Original Article

Prevalence of adverse outcomes of pregnancy in Sivas-Turkey and their associated factors: A population-based survey

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ABSTRACT

Background & Aim: Preterm birth (PTB) and low birth weight (LBW) which amongst common adverse pregnancy associated with newborn morbidity and mortality. Socio-demographic as well as maternal factors influence PTB and LBW. To date, data on factors contributing to adverse pregnancy outcomes in Sivas, Turkey are limited. This study aimed to estimate the prevalence of PTB and LBW in Sivas and their associated factors in women of childbearing ages.

Materials & Methods: The population-based survey involved 1273 women were conducted in Sivas center, Turkey, between September 2013 and May 2014. Odds ratios with 95% confidence intervals of LBW/PTB for a range of socio-demographic and maternal factors were estimated using multivariate logistic regression analysis.

Results: The overall prevalence of PTB and LBW were 16.3% and 17.7% respectively. Maternal low educational level (odds ratio, OR = 4.25 for PTB and OR = 4.93 for LBW) as well as being unemployed (OR = 2.08 only for PTB), being a smoker (OR = 1.37 for PTB and OR = 1.67 for LBW), being a multiparous women (OR = 2.59 for PTB and OR = 3.79 for LBW) and having a low income level (OR = 1.53 only for LBW) were the factors associated with the PTB/LBW.

Conclusion: The results suggest that the rates of PTB/LBW were common in Sivas. Low education and income levels, smoking, unemployment and multiparity are the risk factors for PTB/LBW and should be addressed to reduce PTB and LBW and improve health of women of childbearing age.

Introduction

Despite to improvements in perinatal and neonatal care especially in the last two decades, adverse birth outcomes such as preterm birth (PTB) and/or low birth weight (LBW), remain the major cause of death and long-term disability (1). Throughout the world, every year, twenty seven percent of infants are born with adverse pregnancy outcomes, and over one million deaths per year were resulted in PTB and/or LBW, with over 90% of these in developing countries (2, 3). PTB and/or LBW constituted the highest rates of all the adverse pregnancy outcomes and are common in developing countries (4). The highest rates of PTB are in Africa (11.9%) and North America (10.6%), and the lowest rates are in Europe (6.2%) (5).

Adverse pregnancy outcomes, more specially PTB and/or LBW, have been noted that one of the most common cause of under-five mortality globally, well above pneumonias and malaria (1). Complications related to adverse pregnancy outcomes are not only leads to newborn mortality but also late sequelae effects of pulmonary, cognitive, behavioural or emotional problems in adult's era (6).

Adverse pregnancy outcomes have been affected to a great extent by mothers own social, demographic and behavioral conditions. As to the factors associated with adverse birth outcomes, young maternal age, heavy physical and/or occupational exertion during pregnancy, alcohol abuse, low maternal education level, maternal smoking

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and low socioeconomic status etc. were found to play a significant role (7-12).

To date, data on prevalence and factors contributing to adverse pregnancy outcomes in Sivas, Turkey are very limited. Previously researchs have been restricted by some factors and the majority of them have been conducted in the hospital based with small sample sizes rather than population setting (13-15). For that reasons, this population-based study aimed to estimate the prevalence of PTB and LBW in Sivas and to investigate socio-demographic and maternal factors associated with PTB and LBW in women of childbearing ages.

Methods

It is a population-based survey, carried out in the center of Sivas city in Turkey, on women of reproductive age (15-49 years), between September 2013 and May 2014. Sivas a Middle Anatolian city with approximately 625,000 inhabitants. The target population of the study comprised about 38,000 households with about 85,000 reproductive women in the 63 districts.

The sample size was calculated based on the PTB and/or LBW prevalence of 0.20 which was obtained from previously published articles (2,16). A total sample size was determined as 1510; with a margin of error for a 95% confidence interval of ±2%.

A multistage cluster sampling scheme was used in this study. First, a total of 11 districts were randomly selected. Then, in each of the districts, the street and street number of the dwelling on the street were selected randomly. Bulding primarily providing short term accommodation such as hotels, rental homes, etc., were excluded. If a household contained more than one eligible woman, for interview; one of them was randomly chosed. Women who had been pregnant at some time during the previous three years of the face-to-face interview, who did not present any communication difficulties were enrolled into the survey. It was explained to women that their participation in the study would be completely voluntary and that all information obtained would be kept confidential. Informed consent forms were assigned by all participants. All interviews were performed by trained final-year medical students. Ethical approval for the study was obtained from the Ethics Committee of Cumhuriyet University with code: 2013-03/33. In consequence, out of the total of 1510 women who were selected for this survey, 1273 women had meet the inclusion criteria, thus yielding a survey of 84.3%.

A validated and reliable self-administered, structured questionnaire for data collection was developed based on literature review. Content validity of the questionnaire was validated by an expert panel, which comprised two physicians, two nurses, an oncologist and a radiologist with specialty in breast cancer diagnosis. Cronbach's alpha coefficient for the reliability (internal consistency) of the subscales in this study ranged from 0.73 to 0.84. All participants in the study completed the questionnaire, which comprised details related to demographic information of the participants, including maternal age, education level, lifetime residence, number of previous births, smoking (during last pregnancy), employment status and income level. The maternal age was categorized as four age groups (<20, 20-29, 30-39, 40-49).

Marital status was divided into married, single, and widowed/divorced/separated. The maternal educational level was determined according to the number of academic years of school attended.

In this study, those who have full-time permanent jobs was defined as employees and grouped as employment and unemployment. Cigarette smoking was defined at least one cigarette once a week during pregnancy. The annual household income was categorized into two groups, based on self reported data: insufficient (≤ US $7,000) and sufficient (> US $7,000).

Women were asked if they had ever been pregnant and, if so, parity (primiparous or multiparous), the gestational age, the outcome of last pregnancy (live birth, miscarriage and abortion), and the birth weight of the baby.

Self reported data obtained by women about their PTB and LBW cases was used in this study.

Smoking during pregnancy and all independent contextual variables (parity, maternal education, employment status, and annual household income) were studied in regard to two variables: (1) PTB, was defined as infant birth at less than 37 gestation weeks, and (2) LBW as birth weight less than 2,500 g.

Statistical Package of Social Science (SPSS Inc., Chicago, IL) for Windows version 16.0. were used for data analysis. Categorical data were expressed as percentages. Quantitative data were presented as mean ± SD. Multivariate logistic regression analysis were performed to assess which variables were significantly associated with LBW/PTB as the dependent variables. The persistance of smoking during their last pregnancy, parity, maternal education, employment status, and annual household income were included in the model for LBW/PTB as independent variables. *P* values les then 5% was considered as statistically significant.

Results

All study participants were from urban areas and 62% of them were over 34 years old. Socio- demographic characteristics of participants with smoking status in the year prior to the survey were presented in Table 1. Most of participants (79.8%) have primary or secondary school degree and 16.5 percent of them were smoked during their last pregnancy. The majority of participants (74.4%) were unemployed and 81 percent of them had an insufficient annual household income. Of the women in this survey, the rate of primiparous ones was 24.7%, while rates of PTB and LBW were 16.3% and 17.7% respectively (Table 1).

The adjusted odds ratios with 95% confidence intervals for two indicators of adverse pregnancy outcomes based on multivariate logistic regression analysis were presented in Table 2. As shown in the Table 2, women with primary school education demonstrated increased odds of PTB compared to women with high school education or more (OR = 4.25, r=0.96, P<0.001). Also, as compared to women who non-smokers, the odds of PTB was higher among women who smoked during pregnancy (OR=1.37, r = 0.23, P = 0.042). Additionally, multiparous women had more than twice the odds of PTB (OR=2.59, r=0.95, P< 0.001) as did unemployed women (OR = 2.08, r = 0.73, P< 0.001).

As shown in the Table 2, women with primary school education had a greater odds for LBW than those with high school education or more (OR = 4.93, r = 0.99, P< 0.001). As compared to women who non-smokers, the higher odds for LBW was observed among women who smoked during pregnancy (OR =1.67, r = 0.41, P= 0.023). Also, increased odds of LBW demonstrated in women with an annual household income of ≤ $7,000 compared to women with an annual household income of >$7,000 (OR=1.53, r= 0.42, P<0.001).

Discussion

Due to high prevalence of PTB and LBW, addressing the burden of them in countries such as Turkey is an important public health matter. To reduce the burden of PTB and LBW, recent literature indicating the disparity in the risk factors for both PTB and LBW among pregnant women. Given this context, this population based study was undertaken to estimate the prevalence of PTB and LBW in Sivas and to investigate maternal characteristics associated with PTB and LBW in women of childbearing ages.

Table 1. Distribution of the participants according to the sociodemographic factors

Factors	N	%
Level of education		
Primary School	388	30.5
Secondary School	628	49.3
≥High School	257	20.2
Smoking during pregnancy		
Yes	210	16.5
No	1063	85.5
Employment status		
Employed	326	25.6
Unemployed	947	74.4
Annual household income (self-reported)		
Insufficient	242	19.0
Sufficient	1031	81.0
Parity		
Primiparous	315	24.7
Multiparous	958	75.3
Having preterm birth		
Yes	207	16.3
No	1064	83.7
Having low birthweight baby		
Yes	225	17.7
No	1048	82.3

Table 2. Relation between socio-demographic and maternal variables and adverse outcome of pregnancy (n =1273).

Independent Variables	Preterm birth		Low birth weight	
	β	OR (95% CI)	β	OR (95% CI)
Level of Education				
≥High School		1.00		1.00
Secondary School	.28	1.36 (0.71 – 1.84)	.37	1.53 (0.88 – 2.31)
Primary School	.96	**4.25 (2.38 - 7.59)**	.99	**4.93 (2.54 - 9.60)**
Employment status				
Employed		1.00		1.00
Unemployed	.73	**2.08 (1.40 - 3.10)**	.05	1.05 (0.68 – 1.61)
Smoking				
No		1.00		1.00
Yes	.23	**1.37 (0.87 - 1.94)**	.41	**1.67 (1.06 - 2.14)**
Parity				
Primiparous		1.00		1.00
Multiparous	.95	**2.59 (1.57 - 4.27)**	98	**3.79 (2.15 - 6.68)**
Annual household income				
>US$7,000		1.00		1.00
≤US$7,000	.17	1.18 (0.97 – 1.44)	.42	**1.53 (1.26 - 1.86)**

All statistically significant P values are in bold type, Adjusted for age, OR=odds ratio; CI=confidence interval.

This study confirmed the previous findings that PTB and LBW are very prevalent complication (17,18).

The prevalence of PTB and LBW observed in this current study were smilar to those reported in some Asian countries, such as Chine, India, Iran and Pakistan with respective prevalences of 9 to 16% for PTB and 9 to 23% for LBW (19-23). However, it differs from previously published studies from some European countries (7% for PTB) (5). This difference in prevalence between studies may be influenced by study design or/and the geographical and demographic features of the population studied.

It has long been known that poor social structure, higher rates of unemployment and smoking, and the complexity of their interaction contribute to results of pregnancy outcome adversely (24,25). Findings of this current study demonstrate that maternal social and demographic factors which enrich the PTB/LBW risk were similar to other studies (10,24). More specially, a strong association between low educational status and PTB/LBW was observed in this study

is similar to a study by Karim and Mascie-Taylor which found a positive association between birth weight and maternal education while in Germany women with the lowest education had significantly elevated risk for PTB (26). A previous study from Spain has documented disadvantages in both LBW and PTB variables (27). Variables related to pregnancy and birth health measuring outcome of pregnancy demonstrate collinearity: For example, being low birthweight is mostly caused preterm birth, thus in this study sample, 59% (132/225) of low-birthweight infants were preterm birth (born before 37 weeks gestation).

Regarding to the effect of maternal smoking, findings of this study are agree with earlier studies (10,11). Smoking as a risk is not surprising since, in addition to nicotine and carbon monoxide, cigarette smoke contains many potentially organic toxic substances (e.g. tars and other organic compounds) in addition to toxic metals, hydrogen cyanide, and nitrogen oxides (28). In spite of causative relationships between smoking and PTB/LBW are complex and remain unclear, smoking, especially during pregnancy, as a risk factor is not surprising since, in addition to nicotine, cigarette smoke not only contains nicotine, but also many other potentially organic toxic substances such as carbon monoxide and tars. An increased risk of PTB/LBW were found among maternal smokers, and this is consistent with previously published data show a significant association between smoking and PTB/LBW (11,29,30).

A number of limitations this study must be pointed out. Firstly, because of all data were self-reported with no objective measures used to validate the responses, information bias should be taken into account as a study limitation. Secondly, this study was limited by the nature of cross sectional design, and therefore data did not permit assessment of potentially causal relation of variables.

The results suggest that the rates of delivering preterm birth and or low birth weight were common in this study. Women who smoke during pregnancy, women with less education and those multiparaous women were particularly associated with PTB and LBW. Future studies should also explore the role of other risk factors for adverse pregnancy outcome, to design of appropriate public health strategies that address this issue.

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Conflicts of Interest

There is no conflict of interest.

References

1. Liu L, Oza S, Hogan D, Perin J, Rudan I, Lawn JE, Cousens S, Mathers C, Black RE. Global, regional, and national causes of child mortality in 2000-13, with projections to inform post-2015 priorities: an updated systematic analysis. Lancet. 2015 Jan 31; 385(9966): 430-440.
2. Blencowe H, Cousens S, Oestergaard MZ et al. National, regional, and worldwide estimates of preterm birth rates in the year 2010 with time trends since 1990 for selected countries: a systematic analysis and implications. Lancet. 2012; 379(9832): 2162-2172.
3. Liu L, Johnson HL, Cousens S et al. Global, regional, and national causes of child mortality: an updated systematic analysis for 2010 with time trends since 2000. Lancet. 2012; 379(9832): 2151-2161.
4. Howson CP, Kinney MV, Lawn JE (2012) PMNCH, Save the Children. Born Too Soon: The Global Action Report on Preterm Birth, WHO, Geneva.
5. Beck S, Wojdyla D, Say L, Betran AP, Merialdi M, Requejo JH, et al. The worldwide incidence of preterm birth: a systematic review of maternal mortality and morbidity. Bull World Health Organ. 2010; 88(1): 31-38.
6. Blencowe H, Cousens S, Chou D, Oestergaard M, Say L, Moller AB, Kinney M, Lawn J. Born too soon: the global

epidemiology of 15 million preterm births. Reprod Health. 2013; 10(1): S2.

7. Fraser AM, Brockert JE, Ward RH. Association of young maternal age with adverse reproductive outcomes. N Engl J Med. 1995; 332(17): 1113-1117.

8. Nelson K, Lohsoonthorn V, Williams MA. Preterm delivery risk in relation to maternal occupational and leisure time physical activity among Thai women. Asian Biomedicine: Research, Reviews and News 2009; 3(3): 267-277.

9. Albertsen K, Andersen A-MN, Olsen J, Grønbæk M. Alcohol consumption during pregnancy and the risk of preterm delivery. Am J Epidemiol. 2004; 159(2): 155-161.

10. Grillo E, Freitas PF. Smoking and other pre-gestational risk factors for spontaneous preterm birth. Rev Bras Saude Mater Infant. 2011; 11(4): 397-403.

11. Henderson JJ, McWilliam OA, Newnham JP, Pennell CE. Preterm birth aetiology 2004-2008. Maternal factors associated with three phenotypes: spontaneous preterm labour, preterm pre-labour rupture of membranes and medically indicated preterm birth. J Matern Fetal Neonatal Med. 2012; 25(6): 642-647.

12. Bailey BA. Factors predicting birth weight in a low-risk sample: The role of modifiable pregnancy health behaviors. Matern Child Health J. 2007; 11(2): 173-179.

13. Hassoune S, Bassel S, Nani S, Maaroufi A. Prevalence and associated factors of low birth weight in the provincial hospital of Mohammedia-Morocco. Tunis Med. 2015 Jul; 93(7): 440-444.

14. Shakya KL, Shrestha N, Kisiju P, Onta SR. Association of maternal factors with low birth weight in selected hospitals of Nepal. J Nepal Health Res Counc. 2015; 13(30): 121-125.

15. Tellapragada C, Eshwara VK, Bhat P, Acharya S, Kamath A, Bhat S, Rao C, Nayak S, Mukhopadhyay C. Risk factors for preterm birth and low birth weight among pregnant ındian women: A hospital-based prospective study. J Prev Med Public Health. 2016; 49(3): 165-175.

16. Lawn JE, Cousens S, Zupan J. 4 million neonatal deaths: when? Where? Why? Lancet. 2005; 365(9462): 891-900.

17. Goldenberg RL, Goepfert AR, Ramsey PS. Biochemical markers for the prediction of preterm birth. Am J Obstet Gynecol. 2005; 192(5): 36-46.

18. Chan RL. Biochemical markers of spontaneous preterm birth in asymptomatic women. Biomed Res Int. 2014; 2014: 164081.

19. Zhang YP, Liu XH, Gao SH, Wang JM, Gu YS, Zhang JY, Zhou X, Li QX. Risk factors for preterm birth in five maternal and child health hospitals in Beijing. PLoS One. 2012; 7(12): 52780.

20. Mumbare SS, Maindarkar G, Darade R, Yenge S, Tolani MK, Patole K. Maternal risk factors associated with term low birth weight neonates: a matched-pair case control study. Indian Pediatr. 2012; 49(1): 25-28.

21. Metgud CS, Naik VA, Mallapur MD. Factors affecting birth weight of a newborn–a community based study in rural Karnataka, India. PLoS One. 2012; 7(7): e40040.

22. Golestan M, Akhavan KS, Fallah R. Prevalence and risk factors for low birth weight in Yazd, Iran. Singapore Med J. 2011; 52(10): 730-733.

23. Najmi RS. Distribution of birthweights of hospital born Pakistani infants. J Pak Med Assoc. 2000; 50(4): 121-124.

24. Euro-Peristat project with SCPE and Eurocat. European Perinatal health report. The health of pregnant women and babies in Europe in 2010. Available at: http://www.europeristat.com. Accessed December 18, 2017.

25. Slattery MM, Morrison JJ. Preterm delivery. Lancet. 2002; 360(9344): 1489-1497.

26. Palma S, Pérez-Iglesias R, Pardo-Crespo R Llorca J, Mariscal M, Delgado-Rodríguez M. Smoking among pregnant women in Cantabria (Spain): trend and determinants of smoking cessation. BMC Public Health. 2007; 7(1): 65.

27. Karim E, Mascie-Taylor CG. The association between birthweight, sociodemographic variables and maternal anthropometry in an urban sample from Dhaka, Bangladesh. Ann Hum Biol. 1997; 24(5): 387-401.

28. Villalbí JR, Salvador J, Cano-Serral G, Rodríguez-Sanz MC, Borrell C. Maternal smoking, social class and outcomes of pregnancy. Paediatr Perinat Epidemiol. 2007 Sep; 21(5): 441-447.

29. Counts ME, Morton MJ, Laffoon SW, Cox RH, Lipowicz PJ. Smoke composition and predicting relationships for international

commercial cigarettes smoked with three machine-smoking conditions. Regul Toxicol Pharmacol. 2005; 41(3): 185-227.

30. Uncu Y, Ozcakir A, Ecran I, Bilgel N, Uncu G. Pregnant women quit smoking: What about fathers? Survey study in Bursa Region, Turkey. Croad Med J. 2005 Oct; 46(5): 832-837.

31. Office for National Statistics. The Information Centre. Statistics on smoking: England 2006. Office for National Statistics; 2006. Available at: http://digital.nhs.uk/catalogue/PUB00662/smok-eng-2006-rep.pdf. Accessed Aug 19, 2016.