

Urinary Iodine concentrations in mothers and their term newborns



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Introduction

Insufficient iodine supplementation in pregnancy leads to increased risk of complications both in mother and fetus. Iodine deficiency also increases the sensitivity of fetus to other factors that can influence thyroid gland function and development and future neurologic development of the child.

Study Aims

1. Assess the relation of iodine supplementation and urinary iodine concentrations in mothers and their term newborns and evaluate iodine transport between mother and fetus.
2. Detect the risk of possible low newborn iodine levels in case of maternal mild to moderate iodine deficiency.

Methods

50 healthy mothers without thyroid disease and their 50 term healthy newborns hospitalized at Perinatology Referral Center, University Hospital Hradec Králové (DEC2012 – MAR2013) were enrolled in the study.

Maternal urine samples before delivery on Day 0 and maternal and newborn morning urine samples on Day 3 were taken. All samples were frozen to -20°C and urinary iodine concentrations were established by the modified Sandell-Kolthoff's reaction.

Results

- 46 % of mothers took regular iodine supplementation during pregnancy (150 – 200 ug/day).
- 78 % of mothers had mild to moderate iodine deficiency before and after delivery, 22 % of mothers had iodine excess (Fig. 1) despite declared iodine supply.
- 54 % of newborns had UIC levels below 100 ug/l (Fig. 2).
- Newborn UIC levels of mothers with regular iodine supplementation were higher than in case of mothers without iodine substitution ($p=0,168$) (Fig. 3).
- Newborn UIC levels of mothers with UIC levels between 50 and 99 ug/l were higher than those of mothers with UIC <50 and 100-149 ug/l. (Fig. 4).

Discussion

- All newborns had normal TSH levels (newborn screening).
- There is still a large group of mothers who do not follow the recommendations for regular iodine supplementation during pregnancy (only 46 % had regular iodine supply in our sample). The maternal UIC levels were independent on declared iodine supplementation. This finding could be related to the questioned regularity of iodine intake and possible different iodine needs among pregnant women.
- Placental iodine transport (derived from newborn UIC) is higher in mothers with moderate iodine deficiency compared to those with UIC <50 or 100-149 ug/l. Correction mechanisms seem to be more effective in case of moderate than severe iodine deficiency.

Conclusion

The aim of the study was to assess iodine supplementation and detect possible risks in case of maternal mild to moderate iodine deficiency.

1. Maternal UIC levels on Day 0 and Day 3 were in 78 % of cases in the range of mild to moderate iodine deficiency. UIC levels were independent on declared iodine supplementation.
2. Newborn UIC levels were in 54 % of cases below 100 ug/l, TSH levels were in all newborns in normal range.
3. Lower UIC levels in newborns of mothers without regular iodine supplementation should serve as an argument to establish regular iodine supplementation for the whole pregnancy (including the 3rd trimester) and during lactation as a means of prevention of developmental impairment in children and maternal health complications.
4. Active placental transport of iodine moderates the risk of low newborn iodine levels in population of mothers with mild to moderate iodine deficiency.

Figure 1: Maternal UIC

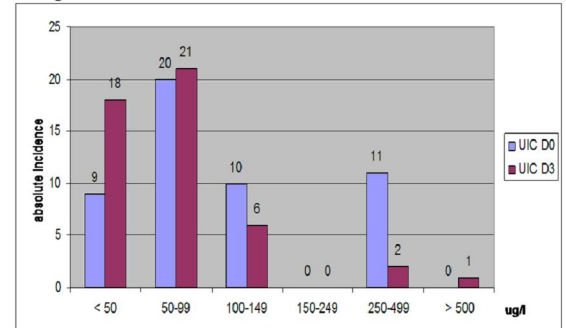


Figure 2: UIC results of newborns D3 according to maternal iodine supply intake

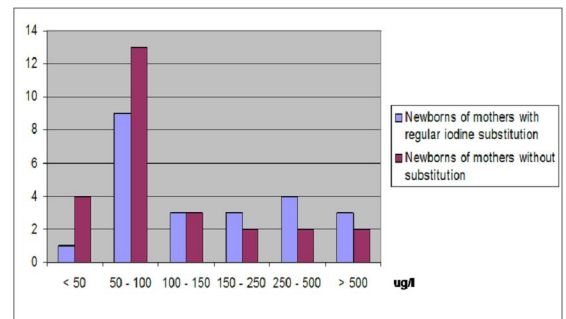


Figure 3: UIC results of newborns D3 according to maternal iodine supply intake

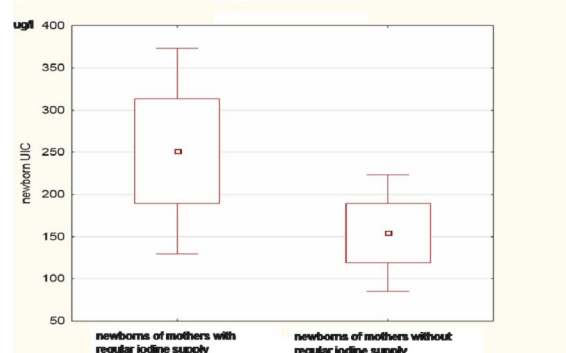


Figure 4: UIC results of newborns D3 according to maternal UIC D0

