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Neonatal abstinence syndrome worsens school performance in childhood

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English key words: neonatal abstinence syndrome, underachievement.
Palabras clave en español: síndrome de abstinencia neonatal, rendimiento escolar bajo.

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Neonatal abstinence syndrome worsens school performance in childhood

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Abstract

Authors' conclusions: the diagnosis of neonatal abstinence syndrome is strongly associated with poor school performance.

Reviewers' commentary: even with the differences between the Australian and Spanish educational systems, the results of the study would probably be applicable to our environment, since they could reflect the isolated effect of neonatal abstinence syndrome on school failure. This would justify that these children in their school stage would be especially identified and screened for low school performance for their inclusion in a support program whose cost-benefit should be evaluated in prospective studies**.**

Key words: neonatal abstinence syndrome, underachievement.

Resumen

Conclusiones de los autores del estudio: el diagnóstico neonatal de síndrome de abstinencia se asocia fuertemente con un peor rendimiento escolar.

Comentario de los revisores: aun con las diferencias de los sistemas educativos australiano y español, los resultados del estudio probablemente serían aplicables a nuestro medio, ya que podrían reflejar el efecto aislado del síndrome de abstinencia neonatal sobre el fracaso escolar. Esto justificaría que a estos niños en su etapa escolar se les prestara una especial atención para cribado de bajo rendimiento escolar, para su inclusión en un programa de apoyo, cuyo coste/beneficio debería ser evaluado en estudios prospectivos.

Palabras clave en español: síndrome de abstinencia neonatal, rendimiento escolar bajo.

STRUCTURED ABSTRACT

Objective: to assess the impact of neonatal abstinence syndrome (NAS) on school performance.

Design: retrospective cohort study.

Setting: population (New South Wales, Australia).

Study population: children born between July 1, 2000 and December 31, 2006 (605 094 children). The authors linked the data of four population databases: a perinatal database that included information on discharge diagnoses, another with demographic data, a third one with mortality data, and a fourth one with school testing results. Still births, infants born at less than 23 or more than 44 weeks' gestation or with unknown gestational age (GA) and children that died before the first school test were excluded.

Risk factor assessment: children discharged from hospital with a diagnosis of NAS (code P96.1 in the Australian Modification of the International Classification of Diseases) (n = 2234). These children were compared with two groups: a matched cohort (MC) matched 2:1 for sex, GA, birth year and socioeconomic status (n = 4330) and the general population cohort (GC) (n = 598 265).

Outcome measurement: a test was administered within the framework of the national education programme (score, 0-1000) at grades 3, 5, 7 and 9 (ages 8-9, 10-11, 12-13 and

14-15). There is an established National Minimum Standard (NMS), and children that score below it cannot progress to the next grade and require additional support. The authors used ANOVA to performed pair-wise comparisons of the scores. Logistic regression analysis was performed, including potential confounding variables in the model: sex, prematurity, indigenous status, school remoteness and parental educational attainment.

Main results: linkage between the perinatal database and school test results was achieved in 468 239 out of the 604 829 children (77.4%), and this percentage was significantly lower in children with NAS (1668 out of 2234 [75.6%]; $P = .003$).

Nearly half of the parents of children with NAS had an education level below grade 9 (44% compared to 18.4% in the MC and 17.1% in the GC; $P < .001$). Most of these children attended public schools (88.3% compared to 71% in the MC and 68.1% in the GC).

Children with NAS scored significantly lower in school tests. At age 12-13 years, 37.7% did not achieve the NMS (compared to 18.4% of the MC [odds ratio (OR), 2.1; 95% confidence interval (95 CI), 1.7 to 2.4] and 14.5% of the GC [OR, 3.6; 95 CI, 2.9 to 4.3]). This difference progressed from grade 3 to grade 7. The risk of not meeting the NMS was also independently associated with NAS (adjusted odds ratio [aOR]: 2.5; 95 CI, 2.2 to 2.7).

In children with NAS, the risk factors to fail to meet the NMS were indigenous status (aOR, 1.7; 95 CI, 1.4 to 2.1), male sex (aOR, 1.3; 95 CI, 1.2 to 1.6) and low parental educational attainment (aOR, 1.3; 95 CI, 1.1 to 1.6). These factors and prematurity also increased the risk of failing to achieve NMS in the GC.

Conclusion: the neonatal diagnosis of NAS was strongly associated with poorer school performance. Parental educational attainment can attenuate this effect.

Conflicts of interest: none disclosed.

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COMMENTARY

Justification: neonatal abstinence syndrome is a major health problem. In Spain, the mean incidence of NAS is of 7.5 children born to substance-using mothers per 1000 live births (1992-2001), of whom 79% experience NAS.[1] It has been reported that these children are at higher risk of developing health, psychological, psychiatric and social integration problems in the long term.[2] It is unclear whether the cause is the increased intrauterine drug exposure or the unfavourable socioeconomic environment. The study that we review here assessed the risk of school failure in patients with NAS independent from other risk factors, which is what makes it relevant.

Scientific rigour or validity: this was a well-done retrospective cohort study. There was a clearly defined population of interest and two comparison cohorts, one matched by confounding variables and another selected from the general population, both of which seemed to be representative. There was a clear definition of exposure (NAS) and effect (school failure), with a temporal association between them. The analysis was correct, controlling for potential confounders and effect modification. The exclusion of asymptomatic NAS patients and the percentage of losses to followup, which were significantly greater in the NAS group, could be a source of bias that would have inflated the effect size. Although the matching of cohorts based on variables associated with the effect under study may have reduced the efficiency, the authors accounted for their choice to not use techniques frequently used for pre-processing data for causal inference in observational studies, such as propensity score matching, because the data generation process was not uniform and this could have led to an imbalanced and biased model.

Clinical relevance: on average, having NAS at birth was associated independently with a 2.5 times greater risk of school failure (aOR, 2.5; 95 CI, 2.2 to 2.7). This means that on average, one out of every children with NAS will have school failure attributable to NAS (number needed to be exposed).[3] These data show a significant effect size with adequate precision and are clinically relevant, as school failure has been associated with poorer long-term psychosocial outcomes.[4] We did not find any similar studies with which to compare the results or to be able to assess the costs and benefits of potential school-based programmes for individualised support in these patients.

Applicability to clinical practice: despite the differences between the Australian and Spanish education systems, the results of this study can probably be generalised to Spain, as they may reflect the independent effect of NAS on school failure. This would warrant a more careful followup of these children during the school years, screening for poor academic performance for the purpose of inclusion in support programmes whose costs and benefits could be evaluated in prospective studies.

Conflicts of interest: the authors of the commentary have no conflicts of interest to declare.

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