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Effect of the anti-tobacco legislation on the rates of prematurity and low birth weight

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English key words: prematurity; smoke-free legislation; low birth weight.
Spanish key words: prematuridad; legislación antitabaco; bajo peso al nacer.

Reception date: November 20, 2017 • **Acceptance date:** November 23, 2017
Publication date: November 29, 2017

Evid Pediatr. 2017;13:57.

HOW TO CITE THIS ARTICLE

Rivero Martín MJ, Aparicio Rodrigo M. Effect of the anti-tobacco legislation on the rates of prematurity and low birth weight. Evid Pediatr. 2017;13:57.

This article is available at http://www.evidenciasenpediatria.es/EnlaceArticulo?ref=2017;13:57
 • ISSN: 1885-7388

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Original article:: Simón L, Pastor-Barriuso R, Boldo E, Fernández-Cuenca R, Ortiz C, Linares C, et al. Smoke-Free Legislation in Spain and Prematurity. Pediatrics. 2017;139. e20162068.

Abstract

Authors' conclusions: the implementation of the Spanish smoke-free policies was associated with a risk reduction for preterm births and low birth weight infants. This association strengthens the application of a smoke-free legislation in the prevention of pregnancy complications.

Reviewers' commentary: it cannot be established a causal relationship between the implementation of the anti-smoking legislation and the decrease of prematurity. However, given the harmful effects of smoking on fetal development and health of the newborn, development of comprehensive smoke-free legislation to minimize fetal exposure to this environmental risk factor is supported.

Key words: prematurity; smoke-free legislation; low birth weight.

Efecto de las leyes antitabaco sobre la tasa de prematuridad y bajo peso al nacimiento

Resumen

Conclusiones de los autores del estudio: la implementación de las leyes antitabaco en España se asoció con una reducción del riesgo de nacimientos prematuros y con bajo peso. Esta asociación refuerza la aplicación de la legislación libre de humo en la prevención de complicaciones del embarazo.

Comentario de los revisores: no se puede establecer una relación causal entre la aplicación de la ley antitabaco y la disminución de prematuridad. Sin embargo, dados los efectos nocivos que el tabaco tiene sobre el desarrollo fetal y la salud del recién nacido, se apoya el desarrollo de leyes integrales antitabaco para minimizar la exposición fetal a este factor de riesgo ambiental.

Palabras clave: prematuridad; legislación antitabaco; bajo peso al nacer.

STRUCTURED ABSTRACT

Objective: to assess whether the two anti-tobacco laws enacted in Spain in 2006 and 2011 to reduce exposure to second-hand smoke were associated with a reduction in the frequency of preterm (PT) birth, low birth weight (LBW) and small for gestational age (SGA).

Design: cross-sectional population-based study. Data obtained from the national birth register of Spain through the Instituto Nacional de Estadística.

Setting: Spain.

Population under study: 5 293 700 infants born alive at gestational ages between 22 and 44 weeks in Spain in the period ranging from January 2000 to December 2013.

Intervention: in January 2006 the first anti-tobacco law took effect, which banned smoking in workplaces except in the hospitality sector. In January 2011, an amendment of this law extended the prohibition to hospitality settings. The authors established three periods of study: pre-legislation (2000-2005), partial prohibition (2006-2010) and total prohibition (2011-2013).

Outcome measurement: primary variable: proportion of PT births (before 37 weeks' gestation), LBW infants (< 2500 g) and SGA infants (birth weight below the 10th percentile).

Secondary variables: maternal age, socioeconomic status, place of birth, singleton or multiple birth, and place of residence.

Main results: of all infants born in the 2000-2013 period, 7.9% were born PT, 9.2% were SGA and 7.8% had a LBW. There was no information on the prevalence of smoking during pregnancy.

Based on raw proportions, the linear trend of preterm births was increasing and peaked between 2007 and 2009, descending moderately thereon. The low birth weight trend was on an increase in the pre-legislation and partial prohibition periods, and plateaued in the last 4 years under study. The proportion of SGA newborns remained more or less stable through time.

The percentages of the changes in proportions, calculated immediately and a year after the enactment of the partial and total bans, were:

- Period of partial prohibition:
  - PT newborns: 4.6% increase (confidence interval [CI]: 2.9 to 6.2), sustained at 5.5% a year later (CI: 5.8 to 7.4).
  - LBW newborns: 0.6% increase (CI: -1 to 2.1), rising to 1.2% 1 year later (CI: -0.4 to 3).
  - SGA newborns: 4.9% reduction (CI: -6.2 to -3.5), maintained the year after (-4.2%).
- Period of total prohibition:
  - PT newborns: 4.5% reduction (IC: -6.1 to -2.9) relative to the partial prohibition period, maintained a year later (-4.1%).
  - LBW newborns: 2.3% reduction (CI: -3.8 to -0.7), with a 3.5% decline 1 year later (CI: -5 to -2.1).
  - SGA newborns: 0.7% increase (CI: -0.8 to 2.2) and a 1.7% reduction the following year (-3.1 to -0.3).

Conclusion: in Spain, there has been a reduction in the risk of preterm births and low-birth-weight newborns coinciding with the enactment of anti-tobacco legislation, and especially with the total ban to smoking in work settings and indoor public spaces.

Conflicts of interest: none.

Funding source: FIS PI11/01276 grant of the Instituto de Salud Carlos III.

COMMENTARY

Justification: exposure to second-hand smoke during pregnancy is associated with health complications in newborns, especially preterm birth, low birth weight, small for gestational age and sudden infant death.[1] There is no evidence of the actual impact of legislation that pursues smoke-free spaces on birth weights or the rate of preterm birth.

Validity or scientific rigour: the authors conducted a cross-sectional study with a clear definition of its target population and endpoints. Since the study included every child born in Spain during the period under study, there was no selection bias and therefore the study population is representative. However, these results cannot be extrapolated to other countries with different health frameworks. The independent variables did not include exposure to second-hand smoke in the home and, although the authors used data on tobacco use in pregnant women, they obtained them from the register of the Spanish collaborative group for the study of congenital malformations and did not collect them specifically for this study. The preterm birth variable was not stratified by gestational age, so the study did not provide data on potential changes in the incidence of extremely preterm or late preterm births. Due to its cross-sectional design, the study could not establish causality, so further studies are required with a suitable design to assess this type of relationship.

Clinical relevance: the study analysed clinical conditions with a high prevalence and a high rate of comorbidities, such as preterm birth, low birth weight and small for gestational age. In Spain, the prevalence of exposure to second-hand smoke during foetal life is high, and it is estimated that 1 out of 2 pregnant women were exposed during the third trimester in the 2004-2008 period, and 1 out of 5 women smoked during pregnancy in 2013.[2]

The year that the partial anti-tobacco legislation was introduced was probably too early to detect any changes, and there was a 4.6% increase in the rate of PT birth, a 0.6% increase in the proportion of LBW newborns, and a 4.9% reduction in the proportion of SGA infants, while in the year that followed total prohibition, there were reductions of 4.1% (PT birth), 3.5% (LBW) and 1.7% (SGA).

The results of this study are consistent with those of a systematic review published in 2014 that found that the risk of preterm birth fell by 10% as a consequence of introducing legislative measures to control tobacco in regions of North America and Europe,[3] supporting the introduction of these measures worldwide. However, the Cochrane review published in 2016[4] concluded that the evidence on the effects of anti-tobacco legislation and its impact on perinatal health

outcomes is not consistent, although there has been a decrease in the number of pregnant women who smoke. Since tobacco use in mothers was not documented in the study reviewed here, it was not possible to establish the effect of the legislation on the number of pregnant women who smoked.

Applicability to clinical practice: the harmful effects of tobacco smoke on the health of the foetus and newborn have been clearly documented and support the development of comprehensive anti-tobacco legislation to minimise foetal exposure to this environmental risk factor.

Still, anti-tobacco laws have an impact by reducing the number of smokers in public spaces, but not in private ones. The data of this study support and justify a more active role of paediatricians, family physicians and gynaecologists in advising against tobacco exposure (active smoking or second-hand smoke in private social environments) during gestation.

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

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