Developmental follow-up of 90 adolescents and adult PKU patients: results and challenges of a multidisciplinary aproach

Carmona C*, Almeida MF**, Rocha JC**, Soares G, ***Fortuna AM***
*Clinical Psychologist **Nutritionist *** Medical Geneticist
Centro de Genética Médica Jacinto de Magalhães (CGM). Porto. Portugal.

INTRODUCTION - Severe neurological disability caused by untreated Phenylketonuria (PKU) can largely be prevented by an early and adequately dietary treatment introduction. Neurocognitive functioning have been studied in patients with PKU. A slight intellectual quotient (IQ) decrease together with impairments in specific cognition aspects, including executive function deficits, may persist in well treated patients.

At CGM, we follow-up 161 patients (78 females and 83 males) aged 0.4 - 47.04 years in a multidisciplinary approach (Nutrition, Metabolism and Psychology): 138 cases from newborn screening and 23 with late diagnosis.

The main objective of this study was to characterize our adolescent and adult PKU patients and to understand the way they adapt to this chronic condition at different ages and in different contexts of life.

METHODOLOGY - We studied 90 patients from newborn screening aged 12 – 31.07 years. Six were excluded in statistic data analysis because they have other diseases associated. We considered the quality of dietetic control (QDC), defined as the annual medians of Phe, as independent variables. The treatment outcome was evaluated considering IQ as a global value, the subtest profile in IQ tests. We used the Wechsler Scales (WISC-III and WAIS-III), school questionaires and the National Classification of Professions.

The Statistical Package for Social Sciences (SPSS 15.0 for Windows) was used for data analysis.

We observed the influence of Phe levels on the DQ/IQ in almost all age groups: significant negative correlations between global DQ/IQ values and the annual median of Phe were found till the age of 20 years. At CGM We considered the following classification (Table 1 and 2).

Table 1. Classification of QDC till 17 years

Annual medians of Phe (mg/dl)	Quality of dietetic control (QDC)
≤ 6 mg/dl	good
> 6 mg/dl	bad

Table 2. Classification of QDC after 18 years

Annual medians of Phe (mg/dl)	Quality of dietetic control (QDC)
≤ 8mg/dl	good
> 8 mg/dl	bad

RESULTS AND DISCUSSION

♦ We analysed the last WISC-III results in 33 PKU adolescents with ages between 13 and 17 years. (13 ♀ and 20 ♂).

The mean of global, verbal and performance IQ were below the mean of healthy population norm (100 ± 15), being respectively 92.68 ± 19.62, 95.35 ± 22.23 and 92.71± 16.78.

Taking into account the QDC we considered 2 groups: last median of Phe values ≤ 6 mg/dl (group I) and last median of Phe values > 6mg/dl (group II). We found significant differences between the two groups in Global, Verbal and Performance IQ (Figure 1).

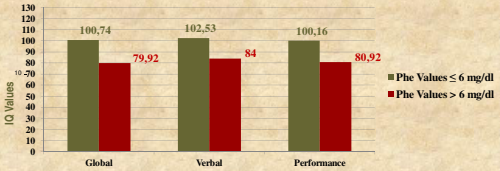

Figure 1. Mean WISC – III Global, Verbal and Performance IQ

♦ We analyse the WISC-III subtest profile. The results showed differences between the two groups in almost subtests (Figure 2). In the group II the scaled scores were significantly bellow the mean in the "Arithmetic", "Comprehension", "Picture completation", "Picture arrangement", and "Block design" subtests.

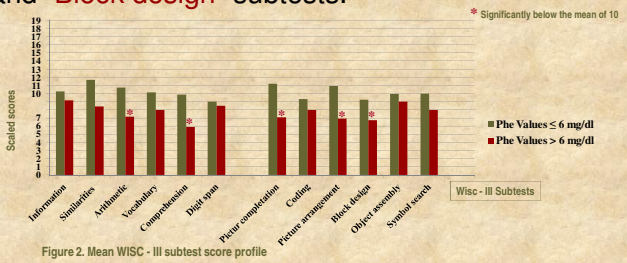

Figure 2. Mean WISC - III subtest score profile

♦ We analysed the last WAIS-III results in 54 PKU adults with ages between 18 and 31.07 years (32 ♀ and 22 ♂).

The mean of global, verbal and performance IQ were also below the mean of healthy population norm, being respectively 88.47 ± 16.61, 90.19 ± 16.30 and 98.68± 15.58.

Taking into account the QDC we considered 2 groups: last median of Phe values ≤ 8 mg/dl (group I) and last median of Phe values > 8 mg/dl (group II). We also found differences between the two groups in Global. Verbal and Performance IQ (Figure 3).

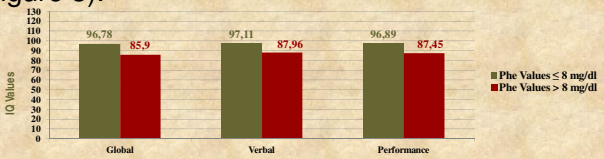

Figure 3. Mean WIAIS – III Global, Verbal and Performance IQ

♦ We analyse the WAIS-III subtest profile. The results showed also differences between the two groups in almost subtests (Figure 4).

Figure 4. Mean WIAIS – III subtest score profile

Patient's global IQ levels were found below the normal range and a specific profile of neurocognitive difficulties was found. These difficulties were negative and significantly correlated with the QDC and did influence their school progress, professional success and treatment adherence.

CONCLUSION - The results showed a specific neurocognitive profile and psychosocial behaviour difficulties beyond the age of twelve in the bad QDC groups suggesting the need of a special multidisciplinary supervision throughout life.

carla.carmona@ insa.min-saude.pt