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Awareness of Women Living in Poland Regarding Congenital Cytomegalovirus Seroprevalence

Świadomość kobiet mieszkających w Polsce dotycząca seroprewalencji wrodzonego zakażenia wirusem cytomegalii

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Abstract

Introduction. Human Cytomegalovirus (HCMV) belongs to the family of Herpesviridae, subfamily of Betaherpesvirinae.
Aim. The aim of the examination was to assess the level of women's knowledge regarding cCMV seroprevalence.
Material and Methods. This study followed a diagnostic survey method, utilizing a self-constructed questionnaire as the primary data collection tool. The questionnaire was administered to a sample of 500 women residing in Poland, between the ages of 18 and 75. Data analysis was conducted using the SPSS Statistica 21.0 software package.
Results. Among the nine listed infectious diseases, cytomegalovirus (CMV) infection ranked seventh, followed by chlamydia and parvovirus. The respondent's level of education influenced their self-reported knowledge about the CMV virus.
Conclusions. The study results clearly indicate that the level of cCMV awareness among adult women is low. Our study is the first step towards the popularization of preventive behaviors to counter cCMV. **(JNNN 2025;14(1):27–34)**
Key Words: cCMV, CMV, congenital cytomegalovirus infection, congenital infection, cytomegalic infection disease, viral infection

Streszczenie

Wstęp. Ludzki wirus cytomegalii (HCMV) należy do rodziny Herpesviridae, podrodziny Betaherpesvirinae.
Cel. Celem badania była ocena poziomu wiedzy kobiet na temat seroprewalencji cCMV.
Materiał i metody. W badaniu zastosowano metodę sondażu diagnostycznego, wykorzystując samodzielnie skonstruowany kwestionariusz jako główne narzędzie zbierania danych. Ankietę przeprowadzono na próbie 500 kobiet mieszkających w Polsce w wieku 18–75 lat. Analizę danych przeprowadzono przy użyciu pakietu oprogramowania SPSS Statistica 21.0.
Wyniki. Spośród dziewięciu wymienionych infekcji zakaźnych, zakażenie wirusem cytomegalii było na siódmym miejscu, a następnie chlamydioza i parwowirus. Wykształcenie respondenta miało wpływ na jego deklarowaną wiedzę na temat wirusa CMV.
Wnioski. Wyniki badania wyraźnie wskazują, że poziom świadomości cCMV wśród dorosłych kobiet jest niski. Nasze badanie jest pierwszym krokiem w kierunku popularyzacji zachowań zapobiegawczych w celu zapobiegania cCMV. **(PNN 2025;14(1):27–34)**
Słowa kluczowe: cCMV, CMV, wrodzone zakażenie wirusem cytomegalii, infekcja wrodzona, cytomegalia choroba zakaźna, infekcja wirusowa

Introduction

Human cytomegalovirus (HCMV) belongs to the Herpesviridae family, which also includes Epstein–Barr virus, herpes simplex virus types 1 and 2, and varicella-zoster virus. It represents the Betaherpesvirinae subfamily and, taking into account its specificity to the human species, is referred to as human herpesvirus 5 [1–5]. It has the largest genome among human herpesviruses. It is a lymphotropic virus. It contains double-stranded DNA. It is strongly associated with the infected cell and it spreads mainly in leukocytes and lymphocytes. It is reactivated as a result of immunosuppression and allogeneic stimulation. The clinical picture of infection depends on the intensity of virus replication and the degree of destruction of infected cells. It may also cause visual defects, neurological symptoms (including increased or decreased muscle tone, delayed psychomotor development, seizures, mental retardation), abnormalities in laboratory tests (including neutropenia, anemia, thrombocytopenia, increased AST and/or ALAT, hyperbilirubinemia) and abnormalities in physical examination (including liver enlargement, spleen enlargement, lymph node enlargement, microcephaly) [6].

Congenital cytomegalovirus (cCMV) infection is the most common congenital infection. Diagnostics towards cCMV should be implemented in newborns with abnormal hearing screening tests, clinical symptoms that suggest cCMV and in newborns of mothers with diagnosed primary infection during pregnancy, reactivation of the infection, or infection with another virus serotype [7–8].

The study aimed to assess the level of women's knowledge in terms of cCMV seroprevalence.

Material and Methods

Design and setting: This study utilized a diagnostic survey method, employing a self-constructed questionnaire administered electronically via an online survey platform.

Eligibility criteria: age over 18, residing in Poland, gender female.

Exclusion criteria: age under 18, residing outside Poland, gender male.

Survey questionnaire: The questionnaire was divided into two sections: demographics, which included two open-ended questions and five closed, single-choice questions and the main section, which comprised 34 closed, single or multiple-choice questions.

Data collection: Pre-defined data including demographics was systematically entered into a specially developed excel database for this research.

Data analysis: All statistical analyses were performed using the SPSS Statistical 21.0 software package. To explore the interrelationships between variables, the standardized Pearson correlation coefficient was calculated based on the Chi-square coefficient, ranging from –1 to 1, where –1 indicates a negative correlation, 0 indicates no correlation, and 1 indicates a strong positive correlation (ref). Additionally, the Chi-square test was employed to examine the relationships between two variables.

The study sample consisted of 500 women aged 18 to 75, with a mean age of 30.49, a median age of 26 years, and a standard deviation of 12.16 years. The characteristics of the study group are detailed in Table 1.

Table 1. Characteristics of the study group

Variable	Number of children			Total
	One child	More than one child	No children	
1	2	3	4	5
Education				
Primary education	3 (0.60%)	2 (0.40%)	1 (0.20%)	6 (1.20%)
Lower secondary education	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Basic vocational education	3 (0.60%)	3 (0.60%)	2 (0.40%)	8 (1.60%)
Secondary vocational education	5 (1.00%)	6 (1.20%)	9 (1.80%)	20 (4.00%)
Secondary education	21 (4.20%)	25 (5.00%)	199 (39.80%)	245 (49.00%)
Higher education	56 (11.20%)	65 (13.00%)	100 (20.00%)	221 (44.20%)
Total	88 (17.60%)	101 (20.20%)	311 (62.20%)	500 (100.00%)
Place of residence				
Country	24 (4.80%)	45 (9.00%)	131 (26.20%)	200 (40.00%)
City < 50,000 inhabitants	26 (5.20%)	17 (3.40%)	49 (9.80%)	92 (18.40%)

Table 1. Continued

1	2	3	4	5
City 50,000–200,000 inhabitants	27 (5.40%)	31 (6.20%)	88 (17.60%)	146 (29.20%)
City 200,000–500,000 inhabitants	5 (1.00%)	2 (0.40%)	27 (5.40%)	34 (6.80%)
City > 500,000 inhabitants	6 (1.20%)	6 (1.20%)	16 (3.20%)	28 (5.60%)
Total	88 (17.60%)	101 (20.20%)	311 (62.20%)	500 (100.00%)
Marital status				
Single	7 (1.40%)	2 (0.40%)	182 (36.40%)	191 (38.20%)
Married	54 (10.80%)	83 (16.60%)	14 (2.80%)	151 (30.20%)
Divorced	8 (1.60%)	7 (1.40%)	1 (0.20%)	16 (3.20%)
Widow	5 (1.00%)	4 (0.80%)	1 (0.20%)	10 (2.00%)
Marital separation	1 (0.20%)	3 (0.60%)	1 (0.20%)	5 (1.00%)
Cohabitee (in an informal relationship)	13 (2.6%)	2 (0.4%)	112 (22.40%)	127 (25.40%)
Total	88 (17.6%)	101 (20.20%)	311 (62.20%)	500 (100.00%)

Results

Among the surveyed women, the most awareness was for rubella — 76% (N-375), chickenpox — 69% (N-344), and toxoplasmosis — 63% (N-314). Of the nine infectious diseases mentioned, cytomegalovirus was ranked third from the bottom, followed by chlamydial infection — 30% (N-149) and parvovirus B12 — 11% (N-55) (Table 2). The respondents' education had an impact on their declared knowledge of the CMV virus. Women with higher education — 22.2% (N-111) more often declared knowledge of the CMV virus than women with lower education — secondary education — 10.2% (N-51), secondary vocational education — 1.2% (N-6), basic vocational education — 0.6% (N-3), primary education — 0.2% (N-1). The correlation with other parameters such as financial status, residential location and marital status.

Table 2. The declared knowledge of infections from the TORCH group

Response	Respondents	%
Rubella	375	75
Chickenpox	344	69
Toxoplasmosis	314	63
Syphilis	303	61
Herpesvirus	271	54
Pertussis	254	51
Cytomegalovirus (CMV)	172	34
Chlamydia	149	30
Parvovirus B19	55	11
Total	2237	

% — percent

cCMV is the most common congenital infection in the world — 48% (N-243) of the respondents agreed with this statement. Marital status (Pearson's Chi²=7.41, df=5, p=0.19), place of residence (Pearson's Chi²=7.33, df=4, p=0.12), education (Pearson's Chi²=8.51, df=4, p=0.07) did not affect the answers given by women, but having children did (Pearson's Chi²=6.30, df=2, p=0.04). Women who had one or more children were more likely to select the correct answer (Table 3).

Table 3. The correlation between being aware of CMV infection and having children

Having children	Cytomegalovirus (CMV) is the most common cause of congenital infections in the world				N		Pearson's Chi²	df	p
	True		False						
	N	%	N	%	N	%			
Yes, one	48	9.60	40	8.00	88	17.60			
Yes, more than one	57	11.40	44	8.80	101	20.20	6.30	2	0.04
No	137	27.40	174	34.80	311	62.20			
Total	242	48.40	258	51.60	500	100.00			

N — number of observations; df — degrees of freedom; p — level of statistical significance; % — percent

Table 4. CMV seroprevalence and place of residence

Variable	Choose the correct statement. CMV seroprevalence:						N		Pearson's Chi²	df	p
	In developed countries it ranges from 40 to 60%, while in developing countries it exceeds 80%		In developed countries it ranges from 1 to 5%, while in developing countries it exceeds 20%		In developed countries it ranges from 0.5 to 2%, while in developing countries it exceeds 10%						
	N	%	N	%	N	%	N	%			
Place of residence											
Country	52	10.40	128	25.60	20	4.00	200	40.00			
City <50,000 inhabitants	32	6.40	48	9.60	12	2.40	92	18.40			
City 50,000–200,000 inhabitants	46	9.20	79	15.80	21	4.20	146	29.20	17.68	8	0.02
City 200,000–500,000 inhabitants	6	1.20	24	4.80	4	0.80	34	6.80			
City >500,000 inhabitants	8	1.60	11	2.20	9	1.80	28	5.60			
Total	144	28.80	290	58.00	66	13.20	500	100.00			

N — number of observations; df — degrees of freedom; p — level of statistical significance; % — percent

It is estimated that 40 to 60% of the population has antibodies against CMV antigens in the IgG class in developed countries, while in developing countries this percentage may exceed 80%. Nearly 29% of women knew this topic. Marital status (Pearson's Chi²=8.53, df=10, p=0.58), education (Pearson's Chi²=9.94, df=8, p=0.27), number of children (Pearson's Chi²=5.40, df=4, p=0.25) had no impact on the answers given by the respondents, but the place of residence did (Pearson's Chi²=17.68, df=8, p=0.02) (Table 4).

49% (N-246) of respondents agreed with this sentence — The liability of cCMV is estimated to be higher than that of congenital defects such as Down syndrome, foetal alcohol syndrome and spina bifida.

TORCH infections may have the most serious consequences for the developing fetus. One-fourth of respondents knew about it — 25% (N-126). Less than half of respondents — 48% (N-238) noted that they are equally severe for every infected person, regardless of age; 24% of respondents (N-118), that for a pregnant woman, 1% of respondents (N-18), that for an elderly person. Marital status (Pearson's Chi²=40.72, df=15, p=0.00), education (Pearson's Chi²=43.13, df=12, p=0.00) of respondents and having kids (Pearson's Chi²=25.90, df=6, p=0.00) had an impact on knowledge on this topic. The correct answer was most often given by married women, those with higher education, and those who did not have children. There is a statistical relationship between education and the number of children (Pearson's Chi²=78.12, df=8, p=0.00). There were 62.2% (N-311) of women who did not have children, of which 39.8% (N-199) of them had secondary education, and 20% (N-100) had higher education (Table 5).

90% (N-450) of the respondents agreed with this statement: Infection of a pregnant woman with CMV significantly affects the development of the fetus and the course of pregnancy. Differences in respondents' answers by marital status (Pearson's Chi²=6.52, df=5, p=0.26), place of residence (Pearson's Chi²=4.07, df=4, p=0.40), education (Pearson's Chi²=3.87, df=4, p=0.42), having children (Pearson's Chi²=0.52, df=2, p=0.77) did not reach statistical significance.

The time of infection is an important parameter to determine the degree of fetal damage. The most serious consequences may be caused by infection in the first trimester of pregnancy. Marital status (Pearson's Chi² =37.29, df=10, p=0.00), education (Pearson's Chi²=39.96, df=8, p=0.00), and having children (Pearson's Chi²=16.61, df=4, p=0.00) had an impact on the answers given by the respondents on this topic. Place of residence had no influence (Pearson's Chi²=6.22, df=8, p=0.62) (Table 6).

cCMV may result from the primary or secondary infection of the mother during pregnancy. Primary infection is associated with the most serious consequences for the fetus. In the case of primary infection, the risk of transmission to the fetus is 24–75%, while in the case of secondary infection, it is about 1–3%. More than half of respondents answered this question correctly — 62% (N-312). Differences in answers with the division into marital status (Pearson's Chi²=17.31, df=10, p=0.07) and place of residence (Pearson's Chi²=3.51, df=8,

Table 5. Consequence of TORCH infections and marital status or education, having children

Variable	For whom TORCH infections may have the most severe consequences?								N		Pearson's Chi²	df	p
	For a pregnant woman		For the fetus		For an elderly person		They are equally serious for every infected person, regardless of age						
	N	%	N	%	N	%	N	%	N	%			
Marital status													
Single	54	10.80	42	8.40	8	1.60	87	17.40	191	38.20			
Married	29	5.80	58	11.60	3	0.60	61	12.20	151	30.20			
Divorced	4	0.80	6	1.20	0	0.00	6	1.20	16	3.20			
Widowed	3	0.60	1	0.20	2	0.40	4	0.80	10	2.00	40.72	15	0.00
Separated	0	0.00	1	0.20	0	0.00	4	0.80	5	1.00			
Partner (in an informal relationship)	28	5.60	18	3.60	5	1.00	76	15.20	127	25.40			
Total	118	23.60	126	25.20	18	3.60	238	47.60	500	100.00			
Education													
Primary education	0	0.00	0	0.00	1	0.20	5	1.00	6	1.20			
Basic vocational	2	0.40	1	0.20	0	0.00	5	1.00	8	1.60			
Secondary vocational education	5	1.20	6	1.20	0	0.00	8	1.60	20	4.00	43.13	12	0.00
Secondary education	65	13.00	36	7.20	12	2.40	132	26.40	245	49.00			
Higher education	45	9.00	83	16.60	5	1.00	88	17.60	221	44.20			
Total	118	23.60	126	25.20	18	3.60	238	47.60	500	100.00			
Number of children under possession													
One	19	3.80	34	6.80	4	0.80	31	6.20	88	17.60			
More than one	18	3.60	36	7.20	1	0.20	46	9.20	101	20.20	25.90	6	0.00
None	81	16.20	56	11.20	13	2.60	161	32.20	311	62.20			
Total	118	23.60	126	25.20	18	3.60	238	47.60	500	100.00			

N — number of observations; df — degrees of freedom; p — level of statistical significance; % — percent

Table 6. Time of infection and marital status, education or having children

Variable	In which trimester of pregnancy can a mother's infection with cytomegalovirus (CMV) have the most severe consequences for the baby?						N		Pearson's Chi²	df	p
	1st trimester		2nd trimester		3rd trimester						
	N	%	N	%	N	%	N	%			
1	2	3	4	5	6	7	8	9	10	11	12
Marital status											
Single	100	20.00	60	12.00	31	6.20	191	38.20			
Married	115	23.00	20	4.00	16	3.20	151	30.20			
Divorced	10	2.00	5	1.00	1	0.20	16	3.20			
Widowed	5	1.00	1	0.20	4	0.80	10	2.00	37.29	10	0.00
Separated	2	0.40	1	0.20	2	0.40	5	1.00			
Partner (in an informal relationship)	66	13.20	45	9.00	16	3.20	127	25.40			
Total	298	59.60	132	26.40	70	14.00	500	100.00			

Table 6. Continued

1	2	3	4	5	6	7	8	9	10	11	12
Education											
Primary education	1	0.20	2	0.40	3	0.60	6	1.20			
Basic vocational education	6	1.20	0	0.00	2	0.40	8	1.60			
Secondary vocational education	9	1.80	8	1.60	3	0.60	20	4.00	39.96	8	0.00
Secondary education	121	24.20	84	16.80	40	8.00	245	49.00			
Higher education	161	32.20	38	7.60	22	4.40	221	44.20			
Total	298	59.60	132	26.40	70	14.00	500	100.00			
Number of children under possession											
One	59	11.80	17	3.40	12	2.40	88	17.60			
More than one	74	14.80	16	3.20	11	2.20	101	20.20	16.61	4	0.00
None	165	33.00	99	19.80	47	9.40	311	62.20			
Total	298	59.60	132	26.40	70	14.00	500	100.00			

N — number of observations; df — degrees of freedom; p — level of statistical significance; % — percent

Table 7. Type of infection and education or having children

Variable	Which cytomegalovirus (CMV) infection in pregnant women is associated with the most serious consequences for the fetus?						N		Pearson's Chi²	df	p
	Primary infection		Reinfection with a new strain of the virus		Reactivation of the infection						
	N	%	N	%	N	%	N	%			
Education											
Primary education	4	0.80	1	0.20	1	0.20	6	1.20			
Basic vocational education	3	0.60	2	0.40	3	0.60	8	1.60			
Secondary vocational education	11	2.20	7	1.40	2	0.40	20	4.00	23.27	8	0.00
Secondary education	133	26.60	69	13.80	43	8.60	245	49.00			
Higher education	161	32.20	33	6.60	27	5.40	221	44.20			
Total	312	62.40	112	22.40	76	15.20	500	100.00			
Number of children under possession											
One	63	12.60	11	2.20	14	2.80	88	17.60			
More than one	77	15.40	13	2.60	11	2.20	101	20.20	21.13	4	0.00
None	172	34.40	88	17.60	51	10.20	311	62.20			
Total	312	62.40	112	22.40	76	15.20	500	100.00			

N — number of observations; df — degrees of freedom; p — level of statistical significance; % — percent

p=0.90) did not reach statistical significance. The answers given were influenced by education (Pearson's Chi² =23.27, df=8, p=0.00) and having children (Pearson's Chi² =21.13, df=4, p=0.00). Women with higher education most often indicated the correct answer, i.e. 161 out of 221, or 73%. Women with one or more children more often indicated the correct answer (Table 7).

The diagnosis of cCMV in a newborn is associated with the presence of CMV DNA in urine or saliva determined by PCR in the first 21 days of life. After this time, the detection of the presence of viral DNA does not allow for a clear determination of the moment of infection, which is extremely important because long-term complications differ significantly. More than half

of the respondents gave an incorrect answer, stating that it is possible to distinguish congenital from acquired infection regardless of the patient's age — 62% (N-310). Differences in answers by marital status (Pearson's Chi^2=12.16, df=10, p=0.27), education (Pearson's Chi^2 =13.63, df=8, p=0.09), place of residence (Pearson's Chi^2 =10.13, df=8, p=0.26) and having children (Pearson's Chi^2=4.66, df=4, p=0.32) turned out to be not statistically significant.

Discussion

Almishaal et al surveyed 1004 respondents with an average age of 32 whether they had ever heard of CMV. Only 8.17% (N-82) indicated that they had. Knowledge of CMV was rated the lowest among other diseases, such as HIV, Down syndrome, rubella, cerebral palsy, autism, and spina bifida. Knowledge of CMV was associated with the educational level. People with higher education were more likely to have prior knowledge about CMV [9]. Graye H. et al. confirmed that their knowledge about CMV infection is lower than the knowledge about other infections, such as toxoplasmosis or listeriosis. They reported that there was less awareness compared to birth defects such as trisomy 21 or FAS syndrome [10]. Ross D.S. et al. using the annual Health Styles survey, assessed adult women's awareness of CMV. Of the 2656 respondents, only 14% had heard of CMV. An upward trend was observed with increasing education [11]. These findings are also confirmed by the results of our survey.

Others have reported lack of sufficient knowledge about cCMV in healthcare workers. Pesh et al. checked the level of knowledge of doctors working daily with newborns and children in primary healthcare and hospitals. They concluded that pediatric and neonatal physicians have a low level of knowledge about cCMV [12]. Muldoon et al. conducted a survey on CMV awareness among physical and occupational therapists in the United States. Their general level of knowledge was assessed as low [13].

Larkin et al. found that two 30-minute online discussions were enough to see an improvement in CMV knowledge among 50–51% of obstetricians-gynecologists [14,15].

Conclusions

1. The study results indicate that the level of awareness of cCMV (congenital cytomegalovirus) among adult women is alarmingly low, despite the virus being one of the most common causes of congenital infections and a leading cause of birth defects and developmental disabilities. This gap in knowledge suggests a critical need for targeted educational efforts to raise awareness and promote behavior changes, particularly among women who are planning a pregnancy or are currently pregnant.
2. Our study is the first step towards popularizing preventive behaviors to prevent cCMV. Increasing public knowledge is essential, as simple hygiene practices — such as regular hand-washing after contact with young children — can significantly reduce the risk of transmission.
3. Future initiatives should focus on educational programs aimed not only at healthcare personnel but also at women of reproductive age. These programs should emphasize the importance of preventive hygiene behaviors, provide clear and practical guidance on minimizing exposure to the virus and highlight the potential risks of congenital CMV to the unborn child.

Implication for Nursing Practice

The so-called gold standard in the diagnosis of congenital infection in newborns is still being disseminated, but the level of knowledge on this subject is not satisfactory. Our study shows that there is a need for nursing staff to educate the public about CMV. Primary prevention, the so-called first phase, is important, and is aimed at healthy people and their environment. Its goal is to minimize the risk of a given disease. Secondary prevention, the so-called second phase, involves early detection of a given disease and rapid actions aimed at stopping the development of the disease. Tertiary prevention, the so-called third phase, is aimed at sick people. Its goal is to limit the effects of the disease.

References

[1] Chiopris G., Veronese P., Cusenza F. et al. Congenital Cytomegalovirus Infection: Update on Diagnosis and Treatment. *Microorganisms*. 2020;8(10):1516.
[2] Dzierżanowska-Fangrat K. Zasady racjonalnej antybiotykoterapii. W: Flisiak R. (Red.), *Choroby zakaźne i pasożytnicze*. Tom 1, Wyd. Czelej, Lublin 2020;132–133.
[3] Lucignani G., Guarnera A., Rossi-Espagnet M.C. et al. From Fetal to Neonatal Neuroimaging in TORCH Infections: A Pictorial Review. *Children (Basel)*. 2022; 9(8):1210.
[4] Balegamire S.J., Renaud C., Mâsse B. et al. Frequency, timing and risk factors for primary maternal cytomegalovirus infection during pregnancy in Quebec. *PLoS One*. 2021;16(6):e0252309.
[5] Carmona A.S., Kakkar F., Gantt S. Perinatal Cytomegalovirus Infection. *Curr Treat Options Pediatr*. 2022;8(4):395–411.

[6] Zając P., Czarkowska-Pączek B. Ryzyko zawodowe zakażenia wirusem CMV u pielęgniarek — czy warto wykonywać badania przesiewowe dotyczące określenia częstości występowania przeciwciał przeciw wirusowi cytomegalii wśród pielęgniarek w Polsce?, *Piel Zdr Publ*. 2020;10(1):43–47.
[7] Kobayashi M., Okahashi A., Okuyama K., Hiraishi N., Morioka I. Awareness and knowledge of congenital cytomegalovirus infection among pregnant women and the general public: a web-based survey in Japan. *Environ Health Prev Med*. 2021;26(1):117.
[8] Megli C.J., Coyne C.B. Infections at the maternal-fetal interface: an overview of pathogenesis and defence. *Nat Rev Microbiol*. 2022;20(2):67–82.
[9] Almishaal A.A. Knowledge of cytomegalovirus infection among women in Saudi Arabia: A cross-sectional study. *PLoS One*. 2022;17(9):e0274863.
[10] Greye H., Henning S., Freese K. Cross-sectional study to assess awareness of cytomegalovirus infection among pregnant women in Germany. *BMC Pregnancy Childbirth*. 2022;22(1):964.
[11] Ross D.S., Victor M., Sumartojo E., Cannon M.J. Women's knowledge of congenital cytomegalovirus: results from the 2005 HealthStyles survey. *J Womens Health (Larchmt)*. 2008;17(5):849–858.
[12] Pesch M.H., Muldoon K.M. Congenital Cytomegalovirus Knowledge, Practices, and Beliefs Among Primary Care Physicians and Newborn Hospitalists. *J Prim Care Community Health*. 2022;13:21501319221106880.
[13] Muldoon K.M., Armstrong-Heimsoth A., Thomas J. Knowledge of congenital cytomegalovirus (cCMV) among physical and occupational therapists in the United States. *PLoS One*. 2017;12(10):e0185635.
[14] Larkin A., Misiuta I. Online CME Effectively Improves Obstetrician-Gynecologists' Clinical Knowledge and Confidence Related to Cytomegalovirus. *Obstet Gynecol*. 2023;141(5S):96S.
[15] Hoki C., White M., Pesch M.H., Melvin A.J., Park A.H. A Cross-Sectional Survey of Pediatric Infectious Disease Physicians' Approach to Congenital Cytomegalovirus Infection. *Int J Neonatal Screen*. 2023;9(2):17.

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