Aminoacidopathies: A Review of 3 Years Experience of Investigations in a Kuwait Hospital

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Summary: We present a summary of the results of quantitative amino acid analysis in 800 subjects over a three-year period in Al-Sabah Hospital, Kuwait. Thirty-five patients with aminoacidopathy were identified, all but two of whom were the offspring of first-degree consanguineous marriages: nine cases of phenylketonuria, one benign hyperphenylalaninaemia, seven non-ketotic hyperglycinaemia, five tyrosinaemia, five homocystinuria, four citrullinaemia, two cystinuria, one hyperprolinaemia, and one maple syrup urine disease. The clinical and biochemical findings in these cases are described.

Kuwait is a small country with a population of 1.6 million, situated at the head of the Arabian Gulf. The population is multinational and multiracial, with Kuwaitis making up less than 50% of the total population. Other Arab nationals constitute the majority of the expatriate population, while there are also large communities from the Indian subcontinent and the Far East. The rate of consanguineous marriages among the Kuwaiti population has been reported as 54.3%, with 30.2% first cousin marriages (Al-Awadi et al., 1985).

Until 1983, the investigations of symptomatic patients for inherited metabolic disorders (IMD) in Kuwait's hospitals consisted mainly of a number of simple chemical urine tests, and thin-layer chromatographic analysis of blood and urine specimens. Latterly, the investigation of such disorders in Al-Sabah Hospital has been carried out by quantitative amino acid analysis. Al-Sabah Hospital is one of six regional hospitals in the country.

In this paper, we describe our experience with quantitative amino acid analysis for the investigation of inherited metabolic disorders and the results obtained during the past three years. To the best of our knowledge, this is the first such report from an Arab country.

MATERIALS AND METHODS

Subjects

From January 1984 to January 1987, a total of 800 patients were investigated by quantitative amino acid analysis. The referring units for these analyses included
Paediatrics, Genetics, Neonatology, Ophthalmology, Neurology and the Institute for the Mentally Retarded. Of these patients, neonates constituted 13%, infants (<1 year of age) 26%, older children 43%, and adults (>12 years of age) 18%. Almost one quarter of the patients were acutely ill. Patients presented with one or more of the following symptoms:

- Mental retardation
- Convulsions, infantile spasm, abnormal movement
- Failure to thrive, delayed milestones
- Vomiting, sepsicaemia, acidosis
- Hypotonia, ‘floppy child’
- Lethargy, drowsiness, coma
- Hepatomegaly, splenomegaly
- Ectopia lentis, congenital cataract
- Recurrent renal stones

Neonates and infants with a family history of unexplained neonatal death or with a known aminoacidopathy in a sibling were also investigated. Adult patients were mainly investigated because of mental retardation or as part of a family study when affected children had been detected.

**Specimens**

Most of the specimens analysed were heparinized blood plasma. Where indicated on clinical grounds, amino acid analysis was performed on 24-hour urine collections.

**Analytical techniques**

For the analysis of amino acids in plasma and urine, we used stepwise elution by 3 lithium carbonate buffers through a column prepacked with spherical cation exchange resin. This analysis was performed during the first two years of this study using a Beckman 119CL system, and, in the last year, using a Beckman System 6300 analyser. Standard methods were used throughout (Beckman Instruments Inc., Palo Alto, CA).

**RESULTS AND DISCUSSION**

Out of the 800 subjects investigated, 35 aminoacidopathies were identified (Table 1). Thirty-three of these patients were found to be the offspring of first-degree consanguineous marriages. The clinical and biochemical features of these cases are as follows.

**Phenylketonuria (PKU, McKusick 26160)**

Nine patients with phenylketonuria were identified, seven of whom presented with mental retardation. Only one of these was the product of a non-consanguineous marriage. Table 2 shows the main features of these cases. Thus the amino acid disorder which is most commonly reported in the literature was also the most