

PREGNANCY COMPLICATIONS AND DELIVERY OUTCOMES OF PREGNANT WOMEN WITH COMMON COLD

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SUMMARY

Objective: To study the association between common cold during pregnancy and pregnancy complications and delivery outcomes: gestational age/birth weight, in addition preterm birth and low birthweight.

Method: In the population-based large data set of the Hungarian Case-Control Surveillance System of Congenital Abnormalities (HCCSCA), 1980–1996, controls without congenital abnormalities were analysed.

Results: Of 38,151 newborn infants, 5,475 (14.4%) had mothers with common cold. The prevalence of threatened preterm delivery, placental disorders and severe nausea and vomiting was lower while the occurrence of anemia was higher in pregnant mothers with common cold than in mothers without common cold. Mothers with common cold in pregnancy had 0.1 week shorter gestational age, thus the proportion of preterm births (9.8% vs 9.1%) was somewhat larger. However, mean birth weight was somewhat larger (3,305 vs 3,271 g) and the proportion of low birthweight newborns (4.2% vs 5.9%) was smaller.

Conclusion: Common cold during pregnancy does not increase the occurrence of pregnancy complications except anemia, while delivery outcomes showed minor but opposite (higher rate of preterm birth and lower rate of low birthweight) changes.

Key words: common cold, pregnancy, pregnancy complications, gestational age, birth weight

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INTRODUCTION

The common cold is a conventional term for a mild upper respiratory illness caused by different microorganisms mainly from the virus family of picornaviridae (rhinoviruses, echoviruses, coxsackie viruses), influenza, parainfluenza, metapneumovirus, adeno- and respiratory syncytial viruses (1). The common cold is manifested such as acute coryza or nasopharyngitis with the symptoms of nasal stuffiness and discharge, sneezing, sore throat, and cough, in general without fever (2). However, common cold is frequently followed by secondary complications including fever.

The common cold is the most frequently reported maternal disorder during pregnancy in Hungary, nevertheless as far as we know so far the effects of common cold during pregnancy have not been studied for pregnancy complications and delivery outcomes. The large and population-based data set of the Hungarian Case-Control Surveillance of Congenital Abnormalities (HCCSCA) (3) seemed to be appropriate for the study of pregnancy complications and delivery outcomes such as birth weight and gestational age, in addition to the proportion of low birthweight and preterm birth as indicators of fetal development in the control newborn infants without any defect born to mothers with or without common cold.

METHODS

Newborn infants without congenital abnormalities were selected from the National Birth Registry of the Central Statistical Office as controls for the HCCSCA. Cases with congenital abnormality were identified in the Hungarian Congenital Abnormality Registry (4) for the HCCSCA. In general, two controls without defect were matched to every case according to sex, week of birth and district of parents' residence of cases. If selected controls were twins, only one of them was randomly included to the data set of the HCCSCA. Here the data of pregnancy complications and delivery outcomes are evaluated only in the control newborn infants without any birth defects because congenital abnormalities may have a more drastic effect for these variables than common cold.

The data on pregnancy complications and delivery outcomes, in addition to confounders such as demographic data of mothers, use of medicinal products (drugs and pregnancy supplements), maternal diseases including common cold were obtained from three sources of information: 1. Prospective data through prenatal care logbooks and other medical records, particularly discharge summaries before the birth of babies. Prenatal care was mandatory for pregnant women in Hungary (if somebody did not visit prenatal care, she did not get maternity grant and leave), thus

nearly 100% of pregnant women visited prenatal care, on average 7 times during the study period. The first visit was between the 6th and 12th gestational week. Licensed obstetricians were obliged to record all pregnancy complications, maternal diseases and related drug prescriptions in the logbook. 2. Retrospective data by a structured questionnaire completed by mothers after the birth of newborn infants. The time between the end of pregnancy and return of questionnaire was 5.2 ± 2.9 months. 3. In addition, 200 non-respondent mothers were visited and questioned at home as part of a validation study (5). Information was available on 83.0% of mothers (82.6% from reply, 0.4% from visit). Prenatal care logbook was available in 93.8% of mothers.

The diagnosis of common cold was based on the reported data, but two groups with or without antifever drug treatments were differentiated. Pregnancy complications were recorded in the prenatal care logbook. Both birth weight and gestational age were medically recorded in the discharge summary of delivery. We calculated gestational age from the first day of the last menstrual period. The definition of preterm birth was less than 37 completed weeks (less than 259 days), while postterm birth was 42 completed weeks or more (i.e. 294 days or more). Thus term births occurred from 37 to less than 42 completed weeks (259 to 293 days). On the other hand, low (less than 2500 g) and large (more than 4500 g) birth weight were also evaluated.

Here only the 17 years' data set of the HCCSCA (1980-1996) are evaluated because the method of data collection was changed after 1996. The details of the HCCSCA's methods have been described previously (3, 6).

Statistical Analysis of Data

Statistical analyses were carried-out with the software SAS version 8.02 (SAS Institute Ins., Cary, North Carolina, USA). We calculated prevalence odds ratios (POR) and their 95% confidence intervals (CI) for categorical data, while Student t-test for quantitative variables. Employment status was exceptional because χ^2 test was used for the evaluation of subgroups. At the calculation of adjusted t and POR, maternal age, birth order, employment status as indicator of socioeconomic status, antifever drugs and pregnancy supplements were used as confounders.

RESULTS

The number of births was 2,146,574 in Hungary during the study period. We sampled 38,151 of these births without any congenital abnormalities, representing 1.8% of Hungarian births during the study period. Of the 38,151 newborn infants, 5,475 (14.4%) had mothers with common cold. Of 5,475 pregnant women, 2,699 (49.3%) had medically recorded common cold.

The usual duration of common cold (nasopharyngitis) was one week without secondary complications. However, about half of our pregnant women had a longer duration due to secondary complications including sinusitis, otitis media, laryngitis, tracheitis, bronchitis, etc., and in general these mothers had antifever therapy.

The monthly distribution of common cold showed a higher occurrence between October and February with a peak in December (Table 1). However, common cold occurred in other months as well while influenza was recorded only between December and

April. The monthly occurrence of acute infectious diseases of respiratory system showed some similarities with common cold but their distribution statistically was different (Table 1).

Common cold was diagnosed in all gestational months of the study pregnancy, however, its prevalence was high in the first seven gestational months (10.2, 11.7, 16.0, 15.0, 13.9, 10.7 and 11.2%), and lower in the 8th (7.7%) and particularly low in the 9th (3.7%) month of gestation.

Table 1. The onset of common cold, in addition of influenza and acute infectious diseases of respiratory system without common cold according to month in mothers of newborn infants studied

Month	Common cold		Influenza		Acute infections of respiratory system*	
	No.	%	No.	%	No.	%
January	591	10.8	389	21.2	419	12.1
February	546	10.0	386	21.0	409	11.8
March	417	7.6	385	21.0	327	9.5
April	334	6.1	226	12.3	262	7.6
May	327	6.0	0	0.0	201	5.8
June	282	5.2	0	0.0	188	5.4
July	220	4.0	0	0.0	156	4.5
August	281	5.1	0	0.0	162	4.7
September	368	6.7	0	0.0	212	6.1
October	488	8.9	0	0.0	270	7.8
November	655	12.0	0	0.0	307	8.9
December	966	17.6	452	24.5	542	15.7
Total	5,475	100.0	1,838	100.0	3,455	100.0
Comparison	referent		$\chi^2_{11} = 1447.8$ $p < 0.0001$		$\chi^2_{11} = 55.9$ $p < 0.0001$	

*without common cold

Table 2 summarizes potential confounders in mothers with common cold or without common cold as referent. Both mean maternal age and birth order was somewhat lower in mothers with common cold, than in mothers without common cold. The proportion of unmarried women was smaller in mothers with common cold. There was some difference in the distribution of maternal employment status, the proportion of professionals and managerials was larger, while the proportion of semi- and unskilled workers, in addition of housewives was smaller in mothers with common cold. In Hungary most housewives belong to the low socioeconomic status.

The mothers of 1,714 (31.3%) newborn infants had only common cold during pregnancy. Among acute infectious maternal disorders during pregnancy (Table 2), the diseases of respiratory and digestive systems showed a higher prevalence in mothers with common cold. The higher occurrence of other acute diseases was

Table 2. Basic characteristics of mothers with or without common cold

Maternal confounders	With common cold (N = 5,475)		Without common cold (N = 32,676)		Comparison	
	No.	%	No.	%		
Maternal age (yr)						
< 25	2,676	48.9	15,318	46.9	$\chi^2_2 = 88.2$ $p < 0.0001$	
25–29	2,004	36.6	10,881	33.3		
> 29	795	14.5	6,477	19.8		
Mean (S.D.)	25.1±4.4		25.5±4.9		t=7.0	p<0.0001
Birth order						
1	2,851	52.1	15,358	47.0	$\chi^2_1 = 48.3$ $p < 0.0001$	
≥ 2	2,624	47.9	17,318	53.0		
Mean (S.D.)	1.6±0.9		1.7±0.9		t=10.0	p<0.0001
Unmarried	153	2.8	1,318	4.0	$\chi^2_1 = 19.4$	p<0.001
Employment status						
Professionals	813	14.9	3,540	10.8	$\chi^2_6 = 185.6$ $p < 0.0001$	
Managerial	1,576	28.8	8,558	26.2		
Skilled worker	1,720	31.4	9,970	30.5		
Semiskilled worker	685	12.5	5,098	15.6		
Unskilled worker	193	3.5	1,666	5.1		
Housewife	179	3.3	1,859	5.7		
Others	309	5.6	1,985	6.1		
Acute infectious diseases					POR	95% CI
Influenza	251	4.6	1,587	4.9	0.9	0.8 - 1.1
Respiratory system	803	14.7	2,652	8.1	1.9	1.8 - 2.1
Digestive system	222	4.1	717	2.2	1.9	1.6 - 2.2
Urinary tract	339	6.2	1,962	6.0	1.0	0.9 - 1.2
Genital organs	412	7.5	2,479	7.6	1.0	0.9 - 1.1
Others	116	2.1	396	1.2	1.8	1.4 - 2.2
Chronic diseases						
Diabetes mellitus	10	0.2	42	0.1	1.4	0.7 - 2.8
Epilepsy	9	0.2	68	0.2	0.8	0.4 - 1.6
Others	1,087	19.9	5,528	16.9	1.2	1.1 - 1.3
Frequently used drugs						
Acetylsalicylic acid	719	13.1	785	2.4	6.1	5.5 - 6.8
Allylestrenol	896	16.4	4,461	13.7	1.2	1.1 - 1.3
Aminophylline	285	5.2	1,999	6.1	0.8	0.7 - 0.9
Ampicillin	626	11.4	2,004	6.1	2.0	1.8 - 2.2
Bromhexine	280	5.1	520	1.6	3.3	2.9 - 3.9
Clotrimazole	558	10.2	2,519	7.7	1.4	1.2 - 1.5
Diazepam	605	11.1	3,525	10.8	1.0	0.9 - 1.1
Dimenhydrinate	318	5.8	1,408	4.3	1.4	1.2 - 1.6
Drotaverine	528	9.6	2,953	9.0	1.1	0.9 - 1.2
Magnesiums	287	5.2	1,663	5.1	1.0	0.9 - 1.2
Metamizole	572	10.5	1,339	4.1	2.7	2.5 - 3.0
Penamocillin	859	15.7	1,387	4.2	4.2	3.8 - 4.6
Promethazine	904	16.5	5,121	15.7	1.1	0.9 - 1.2
Terbutalin	583	10.7	3,411	10.4	1.0	0.9 - 1.1
Pregnancy supplements						
Iron	3,751	68.5	23,023	70.5	0.9	0.9 - 1.0
Calcium	620	11.3	2,963	9.1	1.3	1.2 - 1.4
Folic acid	2,851	52.1	17,924	54.9	0.9	0.8 - 1.0
Vitamin B ₆	602	11.0	3,484	10.7	1.0	0.9 - 1.1
Vitamin D	1,142	20.9	9,008	27.6	0.7	0.6 - 0.7
Vitamin C	319	5.8	1,359	4.2	1.4	1.3 - 1.6
Vitamin E	239	4.4	2,048	6.3	0.7	0.6 - 0.8
Others or unspecified vitamins	967	17.7	3,709	11.4	1.7	1.6 - 1.8
Multivitamins	387	7.1	2,122	6.5	1.1	0.9 - 1.2

Table 3. Prevalence of pregnancy complications in pregnant women with or without common cold

Pregnancy complications	With common cold (N = 5,475)		Without common cold (N = 32,676)		Difference POR (95% CI)
	No.	%	No.	%	
Threatened abortion	888	16.2	5,624	17.2	0.93 (0.86–1.01)
Placental disorders*	65	1.2	527	1.6	0.73 (0.57–0.95)
Nausea and vomiting, severe	499	9.1	3,370	10.3	0.87 (0.79–0.96)
Threatened preterm delivery**	569	10.4	4,891	15.0	0.66 (0.60–0.72)
Preeclampsia***	457	8.4	2,764	8.5	0.99 (0.89–1.09)
Prolonged pregnancy	82	1.5	426	1.3	1.15 (0.91–1.46)
Gestational diabetes	28	0.5	242	0.7	0.69 (0.47–1.02)
Polyhydramnios	32	0.6	159	0.5	1.20 (0.82–1.76)
Oligohydramnios	1	0.0	13	0.0	0.46 (0.06–3.51)
Anemia	1,036	18.9	5,320	16.3	1.20 (1.12–1.29)

* including placenta previa, premature separation of placenta, antepartum hemorrhage

** including cervical incompetence

*** including pregnancy hypertension, albuminuria and oedema

explained mainly by otitis media which might be connected with common cold. The prevalence of chronic maternal disorders was similar in pregnant women with or without common cold, except the “others” including very heterogeneous diseases.

Among medicinal products, frequently used drugs and pregnancy supplements were differentiated (Table 2). Two antifever (acetylsalicylic acid and metamizole) and three antimicrobial (ampicillin, clotrimazol, penamexillin) drugs were used more frequently by mothers with common cold. The use of allylestrenol, bromhexine and dimenhydrinate connected with pregnancy complications was also more frequent in mothers with common cold.

There was a higher use of calciums and vitamin C, while a lower use of vitamin D and E in the mothers with common cold.

The first objective of our study was the evaluation of pregnancy complications (Table 3). The proportion of anemia was larger while of severe nausea and vomiting, placental disorders, and particularly threatened preterm delivery was smaller in mothers with common cold than in the mothers without common cold.

Sex ratio, i.e. the proportion of boys was similar in the newborns of mothers with common cold (3,526; 64.4%) compared to the group of mothers without common cold (21,273; 65.1%) ($\chi^2=1.0$; $p=0.31$).

The second objective of the study, i.e. the evaluation of delivery outcomes was based on gestational age and birth weight (Table 4). Mean gestational age was 0.1 week shorter in the mothers

with common cold compared with mothers without common cold. However, the mean birth weight was 34 g larger in liveborn babies born to mothers with common cold than in the newborns of mothers without common cold. Adjusted POR for the rate of preterm births (9.8% vs 9.1%) showed a significant increase, while the proportion of low birthweight (4.2% vs. 5.9%) was smaller in the group of mothers with common cold compared with newborn infants born to mothers without common cold. There was no obvious difference in the proportion of postterm birth and large birthweight.

Finally we differentiated newborn infants born to mothers with common cold according to antifever therapy because we supposed that pregnant women with antifever therapy had secondary complications including fever. However, there was no obvious difference in delivery outcomes between the two study groups.

DISCUSSION

Our study showed a lower prevalence of threatened preterm delivery, placental disorders, and severe nausea and vomiting in mothers with common cold during the pregnancy, while the occurrence of anemia was higher. The mean birth weight was somewhat larger, and is associated with a smaller proportion of low birthweight, though gestational age was somewhat shorter and the proportion of preterm birth was somewhat larger.

Table 4. Data of delivery outcomes in newborn infants born to mothers with common cold and without common cold (as referent), in addition with or without antifever therapy

Variables	Pregnant women				Adjusted		Common cold with antifever therapy (N = 2,047)		Adjusted		Common cold without antifever therapy (N = 3,428)		Adjusted	
	with common cold		without common cold											
	(N = 5,475)		(N = 32,676)											
Continuous	Mean	S.D.	Mean	S.D.	t	p	Mean	S.D.	t	p	Mean	S.D.	t	p
Gestational age, wk	39.3	2.0	39.4	2.1	−3.4	0.0008	39.3	2.0	1.8	0.08	39.3	2.0	2.5	0.01
Birth weight, g	3305	487	3271	515	−2.6	0.008	3303	488	−1.9	0.06	3306	487	−2.9	0.004
Categorical	No.	%	No.	%	POR	95% CI	No.	%	POR	95% CI	No.	%	POR	95% CI
Preterm birth	539	9.8	2,957	9.1	1.2	1.1 - 1.3	206	10.1	1.2	1.0 - 1.4	333	9.7	1.1	1.0–1.3
Postterm birth	542	9.9	3,320	10.2	0.9	0.8–1.0	201	9.8	1.0	0.8 - 1.1	341	10.0	1.0	0.9–1.1
Low birthweight	231	4.2	1,936	5.9	0.8	0.7–0.9	91	4.5	0.8	0.6 - 0.9	140	4.1	0.7	0.6–0.9
Large birthweight	35	0.6	280	0.9	0.7	0.5–1.0	11	0.5	0.6	0.3 - 1.1	24	0.7	0.8	0.5–1.2

The strengths of HCCSCA can be explained by the large and population-based data set including 5,475 pregnant women with common cold from an ethnically homogeneous European (Caucasian) people in which pregnancy complications, in addition gestational age and birth weight were medically recorded and potential confounding factors were available for analysis. Of course, limitations of the data set need to be mentioned as well. The major weakness of our study is the unreliable diagnosis of reported common cold without the identification of microbial agents. Thus the differential diagnosis between common cold and acute infectious diseases of respiratory system, in addition between common cold and influenza was not based on scientific evidence. Response rate was 83%. Only 200 non-respondent mothers were visited at home, because the ethics committee considered that this follow-up would be disturbing to the parents of all healthy children. However, the prevalence of maternal diseases including common cold did not show differences between respondent and nonrespondent families (5). Another limitation in our study is the lack of data regarding maternal smoking and alcohol drinking as confounder. Our previous validation study showed the low reliability of retrospective maternal self-reported information regarding smoking and alcohol drinking in the mothers of cases with congenital abnormalities (7), therefore these data were collected only in a minor part of the data set of the HCCSCA based on the home visit. Of 200 mothers, 38 (19%) smoked and less than 1% drank alcohol regularly during pregnancy.

The major finding of the study is that common cold, the most frequent maternal disease during pregnancy (8) is not associated with a higher prevalence of pregnancy complications except anemia and the rate of preterm birth. The higher rate of anemia is in agreement with the lower intake of iron and folic acid by mothers with common cold and this health status may have a higher risk for common cold (9, 10). The lower proportion of some pregnancy complications (mainly threatened preterm birth and placental disorders) in pregnant women with common cold, and somewhat larger birth weight and smaller proportion of low birthweight in

their newborn infants needs further studies. A better lifestyle due to the anxiety caused by common cold during pregnancy does not seem to be a reasonable hypothesis.

In conclusion, our findings indicate that common cold does not result in a clinically important risk for pregnancy complications and delivery outcomes including preterm birth.

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