ORIGINAL ARTICLE

Evaluation of factors affecting birth weight and preterm birth in southern Turkey

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Abstract

Objective: To identify factors affecting birth weight and pre-term birth, and to find associations with electromagnetic devices such as television, computer and mobile phones.

Methods: The study was conducted in Turkey at Gazintep University, Faculty of Medicine's Outpatient Clinic at the Paediatric Ward. It comprised 500 patients who presented at the clinic from May to December 2009. All participants were administered a questionnaire regarding their pregnancy history. SPSS 13 was used for statistical analysis.

Results: In the study, 90 (19%) patients had pre-term birth , and 64 (12.9%) had low birth weight rate Birth weight was positively correlated with maternal age and baseline maternal weight (r= 0.115, p= 0.010; r= 0.168, p= 0.000, respectively). Pre-term birth and birth weight less than 2500g were more common in mothers with a history of disease during pregnancy (p=0.046 and p=0.008, respectively). The habit of watching television and using mobile phones and computer by mothers did not demonstrate any relationship with birth weight. Mothers who used mobile phones or computers during pregnancy had more deliveries before 37 weeks (p=0.018, p=0.034; respectively). Similarly, pregnancy duration was shorter in mothers who used either mobile phone or computers during pregnancy (p=0.005, p=0.048, respectively).

Conclusion: Mobile phones and computers may have an effect on pre-term birth.

Keywords: Birth weight, Electromagnetic waves. (JPMA 63: 459; 2013)

Introduction

Birth weight and birth-time are the most important factors affecting perinatal morbidity and mortality. Low birth weight (LBW) has been defined by the World Health Organization (WHO) as an infant weighing less than 2500g.[1] Pre-term birth is defined as the delivery of a baby before 37 completed weeks of gestation.[2] Pre-term birth rate is reported as 12.7-31.3%, and LBW rate is reported as 4-30% around the world.[1,3,4]

Birth weight and pre-term birth are also affected by various maternal, foetal and environmental factors. The mother's age, risk history associated with previous pregnancies, presence of medical risk factors in the pre-pregnancy period as well as in the pregnancy period, working conditions, psychological stress, consumption of tobacco, alcohol, caffeine, and medicine, air and water pollution, and ionised radiation exposure environmentally, among other factors, may lead to LBW births.[2,5,6]

The development of power stations, radio, radar, television (TV), computers, mobile phones, microwave ovens and numerous devices used in medicine and industry has given rise to exposure to low-frequency electromagnetic radiation (EMR). These technological advances have aroused concerns about the potential health risks associated with unprecedented levels of EMR exposure. There are reports on the increased risk of miscarriage, particularly in the early pregnancy term, due to exposure to EMR fields.[7,8] Therefore, the current study was planned to identify factors affecting birth weight/preterm birth, and to determine the effects of electromagnetic devices such as TV, computer and mobile phones.

Subjects and Methods

The study comprised 500 mothers who presented to the Outpatient Clinic at the Department of Paediatrics under the faculty of Medicine, Gaziantep University, Turkey, from May to December 2009. The sample size was calculated using a power calculation based on earlier studies.[1] The minimum sample size was determined to be 366 at 80% power level with an a-error of 5%.

The study was approved by the Hospital Ethics Committee. After informed consent, all the participants were asked to fill in a questionnaire consisting of 39 questions, which were prepared following reviews of various previously published literature on the issue, and their understandability was reviewed by a pilot study.[5,6]

The questionnaire consisted of three parts: The first part included questions on socio-demographic information; the second part included questions on the mother's

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weight, height, weight gained during pregnancy, consumption of tobacco and alcohol during pregnancy, disease history, observance of religious fasting during pregnancy (during the Muslim month of Ramadan, food and fluid ingestion is restricted from sunrise to sunset), consumption of tea, milk and yoghurt, and birth week and birth weight of the other children, if any. The final part included questions on the use of television, computer and mobile phones during pregnancy.

Data was analysed using SPSS 13.0. The frequency distribution was calculated. Continuous variables were expressed as mean ± standard deviation. The Chi-square test, independent samples t-test, and logistic regression analysis were used when appropriate. Statistical significance was considered at p<0.05.

Results

The average age of the mothers was 29.5±5.9 years (range: 17-47 years). The youngest child was 1 month old and the oldest was 12 years old (mean: 2.5±2.7 years). LBW rate was determined as 12.9% (64/500, CI 95%: 9.9,15.7) and pre-term birth rate as 19.1% (90/500, CI 95%: 14.6,21.4).

During the last pregnancy, all of the participants had watched TV every day; 343 (68%) per cent of the mothers had used mobile phones; and 99 (19.8%) of them had used computers. All the 3 devices were used by 99 (19.8%) mothers.

As the mother's age increased, the birth weight of the youngest child also increased (r= 0.498, p< 0.001; r= 0.115; p= 0.010, respectively). A positive correlation was identified between the pre-pregnancy weight of the mother and the infant birth weight (r= 0.168, p< 0.001). The same correlation was also present between the mother's height and the infant's birth weight (r= 0.118, p= 0.010). No relation was identified between the weight gained by the mother during pregnancy and the infant's birth weight (r= 0.044, p= 0.340). The participitants consumed 2.8±2.0 and 1.3±0.6 cups of tea and coffee, 109.7±58.0mL milk and 125.8±44.2g yoghurt per day during pregnancy. The amount of milk, yoghurt, tea and coffee consumed during pregnancy did not have any significant effect on the birth weight. Birth weight <2.500g was more common among housewives (housewife 59/399, 14.8% vs working mother 5/97, 5.2%; p <0.011). The mothers whose first child was delivered with a birth weight <2.500g were more likely to deliver their latest baby with a birth weight <2.500g (<2.500g = 11/28, 39.3%; >2,500g = 25/272, 9.2%; p <0.001). The mean number of cigarettes consumed each day was 5.6±5.6 (range: 1-20). Tobacco use during pregnancy did not affect the birth weight. The mothers who suffered from at least one disease like anaemia, hypertension, inflammatory disease, or gestational diabetes (n=286; 57.2%) during pregnancy had more deliveries under 2,500g (disease: 42/262, 16.0%; no disease: 17/213, 8.0%; p <0.008). Fasting during pregnancy did not affect the birth weight. The habit of watching television and using mobile phones and computers by mothers did not demonstrate any relationship with the birth weight.

The mothers who delivered infants before 37 weeks more frequently delivered their latest babies before 37 weeks as well (First baby <37 weeks [16/25], 64.0%; first baby =37 weeks [32/280], 11.4%; p <0.001). Mothers who had a chronic disease before pregnancy had more pre-term deliveries before 37 weeks (with disease 16/58, 27.6%; without disease 74/439, 16.9%; p <0.046).

There was no significant relationship between the time of watching television and birth-week. The mothers who used mobile phones or computers during pregnancy had more deliveries before 37 weeks (p= 0.018, p= 0.034; respectively, Table-1). Similarly, pregnancy duration was shorter in mothers who used either mobile phone or computers during pregnancy (p= 0.005, p= 0.048, respectively, Table-2). The duration of computer use did not affect the pregnancy duration. However, pregnancy duration of the mothers talking with cell phones more than 1 hour per day was for less than of mothers talking shorter than 1 hour (37.6±2.2

Table-1: Rates of delivery before 37 weeks, according to the participants' usage of mobile phone/computer during pregnancy.

		Delivery before 37 weeks (n/total), %	P-value	χ^2
Cell phone usage	User	71/340, 20.9%	<0.018	5.584
	Non-user	19/157, 12.1%		
Computer usage	User	25/98, 25.5%	<0.034	4.510
	Non-user	65/399, 16.3%		

Table-2: Average delivery weeks, according to the participants' usage of mobile phone/computer during pregnancy.

		Delivery week mean±SD (min-max)	P-value	95% CI
Cell phone usage	User	38.7±1.9 (28-41)	<0.005	0,143-0,779
	Non-user	39.2±1.6 (32-41)		
Computer usage	User	38.5±1.8 (34-41)	<0.048	0,004-0,795
	Non-user	38.9±1.8 (28-41)		

weeks vs. 38.8±1.8 weeks, p <0.001).

The logistic regression analysis with all factors that were found to have an effect on birth-week indicated that the most effective factors were the gestational age of the first baby (OR: 18.1, 95% CI: 6.9,47.7, p <0.001) and use of mobile phones (OR: 2.5, 95% CI: 1.1,5.7, p <0.035). However the type of phone and talking time were not determined.

Discussion

LBW rates are reported as 4-30% around the world.[1] In this study, the LBW rate was found to be 12.9%, which was in accordance with the WHO data, The pre-term birth rate in the study was 19.1% compared to the reported 9.9-31.3% in the literature.[3,4]

The mother's age was one of the most important factors affecting birth weight. Previous studies have also demonstrated that young maternal age is the most important risk factor in pre-term and LBW deliveries.[9-11]

Heavy physical activity and strenuous working conditions are risk factors in pre-term and LBW deliveries.[12,13] In women from different ethnic, socioeconomic and cultural environments, high levels of psychological and social stress increase the chances of pre-term birth.[12] Being a housewife may also be a stress factor, and when the mother cares for other children at home, she is engaged in heavy physical activity, and foetal growth may get affected and pre-term delivery may occur.[12] LBW deliveries were more common among housewives in the study.

The pre-pregnancy body mass index (BMI) of the mother is an important factor in determining the infant's birth weight.[14] In developing countries, low weight and height of mothers, indicating insufficient nutrition during development, as well as low weight-gain during pregnancy lead to intra-uterine growth restriction (IUGR).[15] According to a study, the babies of normal-weight mothers are born 208g heavier than the infants of underweight mothers.[16] Another study reported that mothers who were overweight before pregnancy, had their infants born with higher birth weights.[17] In the current study, a positive correlation was also determined between the mother's height and pre-pregnancy weight and the infant's birth weight.

In our study, 44 per cent of the mothers kept their fast during pregnancy, and the fasting did not have any effect on birth weight. A study reported that birth weight was higher by 100g in fasting mothers compared to the non-fasting mothers, but as the BMI of fasting mothers was higher, the difference may have resulted from the difference in BMI.[18] Another study demonstrated that fasting had no effects on birth weight, regardless of the trimester of pregnancy.[19]

The most important risk factor in pregnancy is former LBW history.[20] The present study also showed that mothers who had LBW or pre-term deliveries in their first pregnancy had a higher possibility of LBW and pre-term delivery in later infants. It has been reported that the risk of delivering an LBW infant was 11.5 fold higher for the second infants of mothers whose first infant had a birth weight <2,500g.[20]

EMR exposure leads to IUGR in addition to increasing the risk of miscarriage.[5,7,8] The study demonstrated that electromagnetic fields radiated by different sources (computer or mobile phones) led to an increase in pre-term births. Use of mobile phones was one of the most important factors affecting the birth-week, while watching television did not have such an effect. The birth-week was affected by the duration of mobile phone usage. Using computers and mobile phones in close contact may be an explanation. This may well be an independent risk factor. A relationship between pre-term birth and EMR exposure is not reported in literature. However, this was only a questionnaire-based study, and the mothers were only asked if they used such devices during their pregnancy. There is still need for a comprehensive study that may demonstrate the relationship between the exposure time and gestational age at birth by measuring and calculating EMR exposure of pregnant mothers.

The study had some limitations. The first is the fact that the pre-pregnancy weight of mothers, weight gained during pregnancy, infant birth weight and all other information was obtained directly from the mothers, instead of employing any set of data. Therefore, the failure of the mothers to accurately remember the details bring into play recall bias. Besides, it was not clear whether the birth-week indicated by the mothers was calculated according to the last menstrual period or to the clinical gestational age.

Conclusion

Birth weight and birth-time are affected by numerous variables. Results suggest that mobile phones and computers, which are commonly used in our daily lives, may have an effect on the birth-week.

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