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## Maternal age as risk factor of prematurity in Spain; Mediterranean area

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### Abstract

**Background:** Maternal age is a preponderant variable in the epidemiological analysis of the premature birth. Studies show that in the extreme ages of the maternal life there is a risk of premature birth that generates a high rate of neonatal morbidity.

**Objetives:** Determine the effect on the extreme ages of women residents in the province of Alicante on the total of the premature births.

**Method:** An explanatory, retrospective case-control study was conducted during the period from January 1<sup>st</sup>, 2008 to December 31<sup>st</sup>, 2011. The study was based on the revision of the newborn registers from the Neonatal Screening Center of the province of Alicante. All the preterm were included, this means between 22 & 36 complete weeks of pregnancy (5,295 out of 78,391 newborn which represents 6.75% of prematurity), and a random sample of the deliveries with 37 weeks or more of pregnancy (control group). The age of the mother was studied as independent variable and the prematurity as dependent variable.

**Results:** Clearly shows an increased risk of prematurity among teenage mothers compared to the age group nearest to them, which is confirmed by a squared Chi test which gives a significantly different distribution ( $p < 0,0001$ ) and an OD for very preterm of 2,41 (1,51-3,24) and of preterm of 1,71 (1,32-2,19). This probability is also higher among mothers over 40 years old with an OD of 1,86 (1,39-2,48) and 1,66 (1,44-1,91) for very preterm newborns and preterm newborns respectively.

**Discussion:** The results clearly manifest that teenagers and older pregnant mothers are at higher prematurity and low birth weight risk, therefore imposes the need to trace educational interventions to minimize this problem from the results in this research.

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Key words: Risk. Prematurity. Adolescent mother. Elderly mother. Gestational age. Low weight.

### EDAD MATERNA COMO FACTOR DE RIESGO DE PREMATURIDAD EN ESPAÑA; ÁREA MEDITERRÁNEA

#### Resumen

**Antecedentes:** La edad materna es una variable preponderante en el análisis epidemiológico del nacimiento prematuro. Los estudios muestran que en las edades extremas de la vida materna hay un riesgo de nacimiento prematuro que genera una tasa elevada de morbilidad neonatal.

**Objetivos:** Determinar el efecto de las edades extremas de mujeres residentes en la provincia de Alicante sobre el total de nacimientos prematuros.

**Método:** Se realizó un estudio explicativo, retrospectivo de casos-control durante el periodo de 1 de enero de 2008 a 31 de diciembre de 2011. El estudio se basó en la revisión de los registros de recién nacidos del Centro de Cribado Neonatal de la provincia de Alicante. Se incluyeron todos los recién nacidos pretérmino, es decir, entre las semanas 22 y 36 de gestación (5.295 de 78.391 recién nacidos, lo que representa un 6,75% de prematuridad), y una muestra aleatoria de los nacimientos con más de 37 semanas de gestación (grupo control). Se estudió la edad materna como variable independiente y la prematuridad como variable dependiente.

**Resultados:** El estudio muestra claramente un mayor riesgo de prematuridad entre las madres adolescentes en comparación con el siguiente grupo más cercano en edad, lo que se confirmó por una distribución significativamente distinta con el test Chi cuadrado ( $p < 0,0001$ ) con una OD para los grandes prematuros de 2,41 (1,51-3,24) y de 1,71 (1,32-2,19) para los prematuros. Esta probabilidad también fue mayor en madres con edades de más de 40 años con una OD de 1,86 (1,39-2,48) y de 1,66 (1,44-1,91) para recién nacidos grandes prematuros y prematuros, respectivamente.

**Discusión:** Los resultados muestran claramente que las madres adolescentes y las más mayores tienen mayor riesgo de hijos prematuros o con bajo peso al nacimiento, lo que motiva la necesidad de establecer intervenciones educacionales para disminuir el problema, a partir de los resultados de esta investigación.

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Palabras clave: Riesgo. Prematuridad. Madre adolescente. Madre mayor. Edad gestacional. Peso bajo.

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## Introduction

The short and long term costs for neonatal care and health disorders that newborns have, represents a significant burden for the families and society. All this justifies the importance of the realization of research studies to identify the risk factors in premature births.<sup>1</sup>

There is some consensus in international literature on the etiological role of some risk factors for preterm birth, being able to find depth reviews on the subject. Among these included those related to the status of the mother and partner, the personal characteristics and the age of the mother among others.<sup>2,3,4</sup>

Apropos of maternal age is important to note that pregnant women in extreme age of reproductive life (under 20 years or over 35 years) show an increased risk of preterm birth. This aspect has been the subject of concern by the scientific community, not only for its high frequency in recent years, but for the damage that are specific to each age and the undeniable impact that pregnancy have for the family and society.<sup>5,6</sup>

Maternal age is a preponderant variable in the epidemiological analysis of the preterm birth. Studies show that in extreme ages of maternal life exists risk of preterm birth, defined as occurring before 37 weeks of pregnancy, according to World Health Organization (WHO), generating a high newborn morbidity and mortality rate.<sup>7,8</sup>

Is clear and well evidenced by the literature, that newborn mortality increases as the gestational age decreases, in addition the incidence of preterm newborns varies from one community to another and depends largely on factors such as (low socioeconomic status, poor maternal nutrition, teenage mother, advanced maternal age, poor prenatal control, poor care in childbirth, etc.).<sup>9,10</sup>

In Latin America, premature birth has been extensively studied, with a high global incidence, with emphasis on countries with lower development level and with poor health systems. Is interesting that this phenomenon includes both teenager women and older women, this last representing a significant increase, similar to developed countries.<sup>11</sup>

In Spain according to the available data at the National Institute of Statistics (INE) of the last 6 years the rate of global prematurity varied between 2006 and 2008 from 6.84% to 8%, which should be added the under-registration produced by our legislation. There are differences among Autonomous Communities and between the different hospitals that exceed some 10% of total childbirths.<sup>12</sup>

Several authors, report an approximate rate of 5.9% of preterm births for Spain, for France 7.2% and an estimated of 11% for USA corresponding for this last country only, about 440,000 premature births per year.

These high values of preterm births either the 5.9% or 7.1% justify the importance of studying, given that

conditions are occurring in our country and specifically in the province of Alicante, so that results are presented on the rise.

The previous assessments allow us to raise the scientific question.

Contribute the extreme ages in Spanish women residents in the province of Alicante in the total of premature births?

## Objective

Determine the effect of extreme ages of women residents in the province of Alicante on the total of premature births.

## Methodological design

A study of explanatory type, retrospective case-control during the period between January 1<sup>st</sup> of 2008 and December 31<sup>st</sup> of 2011. The study was based on the revision of the newborn registers from The Neonatal Screening Center of the province of Alicante of the General Hospital of The University of Alicante.

All the preterm were included, this means between 22 & 36 complete weeks of pregnancy, and the deliveries with 37 weeks or more of pregnancy (control group).

For the control group was established as a random sampling and correctly diversify the total sample of the four years, collecting the same data from the first 25 newborns each month, received in The Neonatal Screening Center of Alicante during the same period of time. All the data had been anonymised with no possible filiation and exclusively treated with statistic purposes.

The independent and explanatory variable in this study is at the age of women, which was stratified in three mayor groups: teenage with the age of the mother  $\leq 19$  years old, normal age from 20 to 35 years old and mother with age  $> 35$  years old.

As dependent variable, prematurity was analyzed, classifying the children according to gestational age in very premature newborns (RNMP)  $\leq 32$  weeks, premature newborns (RNPT) those between 32 and 37 weeks gestation and term infants (RNT) those  $> 37$  weeks. And according to birth weight in the following groups: very low weight newborns (RNMBPN)  $< 1,500$  grams, low weight newborns (RNBPN)  $< 2,500$  grams and normal weight newborns (RNNPN)  $\geq 2,500$  grams.

Distributions were analyzed using the Chi-square test; odds ratio and prevalence calculations have been performed through the program for epidemiological analysis of tabulated data of the Council of Galicia, Epidat version 3.1 considering a significance level for  $p < 0.05$ .

**Table I**  
Rate of maternal age in the three groups according to gestational age

Group	Rates maternal age (years)						
	5	10	25	50	75	90	95
RNMPT	20,0	23,0	28,0	32,0	36,0	39,0	41,0
RNPT	21,0	24,0	28,0	32,0	35,0	38,0	40,0
RNT	21,5	24,0	28,0	32,0	35,0	38,0	39,0

**Table II**  
Number and rates of newborns in each gestational age group between mothers aged < 19 years and 19-24 years & odds ratio (ci 95%)

	Mothers < 19 years	Mothers 19-24 years	Odds ratio (CI 95%)
RNMPT	23 (2,7%)	86 (1,2%)	2,41 (1,51-3,84)
RNPT	84 (9,8%)	442 (6,1%)	1,71 (1,33-2,19)
RNT	11 (748*) (87,5%)	99 (6,732*) (92,7%)	–

\*% calculated from control group and from the total sample.

## Results

Total births in the province of Alicante, during the analyzed period 2008-2011, has been 78,391, which have been preterm according to the established criteria, a total of 5,295 (6.75%) with a 1.04% of RNMPT and 5.72% of RNPT (table I).

The pairs of rates 5 & 95, and 10 & 90 is extended to mother's age lower and higher in the preterm groups, indicating a greater percentage of mother with lower and upper ages in preterm groups than the control group.

Therefore, we have studied the risk of prematurity and low weight linked to extreme ages.

a) *Teen pregnancy*: This distribution is significant different ( $p < 0.002$ ), and in there is an increased risk of very low weight newborn of adolescent mothers, 2,68 (1,40-5,15), while OR is lower and very close to 1 for the low weight newborn in this group of mothers.

b) *Older mothers*: The risk for preterm is greater in the group of mothers over 40 years than in the group immediately below, with an OD of 1,86 (1,39-2,48) for very preterm and 1,66 (1,44-1,91) for preterm.

The probability of having a very low weight premature child is higher in women over 34 years old. OR (adjusted), 3,56 (2,50-5,08), reversing for the low weight risk to 0,70 (0,57-0,86).

## Discussion

Table II presents the relation of low weight newborns numbers and rates in each group of gestational age between mothers < 19 years old and 19-24 years old and OR. Shows that the increased risk of prematurity is among teenage mothers compared to the age group closest to the same, which is confirmed with a Chi-

squared test that gives a significant different distribution ( $p < 0,001$ ) and a OR higher than 1 for the mothers younger than 19 years old, with higher RNMPT and RNPT risk.

The results of this research agree with those reported by other authors who have explored the impact of teen pregnancy on preterm delivery. When comparing these figures with data coming from adult women, it appears that the adolescents are more likely to have a preterm birth and in the same way the incidence of medical complications involving to the mother and her child are increased. Recent data indicates that these risks are especially relevant for the younger adolescents. Teenagers have a 75% greater risk of premature delivery than adult women. Was found that the incidence of low birth weight (< 2,500 grams) is more than double in adolescents compared to adult women and neonatal mortality (0-28 days) is almost 3 times greater.<sup>15</sup>

Other studies have observed an increase in premature births, which in turn are the ones that contribute the most to neonatal deaths. Despite the magnitude of the problem, is not completely clear if these results depends on biological factors or are only the consequence of sociodemographic factors associated to pregnancy in the adolescence.

Table III shows low birth weight numbers and rates between mothers aged < 19 years and 19-24 years. From the point of view of the newborn the findings in this research demonstrate how the low birth weight and small newborns for the gestational age is greater for the group of adolescents, noticing by close to 24 years old, the behavior of adolescent is similar to adult women.

Our findings regarding prematurity are similar to those reported by American authors reporting data coming from 134.088 women aged between 13 and 24 years old in the state of Utah (United States), where it was found that the incidence of low birth weight in

**Table III**  
Newborns numbers and rates in each group of gestational age among mothers between 35 and 40 and > 40

	Mothers 35-40 years	Mothers > 40 years old	Odds ratio (CI 95%)
RNMPT	228 (1,2%)	58 (2,0%)	1,86 (1,39-2,48)
RNPT	1179 (6,0%)	268 (9,4%)	1,66 (1,44-1,91)
RNT	270 (18359*) (92,9%)	37 (2516*) (88,5%)	–

\*% calculated from control group and from the total sample.

**Table IV**  
Low weight newborn numbers and rates among mothers between 35 and 40 years and > 40 years

	Mothers 35-40 years	Mothers > 40 years old	Odds ratio (CI 95%)
RNMBPN	144 (0,7%)	40 (2,6%)	3,56 (2,50-5,08)
RNBPN	1877 (9,5%)	102 (6,7%)	0,70 (0,57-0,86)
RNNPN	17,723 (89,8%)	1,381 (90,7%)	–

adolescents aged 17 and less, almost duplicated to the observed among women aged between 20 and 24 years.<sup>16</sup>

We found a much higher incidence of newborns with very low birth weight in adolescent mothers. While OR is very lower and very close to 1 for newborns with low birth weight in this group of mothers. This result at the discretion of the authors indicates that early adolescents are at high risk of having small newborns for the gestational age in relation to women close to 24 years old.

Most of the studies and especially those made with a larger number of patients, found that as the younger the woman is more likely to have premature babies and/or low birth weight for the gestational age, with the consequences implied from the point of view of neonatal morbimortality.

In the opinion of the authors of this research, biological immaturity could be the explanation of these adverse results; this immaturity includes young gynecological age and getting pregnant before they complete their own growth. The immaturity of the internal genitalia may predispose to very young mothers to increased prostaglandin production with the consequent increase of premature births.

Table IV reflects preterm births numbers and rates and table 5 low birth weights between mothers aged 35 and 40 and > 40 years where it is found the probability of having a very preterm new born or very low birth weight in women older than 34 years old, OR (adjusted), 1,86 (1,39-2,48) & 3,56 (2,50-5,08) respectively. For preterm and low weight differences are equal.

Our research demonstrated that older pregnant women have an increased risk for premature births, as it exists in teenage pregnancy.

There is coincidence that one of the main factors affecting prematurity is the advanced age of mothers, result of current lifestyles along with unhealthy habits such as smoking, overweight and malnutrition and the

rapid succession of pregnancies and multiple pregnancies.<sup>17</sup>

Should be noted that according to the results showed for the project EUROPOP, in Spain, the rate of women having her first baby after 35 years old has increased in recent years.<sup>18</sup>

Ramirez de Castro cited by Hernandez Cabrera J and other researchers inform that maternal age has been recorded as risk factor for low birth weight mainly in the extreme ages of life. Results identified in this study agree with these criteria.

Foreign research that evaluate reproductive prognosis in women 40 or older, show the greater risk of maternal death, perinatal or low birth weight. Similarly suggest that women with a mean age older than 35 (older pregnant) are at increased risk of obstetric complications with increased maternal and fetal morbidity and mortality, as probable consequence of chronic disease and inadequate psychobiological habits.<sup>20</sup>

Opinion of the authors is that women aged above 34 years are worth a differentiated look, taking into account the current trend in the developed world is to postpone the moment of motherhood. At this age of life, women expect to have consolidated their project of life. Also expected to have achieved greater financial solvency and greater emotional stability and largely unknown is the impact that pregnancy brings to both the mother and newborn. Regarding teenage pregnancy is a fact still present in our environment, so we have to deepen education in sexual and reproductive health. In both segments of age the role of nursing in their specialties in midwifery and pediatric nursing deserve special consideration in their duties of prevention and control during pregnancy.

## Conclusions

Reviewed medical literature indicates that the risks of prematurity and very low birth weight are increased

when the woman is an adolescent or is more than 35 years old, what has been confirmed in this study, finding a high association with the extreme ages of the reproductive age of women.

The study reveals that pregnant adolescent and older mothers have a higher risk factor of prematurity and low birth weight, so there is a need to draw educational interventions to minimize this problem from the results presented in this research.

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