

## Relationship Between Filter Paper and Serum Thyroid Stimulating Hormone in Screening of Neonatal Hypothyroidism

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Dear Editor,

Congenital hypothyroidism is more prevalent in Iran than other countries (1.2-2.4 in 1000 births compared with 1/2000-1/4000) [1]. In most countries, filter paper TSH is used for screening test. The cutoff point in Iran was defined as 5 mIU/L. Few studies investigated the relationship between filter paper TSH with serum TSH. Giving that screening is being performed in Markazi Province since 2006, the present study, investigates the relationship between filter paper and serum TSH in the screened neonates.

This analytical and cross-sectional study was performed from 2006 to 2012 on 127,112 neonates of 3-5 days old who included in the study based on the National Screening Protocol. Heel blood of neonates was sampled using a lancet in all rural and selected municipal care centers. Blood samples were then extended as filled circles on a special filter paper called S & S903, approved by the Ministry of Health. TSH level was measured via Padtan Elm ELISA method and those children with a heel blood TSH level higher than 5 mIU/L were referred for further examination to diagnose of hypothyroidism using a serum sample. In the present study, the results of heel TSH were compared with serum TSH in order to determine the regression models for predicting serum TSH based on heel TSH.

The data were analyzed using SPSS and the obtained data showed the correlation of serum TSH and heel TSH with an  $r = 0.543$  and 95% CI = 0.484 - 0.597. The Pearson correlation test showed that the relationship was statistically significant ( $P = 0.0001$ ).

In neonates with a filter paper TSH level of higher than 5 mIU/L and lower than 10 mIU/L, the correlation was  $r = 0.159$  ( $P < 0.003$ ); using regression analysis, the intensity of this correlation is calculated by  $TSH(\text{serum}) = 2.5 \times TSH(\text{filter paper})$ . In neonates with a filter paper TSH level of higher than 10 mIU/L and lower than 20 mIU/L, the correlation was  $r = 0.219$  ( $P < 0.041$ ); using regression analysis, the intensity of this correlation is calculated by

$TSH(\text{serum}) = 1.750 \times TSH(\text{filter paper})$ . In neonates with a heel TSH level of higher than 20 mIU/L and lower than 100 mIU/L, the correlation was  $r = 0.443$  ( $P < 0.001$ ); using regression analysis, the intensity of this correlation is calculated by  $TSH(\text{serum}) = 16.220 + 0.767 \times TSH(\text{filter paper})$ . According to the findings, there is a significant relationship between TSH level in filter test and serum TSH of neonates with hypothyroidism.

In Isfahan, Ayyad et al. found the coefficient between heel and serum TSH as 0.63 which is also significant ( $P < 0.001$ ) [2]. In Philippines, Capistrano-Estrada et al. [3] also found a direct relationship between filter paper and serum TSH with a correlation rate of 0.57. In the present study, a positive correlation was observed between heel and serum TSH, and through dividing filter paper TSH into three groups of 5-10, 10-20, and 20-100 mIU/L, the highest correlation was seen in the group of  $20 \text{ mIU/L} < TSH < 100 \text{ mIU/L}$ . Moreover, the equations relevant to the calculation of serum TSH were achieved for individual groups according to the heel TSH. Beside human error, some cases of hypothyroidism can also have normal heel TSH for unknown reasons. Despite factors affecting the levels of filter paper TSH, this test can be used as a rational and acceptable screening program, given the positive correlation of filter paper TSH level at 20 and 100 mIU/L, its low cost, and ease to perform the filter test in rural care centers.

### References

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