjusted for gestation, gender, parity, SES). Childrens' plasma vitamin B12 concentration at 6 y was 224 pM (166–308) and was related to maternal vitamin B12 ($r^2 = 2.9\%$, $p < 0.001$, additionally adjusted for family's non-vegetarian food habits).
**Conclusion:** Maternal vitamin B12 status is a significant predictor of the child's vitamin B12 status at birth and in childhood. Improving maternal vitamin B12 status will contribute to improving the vitamin B12 status of Indians.

**P2-88** **Does dietary maternal micronutrient restriction alter fat metabolism and mtDNA damage *per se* predispose the offspring's to insulin resistance and hypertension in later life?**

J.F. Rosario*, M.P. Gomez. *Dept of Biochemistry, St. Joseph's College (Autonomous) – Affiliated to Bharathidasan University, Tiruchirappalli, Tamil Nadu*

**Objective:** To assess the effect of maternal dietary micronutrient restriction (MR) per se on insulin resistance, fat metabolism and systolic blood pressure in MR offspring's. Additionally, given the link between reduced mitochondrial DNA (mtDNA) content and the development of type 2 diabetes mellitus, we have measured mtDNA damage and apoptosis in skeletal muscles.
**Design:** Female weanling mice received a control or a 50% micronutrient restricted (MR) diet for 12 weeks. After that animals were mated with control males. Pups born to the dams on the restricted diet were weaned on to the restricted diet till postnatal day 360.
**Results:** At birth, pups from deficient dams had reduced birth weight and crown rump length. Increased fasting glucose, insulin, total cholesterol and triglycerides levels were observed in MR offspring's. At PD-120, MR restricted offspring's had an elevated systolic blood pressure than controls. Compared with controls, total body electrical conductivity measurements indicated significantly higher body fat %, lower lean body mass and fat-free mass in MR offspring besides elevated plasma triacylglycerols. MR restriction also induced apoptosis in skeletal mussels which was detected by DNA fragmentation, caspase-3 cleavage and cytochrome c release.