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ORIGINAL ARTICLE

Knowledge of factors predisposing to the occurrence of cerebral palsy among pregnant women

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Abstract

Introduction. Cerebral palsy (CP) is a medical and social problem. Among the causes of cerebral palsy are mentioned risk factors associated with the course of pregnancy and labour, as well as post-natal risk factors.

Objective. Evaluation of knowledge concerning factors predisposing to cerebral palsy among pregnant women.

Material and Methods. The study covered 100 pregnant women hospitalized in the Pregnancy Pathology Ward at the Saint John Independent Regional Hospital in Lublin. The database and statistical analysis were performed using statistical software STATISTICA 8.0 (StatSoft, Poland).

Results. In the opinions of pregnant women in the study, the causes of the occurrence of CP related with the pathology of pregnancy are as follows: intrauterine infections (39.0%), chronic diseases and congenital abnormalities in the mother (35.0%), birth defects concerning the central nervous system of the foetus (46.0%), and stimulants used in pregnancy (52.0%). According to the respondents, the most frequent cause associated with the pathology of labour which predisposes to the occurrence of CP is intracranial bleeding (42.0%), low Apgar score (38.0%), hypoxic ischaemic encephalopathy (30.0%), and perinatal injury (31.0%).

Conclusions. There is a need for educating women living in rural areas, with elementary or vocational elementary level of education, and those possessing a mediocre or poor material standard, concerning factors predisposing to the occurrence of cerebral palsy (CP) associated with pregnancy, labour and delivery, and the postpartum period.

Key words

pregnant women, knowledge, risk factors, cerebral palsy

INTRODUCTION

Cerebral palsy (CP) is a medical and social problem. The Surveillance of Cerebral Palsy in Europe (SCPE) defines it thus:

– a group of permanent, but not unchanging, disorders of movement and/or posture and of motor function, which are due to a non-progressive interference, lesion, or abnormality of the developing/immature brain [1].

This disorder is not a separate nosologic unit, but a set of symptoms with a complicated etiopathogenesis [2].

Among the causes of cerebral palsy are mentioned risk factors related with the course of pregnancy and labour, as well as post-natal risk factors. Hypoxic ischaemic encephalopathy syndrome in full-term newborns and intracranial bleeding in preterm babies are of the greatest importance in the development of CP. As early as 1843, Little paid attention to the relationship between the abnormal course of pregnancy, difficult delivery, preterm birth and hypoxia in a newborn, and spastic extremities [2, 3, 4, 5, 6].

The awareness of pregnant women of cerebral palsy risk factors may contribute to them undertaking adequate health promoting behaviours, and understanding for the necessity for medical care during the perinatal period.

MATERIAL AND METHOD

The study was conducted at the Saint John Independent Regional Hospital in Lublin. A total number of 100 questionnaire forms were distributed among pregnant women hospitalized in the Pregnancy Pathology Ward in the hospital.

The age of the pregnant women examined was within the range 18 – over 35. (26.0% of respondents were aged 18-25; 39.0% – 26-30; 20.0% – 31-35; and 15.0% were aged over 35). The majority of women in the study were urban inhabitants (56.0%), while 44.0% lived in rural areas. Considering education level, the largest group were women with university education (45.0%), whereas 44.0% of respondents possessed secondary school, and 11.0% elementary education. 73.0%

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of the pregnant women examined were married, and 27.0% were unmarried.

The greatest number of respondents described their material standard as very good or good (82.0%), while 18.0% as mediocre or poor.

In 44.0% of respondents this was the first pregnancy, 35.0% the second, 17.0% the third, and 4.0% the fourth or subsequent pregnancy; 53.0% were in the 2nd trimester of pregnancy, 19.0% in the 1st trimester, and 28.0% in the 3rd trimester.

The study was conducted with the use of a self-designed questionnaire form developed specially for the presented study.

The results obtained were subjected to statistical analysis. The measurable variables analyzed were presented using the mean, median and standard deviation, and non-measurable variables – by number and percentage. Normality of distribution of measurable variables was assessed with the use of the Shapiro-Wilk test. In order to compare two independent groups, Mann-Whitney test was applied, while for more than two groups – Kruskal-Wallis test. Chi-square test for independence (χ^2) was used to investigate the relationships between qualitative variables. The p values $p<0.05$ were considered statistically significant. The database and statistical analyses were performed with software STATISTICA 8.0 (StatSoft, Poland).

RESULTS

Table 1 presents the knowledge of risk factors related with pregnancy pathology which predispose to the occurrence of cerebral palsy (CP). In the opinions of the pregnant women examined, the pregnancy pathology-related causes predisposing to CP are primarily: intrauterine infections (39.0%), chronic diseases and congenital abnormalities in the mother (35.0%), birth defects concerning the central nervous system of the foetus (46.0%), and stimulants used in pregnancy (52.0%), followed by genetic factors (26.0%), occurrence of serologic conflict (20.0%), pre-eclamptic toxemia (17.0%), threatened preterm labour (13.0%), and malnutrition of the mother (10.0%). For further statistical analysis, knowledge concerning factors predisposing to the occurrence of cerebral palsy was evaluated as follows: each answer 'Yes' was ascribed 5 scores, whereas the answers 'No' and 'I do not know' – 0 score. The maximum number of scores that could be possibly obtained was 45 scores. The mean evaluation of the knowledge of the risk factors in the group examined was as low as 12.90±11.31 scores. 29.0% of respondents did not possess knowledge of risk factors (0 score), 37.0% obtained from 1-15 scores (mean evaluation 10.95±4.05 scores), while 34.0% had more than 15 scores (mean evaluation 26.03±4.05 scores).

Table 2 presents the correlation between knowledge of factors related with pregnancy pathology, which predispose to the occurrence of cerebral palsy (CP), and age, education level, material standard, place of residence and number of pregnancies. The results of statistical analysis showed significant differences (p=0.001) in the evaluation of factors predisposing to the occurrence of CP between urban and rural females; M=16.07 and M=8.86, respectively. Statistically significant differences (p=0.006) were also observed between respondents who had a very good or good material standard (M=14.15), and those whose standard was mediocre or poor (M=7.22). In addition, the study confirmed that pregnant women possessing university education possessed a slightly better knowledge of the CP factors (M=15.00), compared to those with secondary school (M=12.16) and elementary or elementary vocational education (M=7.27); however, the differences observed were statistically insignificant (p=0.06). Statistical analysis did not show any significant differences in the evaluation of the risk factors between age groups (p=0.11), and number of pregnancies (p=0.63).

Table 3 presents the women's knowledge of risk factors related with pathology of labour which predispose to the occurrence of cerebral palsy (CP). According to the respondents, the most frequent cause associated with

Table I. Knowledge of risk factors related with pathology of pregnancy, which predispose to the occurrence of cerebral palsy (CP) in the group of women examined

	CP risk factors related with pregnancy pathology	Yes		No		I do not know	
		n	%	n	%	n	%
A	genetic	26	26.00	25	25.00	49	49.00
B	congenital defects of the central nervous system	46	46.00	6	6.00	48	48.00
C	intrauterine infections (toxoplasmosis, cytomegaly, rubella)	39	39.00	7	7.00	54	54.00
D	occurrence of serologic conflict	20	20.00	22	22.00	58	58.00
E	preeclamptic toxemia	17	17.00	21	21.00	61	61.00
F	risk of preterm delivery (bleeding, placenta praevia, placental abruption)	13	13.00	27	27.00	60	60.00
G	chronic diseases and congenital defects in the mother	35	35.00	13	13.00	52	52.00
H	malnutrition of the mother	10	10.00	37	37.00	53	53.00
I	stimulants in pregnancy (tobacco smoking, alcohol consumption)	52	52.00	4	4.00	44	44.00

Table 2. Relationship between knowledge of factors related with pregnancy pathology which predispose to the occurrence of cerebral palsy (CP), and age, education level, material standard, place of residence and number of pregnancies among the women examined

Socio-demographic factors		Mean	SD	Median	Statistical analysis
age	under 30	9.23	11.02	2.50	H=4.33; p=0.11
	31-35	13.21	9.90	15.00	
	over 35	15.29	12.54	15.00	
place of residence	urban area	16.07	10.52	15.00	Z=-3.28; p=0.001*
	rural area	8.86	11.09	0.00	
education level	elementary/ elementaryvocational	7.27	10.81	0.00	H=5.68; p=0.06
	secondary school	12.16	12.17	10.00	
	university	15.00	10.17	15.00	
material standard	very good, good	14.15	10.74	15.00	Z=2.72; p=0.006*
	mediocre, poor	7.22	12.39	0.00	
number of pregnancies	1st	14.09	11.01	15.00	H=0.93; p=0.63
	2nd	12.00	12.02	10.00	
	3rd and subsequent	11.90	11.01	15.00	

* – significant differences

Table 3. Knowledge of risk factors related with pathology of labour, which predispose to the occurrence of cerebral palsy (CP) in the group of women examined

CP risk factors related with labour pathology		Yes		No		I do not know	
		n	%	n	%	n	%
A	hypoxic ischaemic encephalopathy	30	30.00	0	0.00	70	70.00
B	low Apgar score	38	38.00	13	13.00	48	48.00
C	intracranial bleeding	42	42.00	1	1.00	57	57.00
D	hyperbilirubinemia	9	9.00	10	10.00	81	81.00
E	perinatal injury	31	31.00	6	6.00	63	63.00

labour pathology which predisposed to CP is intracranial bleeding (42.0%), %), low Apgar score (38.0%), hypoxic ischaemic encephalopathy (30.0%), and perinatal injury (31.0%); nevertheless, only 9.0% of respondents knew that hyperbilirubinemia is also an important cause.

In order to perform further statistical analyses, knowledge pertaining to the factors predisposing to cerebral palsy was evaluated as follows: each answer 'Yes' was ascribed 5 scores, whereas the answers 'No' and 'I do not know' – 0 score. The maximum number of scores that could be possibly obtained was 25 scores. The mean evaluation of the knowledge of CP factors in the group examined was only 7.55 ± 7.33 scores. 37% of the women examined did not possess knowledge concerning the factors (0 scores), 38.0% obtained the number of scores from 1-10 (mean 8.03 ± 2.48 scores), whereas 25.0% more than 10 scores (mean 18.00 ±3.23 scores). The results of statistical analysis indicated significant differences (p=0.003) in the evaluation of factors predisposing to the occurrence of labour pathology-related cerebral palsy between urban and rural women – M=9.29 and M=5.34, respectively. Significant differences (p=0.006) in the evaluation of knowledge of factors were also observed between the respondents who had very good or good material standard (M=8.41), and those who had a mediocre or poor standard (M=3.61). It was also noted that the respondents with university education level had a slightly better knowledge of the factors (M=8.89) than those with secondary school education (M=7.61), and elementary or elementary vocational education (M=1.82). The differences observed were statistically significant (p=0.008). Statistical analysis did not confirm any significant differences in the knowledge of the factors between age groups (p=0.27), and the number of pregnancies (p=0.56) among the pregnant women in the study (Tab. 4).

Table 5 demonstrates respondents' knowledge of risk factors related with the postpartum period which predispose to cerebral palsy (CP). In the opinions of the pregnant women examined, the CP causes associated with the postpartum period cover: infection of the central nervous system (49.0%), injuries (36.0%) and hydrocephalus (23.0%). For further statistical analysis, knowledge pertaining to postpartum period-related factors predisposing to the occurrence of cerebral palsy was evaluated as follows: each answer 'Yes' was ascribed 5 scores, while the answers 'No' and 'I do not know' – '0' score. The maximum number of scores that could be possibly obtained was 15. The mean evaluation of knowledge of the risk factors in the group examined was only 5.40±5.16 scores. 35.00% of the women examined did not possess knowledge of risk factors (0 score), 36.00% obtained the number of scores from 1-5 (mean evaluation 5.00±0.00 scores), while 29.00% more than 10 scores, (mean evaluation 12.41±2.54 scores). Statistical analysis showed significant differences (p=0.005) in the evaluation of knowledge of factors predisposing to cerebral palsy related with the postpartum period between urban and rural women – M=6.61 and M=3.86, respectively. A statistically significant

Table 4. Relationship between knowledge of factors related with labour pathology which predispose to the occurrence of cerebral palsy (CP), and age, education level, material standard, place of residence and number of pregnancies among the women examined

Socio-demographic factors		Mean	SD	Median	Statistical analysis
age	under 30	5.96	7.62	0.00	H=2.60; p=0.27
	31-35	7.44	6.48	5.00	
	over 35	8.86	7.96	10.00	
place of residence	urban area	9.29	6.77	10.00	Z=-2.97; p=0.003*
	rural area	5.34	7.50	0.00	
education level	elementary/vocational	1.82	4.05	0.00	H=9.61; p=0.008*
	secondary school	7.61	7.74	5.00	
	university	8.89	6.98	10.00	
material standard	very good, good	8.41	7.15	10.00	Z=2.76; p=0.006*
	mediocre, poor	3.61	7.03	0.00	
number of pregnancies	1st	7.16	6.59	5.00	H=1.10; p=0.56
	2nd	7.14	7.89	5.00	
	3rd and subsequent	9.05	8.00	10.00	

* – significant differences

Table 5. Knowledge of risk factors related with postpartum period which predispose to the occurrence of cerebral palsy (CP) in the group of women examined

CP factors related with postpartum period		Yes		No		I do not know	
		n	%	n	%	n	%
A	infections of the central nervous system	49	49.00	1	1.00	50	50.00
B	hydrocephalus	23	23.00	16	16.00	65	65.00
C	injuries	36	36.00	7	7.00	57	57.00

Table 6. Relationship between knowledge of factors associated with postpartum period which predispose to the occurrence of cerebral palsy (CP), and age, education level, material standard, place of residence and number of pregnancies among the women examined

Socio-demographic factors		Mean	SD	Median	Statistical analysis
age	under 30	4.04	5.48	0.00	H=4.24; p=0.12
	31-35	5.64	5.40	5.00	
	over 35	6.14	4.55	5.00	
place of residence	urban area	6.61	4.96	5.00	Z=2.83; p=0.005*
	rural area	3.86	5.04	0.00	
education level	elementary/vocational	2.27	4.67	0.00	H=9.78; p=0.006*
	secondary school	4.89	5.34	5.00	
	university	6.67	4.77	5.00	
material standard	very good, good	5.61	4.99	5.00	Z=1.17; p=0.24
	mediocre, poor	4.44	5.91	0.00	
number of pregnancies	1st	5.57	5.08	5.00	H=1.90; p=0.39
	2nd	4.57	5.05	5.00	
	3rd and subsequent	6.43	5.51	5.00	

* – significant differences

difference was also noted (p=0.006) between the knowledge of postpartum period related factors predisposing to CP between pregnant women who had university education (M=6.67), and those with secondary school (M=4.89) and elementary or elementary vocational education (M=2.27). Statistical analysis did not confirm any significant differences in the evaluation of the knowledge of factors between age groups (p=0.12), material standard (p=0.24) and number of pregnancies (p=0.39) (Tab. 6).

DISCUSSION

The health of a baby depends on the state of the mother's health before pregnancy, during pregnancy, safe labour, and adequate perinatal and postpartum care.

Cerebral palsy is a syndrome of varied clinical image induced by many factors [2]. Kułak et al. [7] conducted studies to evaluate cerebral palsy risk factors among babies from the Białystok Region. In a retrospective study, the researchers compared CP risk factors occurring prior to labour and delivery, and in the neonatal period among 345 babies with CP; the control group covered 360 neonates. These studies confirmed a statistically significant relationship ($p<0.05$) between placental abruption, premature rupture of membranes, and spontaneous abortion during the antenatal period, and the occurrence of CP. A relationship was also noted between premature birth, Caesarian section and birth weight of a baby (<2,500 g), and the risk of cerebral palsy. Insufficient obstetric care, age of the mother below or above 30, mother's illness, preeclampsia, and placenta praevia were not significantly related with CP. In the neonatal period, the significant CP risk factors were: Apgar score less than 4 at one minute of life, respiratory-distress-syndrome, prolonged cardiopulmonary resuscitation, sepsis, meningitis, hyperbilirubinemia, neonatal seizures, and changes in the cranial ultrasound scan.

The studies by Livineca et al. [8] show that premature rupture of membranes (PROM) and premature birth predispose to the occurrence of CP. Based on own studies, Thorngren-Jerneck and Herbst [9] observed a relationship between CP and factors such as: first delivery, twin birth, premature rupture of membranes, preeclampssia, age of the mother >40 lat, cigarette smoking, and low Apgar score. Studies by Polak et al. [3] showed that the most important CP risk factors are: gestational age, multiple pregnancies up to week 29, and infections, mainly infection of the amniotic sac and membranes (*chorioamnionitis*). Other risk factors are also the use of postnatal corticosteroids and bronchopulmonary dysplasia.

Based on the results of own studies, it was observed that only 13.0% of respondents considered premature birth as a CP risk factor. Intrauterine infections were mentioned by 39.0% of the women examined, diseases and congenital abnormalities in the mother – 35.0%, hypoxic ischaemic encephalopathy – 30.0%, and perinatal injury – 31.0%.

Sternal et al. [2], among factors predisposing to the occurrence of CP, mentioned: inflammatory process (chorioamnionitis, intrauterine infections), genetic syndromes (Coffin-Lowry syndrome, cerebro-oculo-facio-skeletal syndrome (COFS), Rett's syndrome, Angelman syndrome, Pelizaeus-Merzbacher disease (PMD), intrauterine infections (toxoplasmosis, listeriosis, cytomegaly, flu viruses, measles, rubella and herpes), disorders during pregnancy (age of the mother, multiple pregnancies, bleeding during pregnancy, intrauterine dystrophy, prematurity), and postnatal factors (cardiovascular disorders, coagulation disorders, secondary hypoxia, birth asphyxia). O'Callaghan et al. [10] and Himmelmann et al. [11], as well as Sukhov et al. [12], considered that premature birth, intrauterine growth restriction (IUGR), infections in pregnancy, multiple pregnancy, disorders of placental function, hypoxia of the foetus, social factors, such as: education level, conditions at home, and material standard, increase the risk of cerebral palsy.

Analysis of own studies allows the presumtion that the awareness of pregnant women of the factors predisposing to the occurrence of cerebral palsy is unsatisfactory. There is a need for educating women, especially those living in the rural areas, with elementary or elementary vocational education level, or those who have a mediocre or poor material standard, concerning factors predisposing to CP associated with pregnancy, labour and delivery, and the postpartum period.

The course of pregnancy and the perinatal period are of great importance for the health of the baby. Therefore, widely understood educational activities should be undertaken with respect to women at reproductive age and in pregnancy pertaining to an adequate life style, and avoidance of factors which may predispose to the occurrence of complications in pregnancy and the perinatal period. Women should be made aware that the prevention of cerebral palsy consists mainly in preventive actions which cover primarily: provision of gynecological-obstetric care of pregnant women, protection of pregnant women against viral, bacterial and parasitic infections, diagnosing and treatment of chronic diseases in pregnant women (e.g. diabetes), and serological conflict, not performing radiological examinations in pregnancy, and abstaining from using drugs without the orders of a doctor, and during the organogenesis stage of development of the embryo (first 12 weeks of pregnancy). Adequate perinatal care is also very important, especially avoiding perinatal injuries, management of labour and delivery according to the procedures and standards in effect. The undertaking of these actions may considerably contribute to the minimization of the occurrence of CP.

CONCLUSION

1. The awareness of pregnant women concerning factors predisposing to the occurrence of cerebral palsy is unsatisfactory. Place of residence, education and material standard conditioned the knowledge of pregnant women of the risk factors associated with the pathology of pregnancy, pathology of labour and the postpartum period, which predispose to the occurrence of cerebral palsy (CP).
2. Respondents living in urban areas, with university education level, and who had a very good or good material standard, possessed a better knowledge of risk factors related with the pathology of pregnancy, labour and delivery, and the postpartum period predisposing to the occurrence of cerebral palsy (CP) than women living in the rural areas, those with elementary or elementary vocational education level, and mediocre or poor material standard.

3. There is a need for educating rural women, those with elementary or elementary vocational education level, and mediocre or poor material standard concerning the factors predisposing to the occurrence of cerebral palsy (CP) related with pregnancy, labour and delivery, and the postpartum period.

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