Wasik Magdalena. Women's knowledge on Cytomegalovirus infection and prophylactic measures in the light of own research. Journal of Education, Health and Sport. 2019;9(8):461-475. eISSN 2391-8306. DOI http://dx.doi.org/10.5281/zenodo.3379326 http://ojs.ukw.edu.pl/index.php/johs/article/view/7337

The journal has had 7 points in Ministry of Science and Higher Education parametric evaluation. Part B item 1223 (26/01/2017).
1223 Journal of Education, Health and Sport eISSN 2391-8306 7

The authors declare that there is no conflict of interests regarding the publication of this paper.

Received: 05.08.2019. Revised: 15.08.2019. Accepted: 27.08.2019.

Women's knowledge on Cytomegalovirus infection and prophylactic measures in the light of own research

Magdalena Wasik

Faculty of Medicine and Health Sciences, Jan Kochanowski University in Kielce, Poland

Abstract

Introduction: Recently an increasing number of infections caused by Cytomegalovirus (CMV) have been observed worldwide. A human being is the reservoir of the infection. The infected person releases viruses in saliva, tears, semen and urine. Pregnant women, newborns, AIDS patients and immunocompromised persons are the most exposed to the severe clinical course of the infection. Preventive measures play an important role in limiting the spread of CMV infections.

Aim of the study: The aim of the study was to investigate the knowledge of women about Cytomegalovirus infection and preventive actions taking into account variables such as age, education and number of children.

Material and method: The study was conducted in the period from February to June 2016 by means of a diagnostic survey. 63 women aged 20 and over took part in the survey. The tool used in the study was a questionnaire. The most numerous group were the respondents aged

20-29 years and the least aged 40-49 years. The research results were developed in Microsoft Excel and Statistica 13.1.

Results: The data analysis shows that women with higher and secondary education have greater knowledge about Cytomegalovirus than women with vocational education.

Conclusions: The level of knowledge of women about Cytomegalovirus infection varies according to the education of the women who have undergone the study. It is extremely important to disseminate knowledge about the prophylactic measures that can significantly affect the proper development of the foetus.

Key words: cytomegaly, pregnancy, prophylactic effects

Introduction

The Cytomegalovirus belongs to the Herpesviridae family. The CMV genome consists of a double strand of DNA, which is bound to the capsid. The tegument consists of a neurocapside, which is surrounded by a layer of proteins, and a phospholipid casing. Surface proteins are nested in the casing, which form the tabs[1].

Cytomegalovirsu is a very complex virus. Its coding capability is estimated at more than 200 proteins[2]. CMV replication follows a typical pattern for this type of viruses with double-stranded DNA. The replication time is approximately 96 hours and begins with the attachment and later penetration into the host. The most important receptor protein is the glycoprotein surface of gB[3]. With the help of a cellular apparatus, viral mRNAs in cytoplasm participate in protein translation. These in further phases undergo posttranslational transformations and proteolytic divisions. Viral DNA synthesis takes place in the cell nucleus. The process of nucleocapside accumulation also takes place here. This process ends with the

1 Dunal M, Trzcinska A, Siennicka J. Wirus Cytomegalii – problem zakażeń wrodzonych. Postępy mikrobiologii 2013; 52,1: 17-19.
2 Gibson W.: Structure and formation of the cytomegalovirusvirion. Curr. Top. Microbiol. Immunol.2008; 325: 187–204.
3 Feire AL, Koss H, Compton T. Cellular integrins function as entry receptors for human cytomegalovirus via a highly conserved disintegrin-like domain. Proc. Natl. Acad. Sci. USA2004;101:15470–15475.

deposition of surface proteins in the casing[4]. Cell fusion causes the spread of infection and allows the virus inside the cell to avoid the action of neutralizing antibodies[5].

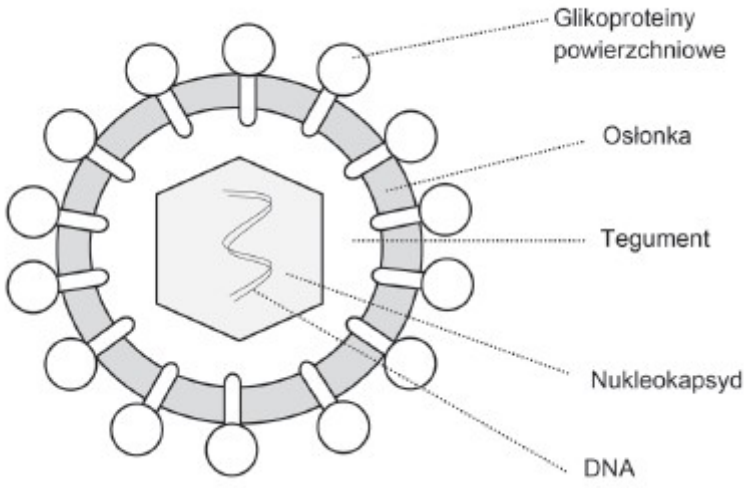

Figure 1. The structure of the cytomegalovirus molecule

Recently, an increase in the number of recognized infections caused by Cytomegalovirus has been observed. The frequency of infection is linked to the economic status of the country. The lower the infection is, the more frequent it is. This virus is one of the most common pathogens that cause neurological disorders in children. It is estimated that congenital CMV infection occurs with a frequency of 5-7/1000 live births. The majority of newborns are asymptomatic[6,7]. The reservoir for the infection is a human being. A person with a confirmed infection releases the virus in tears, saliva, semen and urine. It is also present in breast milk, transplanted organs and blood[8]. he main source of infection for pregnant women are children from 1-4 years of age. The risk of infection during this period is greatest due to

4 Dunal M, Trzcinska A, Siennicka J. Wirus Cytomegalii – problem zakażeń wrodzonych. Postępy mikrobiologii 2013;52,1:17-19Dunal M, Trzcinska A, Siennicka J. Wirus Cytomegalii – problem zakażeń wrodzonych. Postępy mikrobiologii 2013; 52,1: 17-19.

5 Casarosa P, Waldhoer M, LiWang PJ, Vischer HF, Kledal T, Timmerman H, Schwartz TW, Smit M.J, Leurs R. CC and CX3C chemokines diferentially interact with the N terminus of the human cytomegalovirus-encoded US28 receptor. Biol. Chem2005; 280: 3275–3285.

6 Śmiechura M, Stużycka M, Konopka Ł, Konopka W. Czuciowo-odbiorcze uszkodzenie słuchu oraz powikłania okulistyczne w przebiegu wrodzonego zakażenia wirusem cytomegalii u dzieci. Ann Acad Med. Siles.2014; 68(3):169-175.

7 El Hasbaoui B, Bousselamti A, Redouani M, Barkat A. Severe neonatal cytomegalovirus infection: about a case. Pan Afr Med. J. 2017; 27:161.

8 Cianciara J, Juszczyk J. Choroby zakaźne i pasożytnicze tom II. Wyd. Czelej. Lublin 2012; 682.

contact with peers or lack of proper hygiene. It is also related to the fact that the amount of viruses secreted in this age is higher than in infancy[9].

In adults the primary infection is asymptomatic, although sometimes it may resemble mononucleosis. It is characterized by fever, enlarged lymph nodes, malaise, weakness and growth of leukocytes. The most exposed to the severe clinical course of infection are pregnant women, newborns, AIDS patients and immunocompromised persons. Through blood, the virus spreads to: Kidney, spleen, heart, liver, retina, brain, inner ear, lungs. Infection usually occurs in early childhood. The virus can be detected after 6 and sometimes even 42 months after infection. Cytomegalovirus infection may occur during pregnancy, childbirth or postnatal period. At least half of all women of childbearing age have been infected before pregnancy. The CMV virus can last a very long time in the human body. Pregnancy can be the factor that stimulates a previously hidden infection. The greatest risk of having a baby with CMV is during primary infection. If the foetus gets infected in the first trimester of pregnancy, the prognosis for the baby is worse[10]. Many neonates with congenital CMV do not show any symptoms during childbirth, but these symptoms may appear later[11].

Screening of pregnant women plays an important role in the prevention of CMV congenital infection. It is an ultrasound examination, serological examination of pregnant blood, amniotic fluid, which is collected by means of amniocentesis and umbilical cord blood examination[12,13]. Screening tests performed on newborns allow for quick diagnosis, initiation of treatment and application of appropriate pediatric and neonatal care[14].

Preventive measures to reduce the spread of infection are essential. They should be targeted at the general public but especially at people with a high level of exposure such as child carers, health professionals in paediatric wards, nurseries and kindergartens[15].

---

9 Bulslewicz D, Czech-Kowalska J, Latka-Grot, Dobrzańska A. Profilaktyka zakażeń wrodzonych wirusem cytomegalii. GinPolMedProject 2016; 3(41): 55.

10 Dunal M, Trzcinska A, Siennicka J. Wirus Cytomegalii – problem zakażeń wrodzonych. Postępy mikrobiologii 2013; 52,1: 20-21.

11 Głkowska M, Dobrzańśka A.Trudności w rozpoznawaniu cytomegalii wrodzonej. Poradnik Lekarza 2008; 2: 41.

12 Czech B, Wysocki. Wewnątrzmaciczne zakażenie wirusem cytomegalii – epidemiologia, diagnostyka, leczenie i zapobieganie. Ginekologia praktyczna 2008; 2: 4-6.

13 Oszukowski P, Pięta-Dolińska A. Cytomegalia. W: Zakażenia perinatalne. Red: Słomko Z, Drews K. Polskie Towarzystwo Medycyny Perinatalnej PTMP. Poznań 2001; 392-403.

14 Milewska-Bobula B. Toksoplazmoza i cytomegalia – postępowanie w okresie ciąży. Medycyna praktyczna. Ginekologia i Położnictwo 2004; 6: 69-80.

15 Lisowska-Mikołajków D, Mikołajków A, Reczuch J, Królak-Olejnik B. Zakażenie wrodzone wirusem cytomegalii – problem wciąż aktualny (na podstwie doświadczenia własnego oraz literatury). Developmental Period Medicine 2018; XXII: 55.

In order to reduce the risk of infection, it is necessary to:

- after every contact with saliva, urine or other secretions, wash your hands thoroughly with soap and water, especially in children, as it is in childhood that we most often experience cytomegaly,
- disinfect toys,
- wash hands thoroughly with butter and warm water after children's hygiene routines[16].

Aim of the study

The aim of the study was to investigate the knowledge of women about Cytomegalovirus infection and prophylactic actions taking into account variables such as age, education and number of children.

Material and method

The study was conducted from February to June 2016 with the use of the diagnostic survey method. It covered 63 women aged from 20 years. The most numerous group were the respondents aged 20-29 years (42.86%), while the smallest group aged 40-49 years (14.29%). The tool used in the study was a questionnaire. It contained 26 questions and they were of a closed nature. The basic information concerned age, education, number of children and place of residence. Other questions that were asked to the respondents concerned the knowledge about the virus, causes and symptoms of the infection, as well as prophylactic measures.

16 Bulslewicz D, Czech-Kowalska J, Latka-Grot, Dobrzańska A. Profilaktyka zakażeń wrodzonych wirusem cytomegalii. GinPolMedProject 2016; 3(41): 55.

Tabele 1. Socio-demographic data

Socio-demographic data		n	%
sex	female	63	100
accommodation	city	30	47,62
	village	33	52,38
age	20-29	27	42,86
	30-39	13	20,63
	40-49	9	14,29
	>50	14	22,22
education	higher education	26	41,27
	secondary education	32	50,79
	vocational education	5	7,94
number of children	1 child	9	14,29
	2 children	14	22,22
	>2	12	19,05
	0	28	44,44

Results

Statistical analysis shows that education has a significant influence on the classification of Cytomegalovirus because p=0.001. People with secondary education (62.5%) and higher (57.69%) know that Cytomegalovirus is a human virus belonging to the Herpesviridae family. Women with vocational education could not indicate the correct answer.

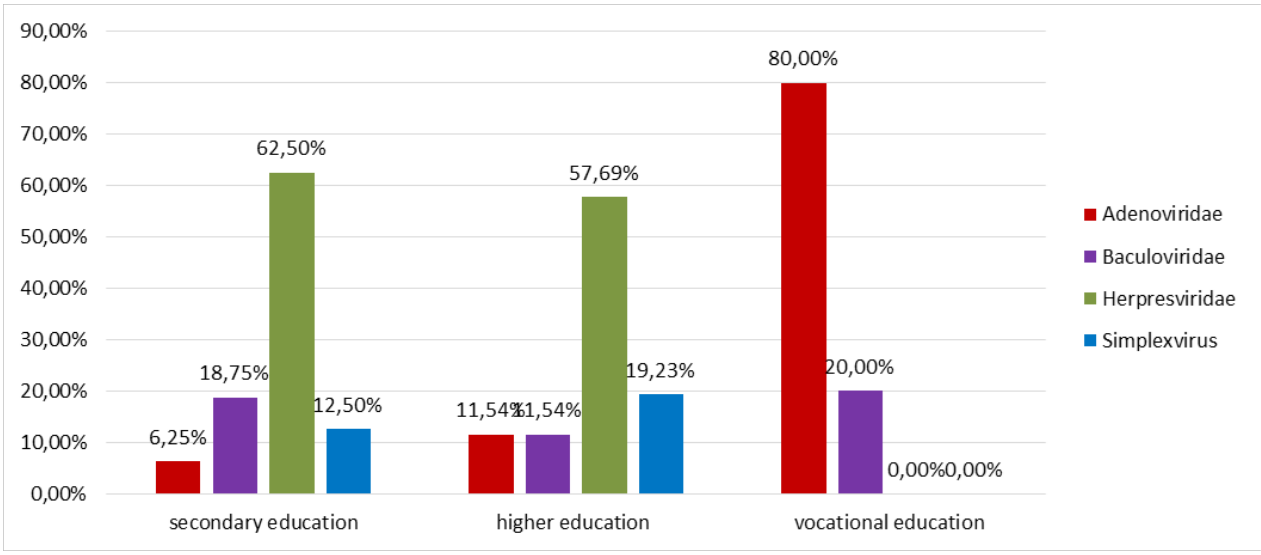

Figure 2. Classification of Cytomegalovirus in the opinion of respondents

The analysis of the research results showed that education has a significant impact on the differentiation of knowledge about the type of disease caused by Cytomegalovirus, because p=0.019. The examined women with secondary education (62.5%) and higher (76.92%), in contrast to women with vocational education, were able to indicate that Cytomegalovirus causes viral disease.

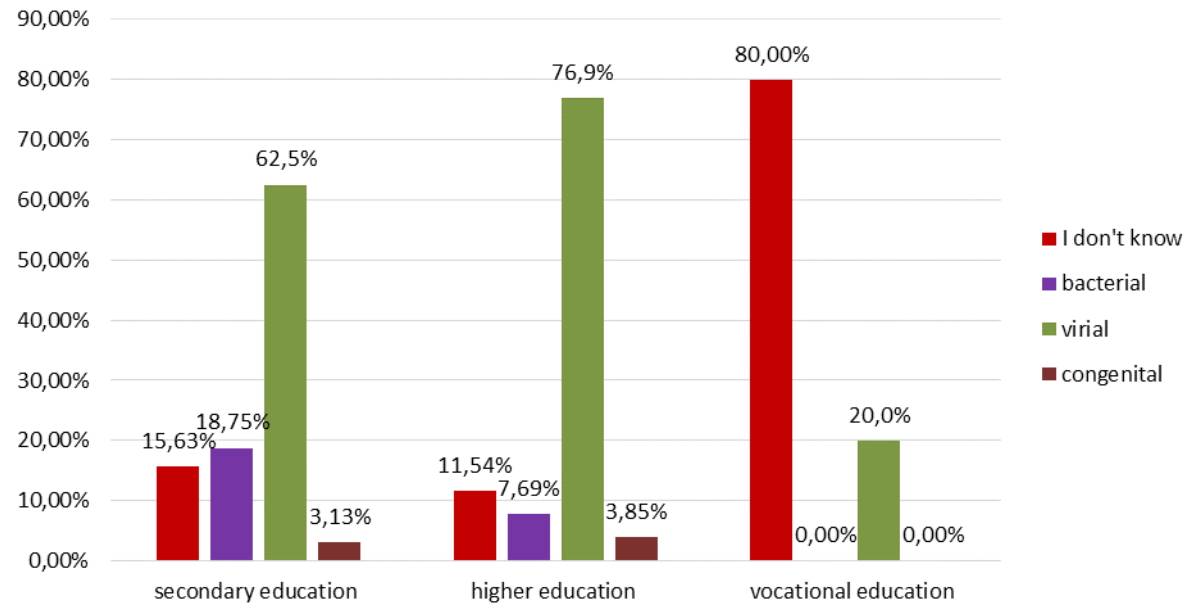

Figure 3. Type of disease caused by Cytomegalovirus in the opinion of respondents

Most women have never heard of cytomegalovirus (38.10%), while the Internet was the largest source of information for the others (31.75%).

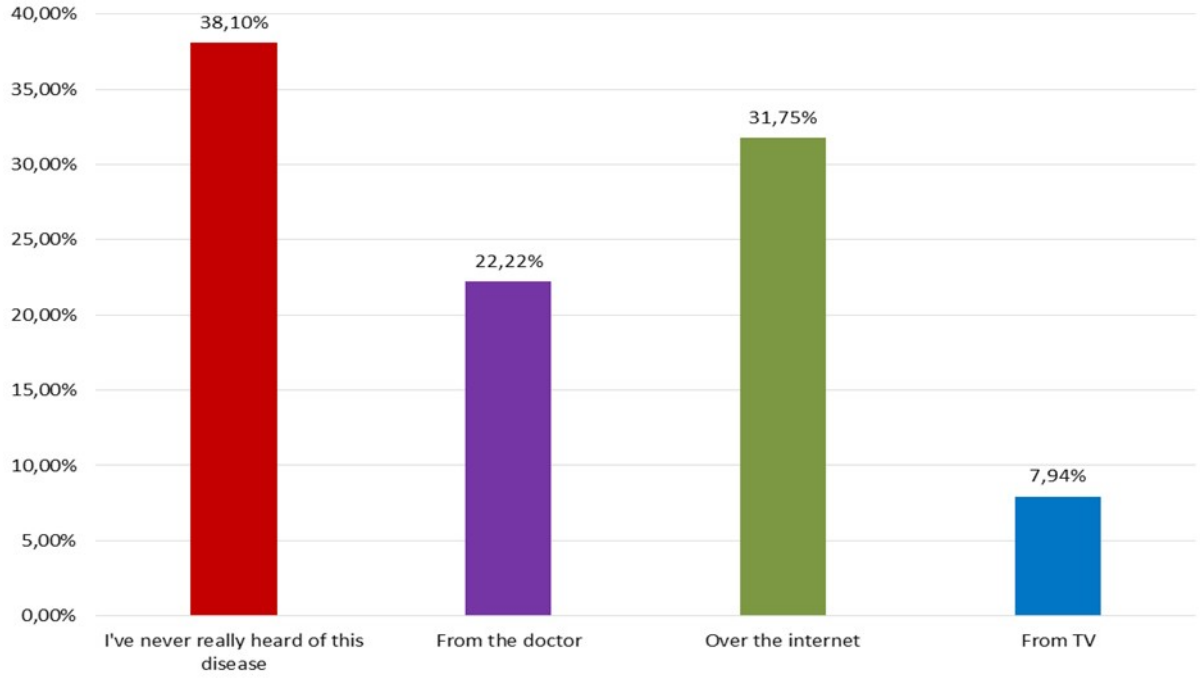

Figure 4. Source of information on CMV

According to the opinion of the examined women, the pathways of infection with cytomegalovirus are placenta during childbirth (68.25%) and blood transfusion (58.73%). The women most rarely chose the answer indicating that they could be infected by drinking tap water (9.52%). Women have knowledge about the ways of getting infected with cytomegalovirus, as evidenced by the lowest percentage of people choosing wrong answers.

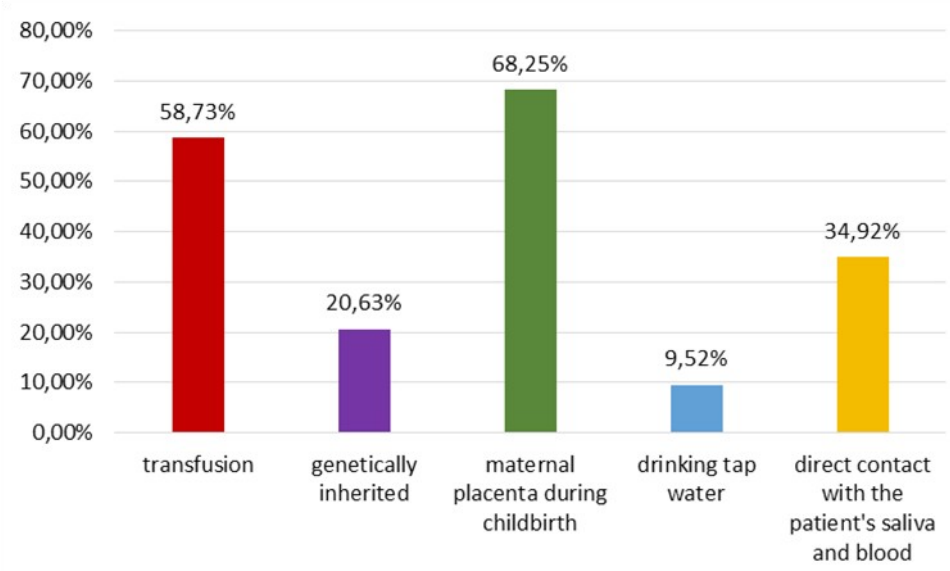

Figure 5. Paths of cytomegalovirus infection in the opinion of respondents

Most of the women surveyed believe that pregnant women with immunodeficiency (80.95%) and AIDS patients (55.56%) are the most exposed to Cytomegalovirus infection. Very rarely women chose the answer that these are people working in steel mills and mines (6.35%).

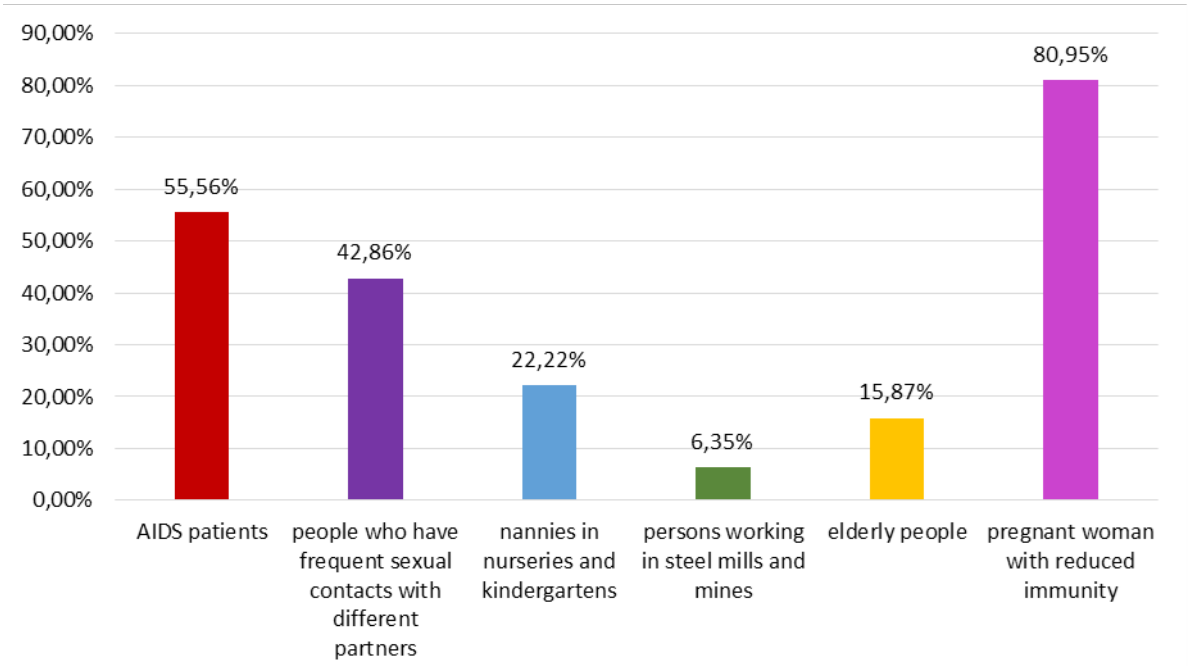

Figure 6. Persons most exposed to Cytomegalovirus infection in the opinion of the respondents

The vast majority of women (84.13%) believe that cytomegaly is a very serious threat to the foetus. A small proportion of the respondents (1.59%) claim that this disease does not affect the child's development.

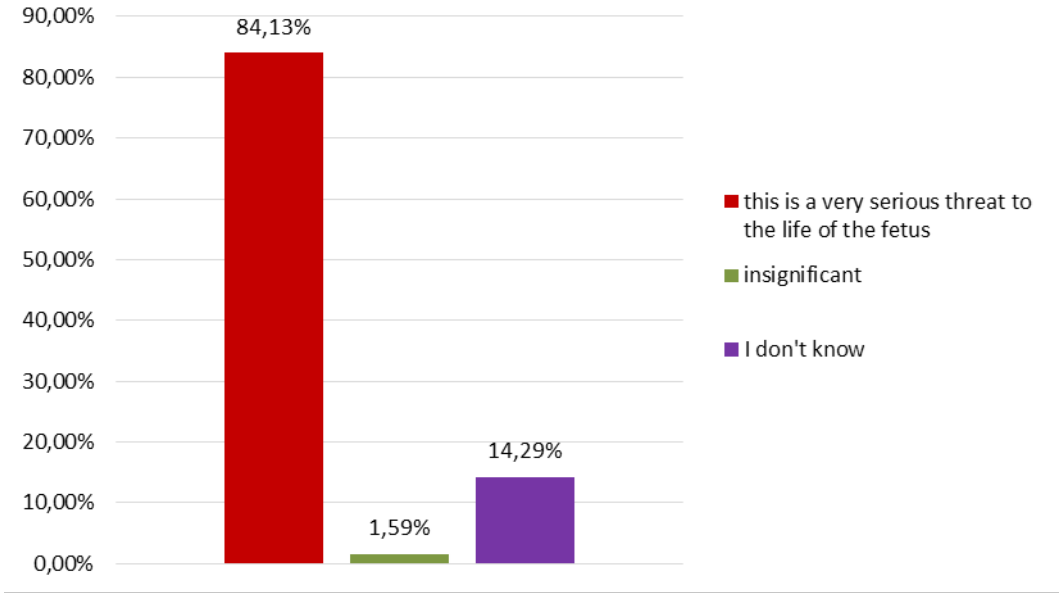

Figure 7. Threat to the foetus caused by cytomegaly in the opinion of the respondents

Women in the majority (39.68%) claim that the cytomegalovirus can cause miscarriage and birth defects in the first trimester of pregnancy.

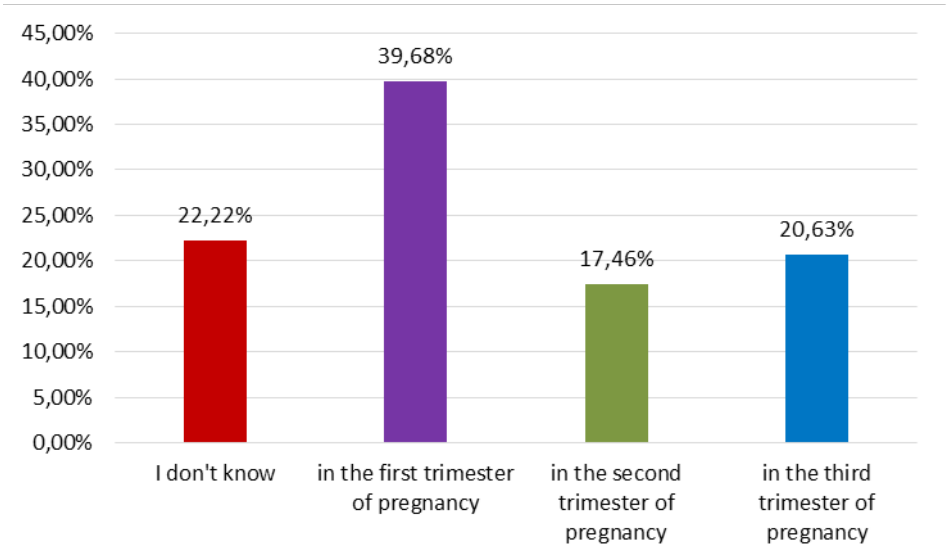

Figure 8. Cytomegaly - miscarriage and congenital malformations in the opinion of the respondents

The vast majority of women believe that symptoms of cytomegaly include enlarged lymph nodes (84.13%) and elevated temperature (73.02%).

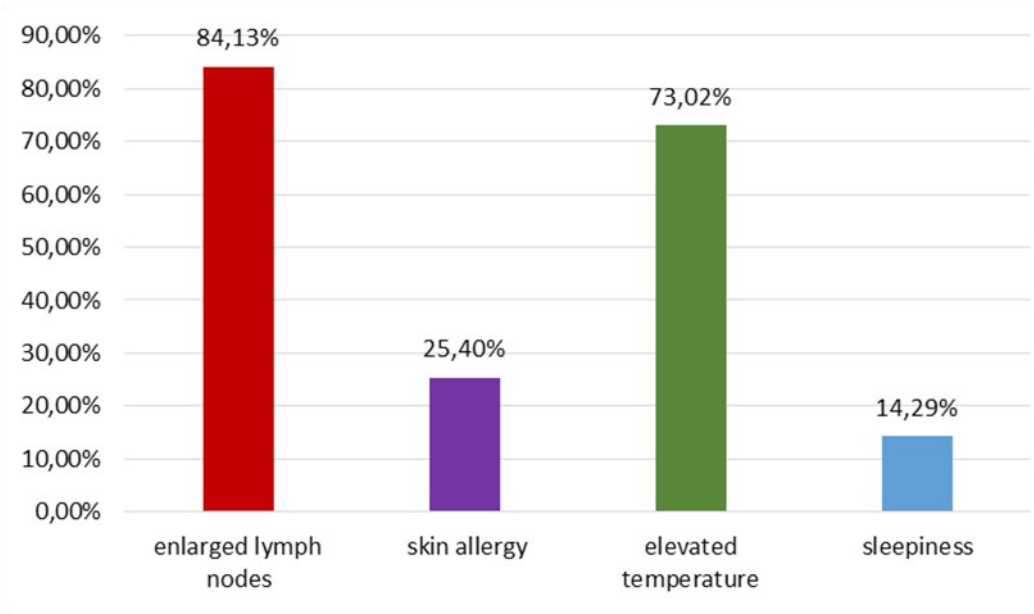

Figure 9. Symptoms of cytomegalovirus in the opinion of the respondents

Independently of education, the most frequently indicated response to prevention was avoidance of contact with blood, saliva, urine and other human secretions (50.79%). In each of the studied groups, erroneous answers constituted the lowest percentage.

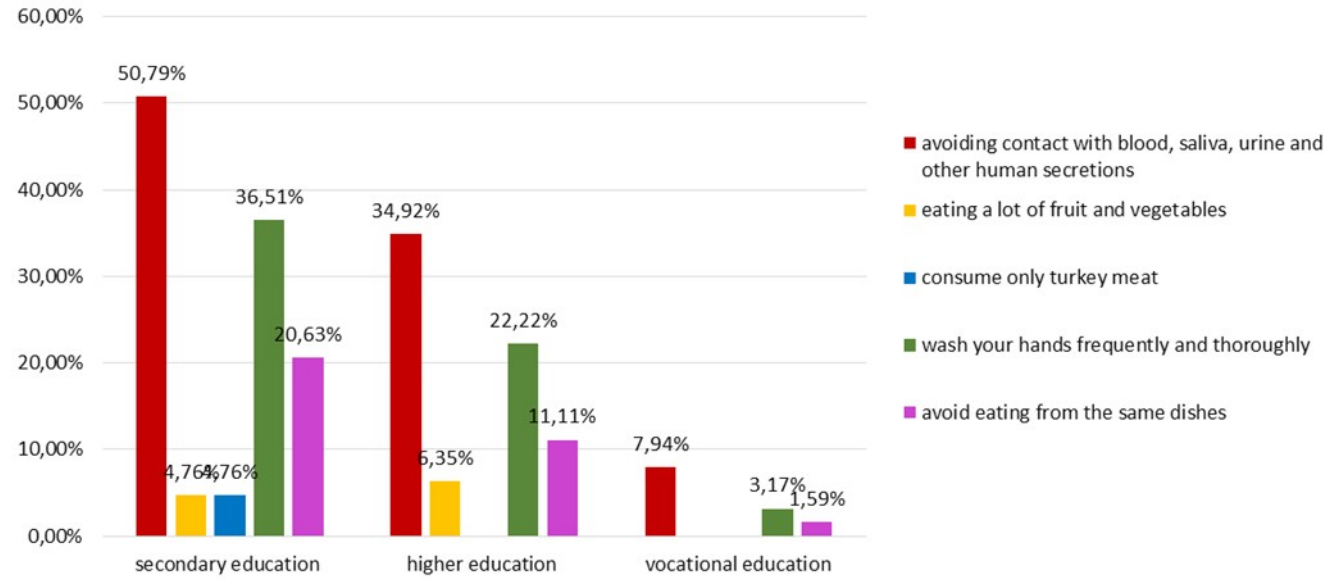

Figure 10. Knowledge on prevention of Cytomegalovirus infections due to education

Most women are believed to be aware of toxoplasmosis and cytomegaly, which should be disseminated on television (41.27%) and by gynaecologists (39.68%). The same percentage of women (9.52%) would like to learn about these infections in hospitals and magazines.

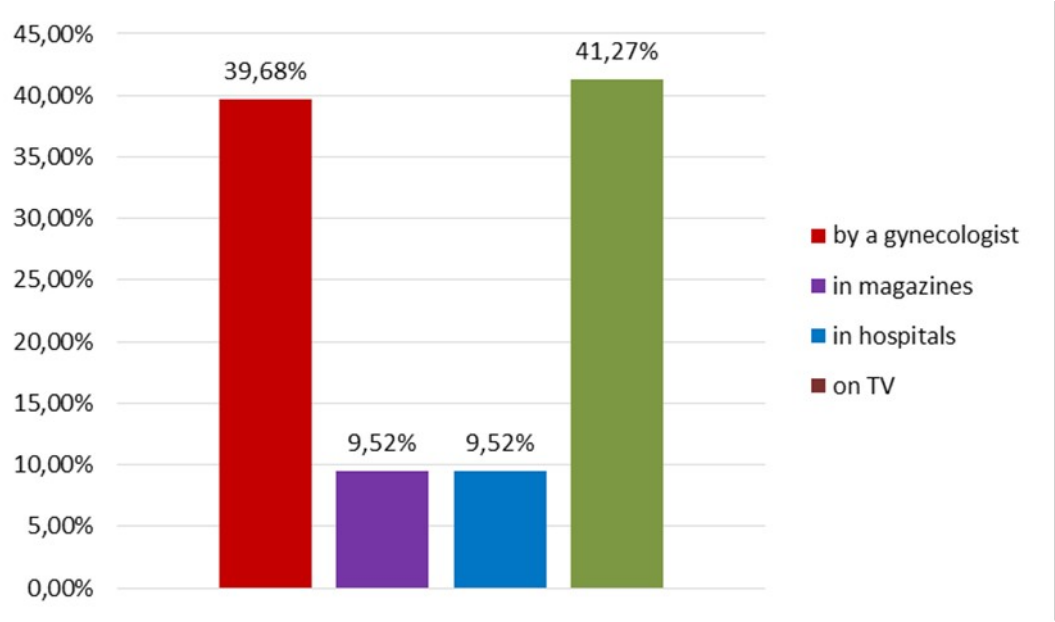

Figure 11. Sources from which subjects would like to learn about the most common infections during pregnancy in the future

Discussion

In the above interpretation studies the knowledge on the basic definitions related to Cytomegalovirus infection was subjected to. The analysis shows that people with secondary education (62.5%) and higher education (57.69%) have the highest opinion about virus classification. Unfortunately, women with vocational education do not have any knowledge on this subject. Women with secondary education (62.50%) and higher education (76.92%) also have greater knowledge about the type of virus caused by the virus, whereas people with vocational education were mostly unable to indicate the correct answer (80.00%).

From the research of Dunal et al. the source of the virus can also be children who go to kindergarten. A long period of active infection can be observed in children under 3 years of

age. It follows that the most vulnerable group of women are mothers of small children and teachers from kindergartens or crèches[17].

According to the analysis carried out by the author of the work, in the opinion of the respondents, the most vulnerable people to cytomegalovirus infection are pregnant women with reduced immunity (80.95%) and AIDS patients (55.56%), while caregivers in nurseries and kindergartens were the third most-ranked answer and accounted for 22.22%.

According to the Czech Republic, the primary infection is often asymptomatic. The cleanest symptoms are swollen lymph nodes, fever, cough, headache and fatigue[18].

The analysis of the author's research shows that the symptoms of cytomegalovirus most often indicated by the subjects are enlarged lymph nodes (84.13%) and elevated temperature (73.02%).

There are many studies that indicate the important role of placenta during congenital cytomegalovirus infection [19].

Based on the collected materials, it can be concluded that women consider mother's placenta during labor (68.25%) as the most common route of CMV infection. A large percentage of respondents indicate blood transfusions (58.73%) and direct contact with saliva and blood of the patient (34.92%) as a route of infection with the virus.

From research conducted by Simani et al. shows that the most effective methods that would allow women to deepen their view of CMV infections include talking to a pediatrician (89%) and websites like WebMD (66%) where they can search for important information themselves. The respondents indicated social networking sites as the least reliable source of information (46%), information purchased from family and friends (52%) or searched through Google (56%)[20].

The analysis of materials collected by the author of this work shows that the majority of women have never heard of cytomegalovirus (38.10%), while the rest of the people learned about this disease via the Internet (31.75%) and from a doctor (22.22%

17 Dunal M, Trzcinska A, Siennicka J. Wirus Cytomegalii – problem zakażeń wrodzonych. Postępy mikrobiologii 2013; 52,1 :20-21.

18 Czech B, Wysocki J. Wewnątrzmaciczne zakażenie wirusem cytomegalii – epidemiologia, diagnostyka, leczenie i zapobieganie. Ginekologia praktyczna 2008;2: 3-4.

19 Dunal M, Trzcinska A, Siennicka J. Wirus Cytomegalii – problem zakażeń wrodzonych. Postępy mikrobiologii 2013; 52,1 :20-21.

20 Simani M, Bonil E, Zador P, Levis D, Kilgo Ch,Cannon M. Educating women about congenital cytomegalovirus: assessment of health education materials through a web-based survey. BMC Women's Health 2014; 14: 144.

Summary

In limiting the spread of Cytomegalovirus infection, in addition to neonatal screening, preventive measures such as frequent hand washing, especially after contact with children and objects that they use, play an important role. Preventive measures for cytomegalovirus should be directed to groups of people who are particularly vulnerable to the possibility of infection. The group of people particularly vulnerable to infection includes women caring for young children. These are nurses, doctors, teachers and childminders.

Conclusions

1. The level of knowledge of women about Cytomegalovirus infections varies.

2. Among the factors that have a significant impact on the level of knowledge about infections is education.

3. Women with higher and secondary education have more knowledge about Cytomegalovirus than women with vocational education.

4. The majority of respondents show satisfactory knowledge about the prevention of infections.

5. The most common source of women's knowledge about Cytomegalovirus infections was internet and television, while the preferred gynecologist is the doctor.

References

1. Bulslewicz D, Czech-Kowalska J, Latka-Grot, Dobrzańska A. Profilaktyka zakażeń wrodzonych wirusem cytomegalii. GinPolMedProject 2016; 3(41): 54-55.
2. Casarosa P, Waldhoer M, LiWang PJ, Vischer HF, Kledal T, Timmerman H, Schwartz TW, Smit M.J, Leurs R. CC and CX3C chemokines diferentially interact with the N terminus of the human cytomegalovirus-encoded US28 receptor. Biol. Chem2005; 280: 3275–3285.
3. Cianciara J, Juszczyk J. Choroby zakaźne i pasożytnicze tom II. Wyd. Czelej. Lublin 2012; 682.

4. Czech B, Wysocki J. Wewnątrzmaciczne zakażenie wirusem cytomegalii – epidemiologia, diagnostyka, leczenie i zapobieganie. Ginekologia praktyczna 2008;2: 3-6.
5. Dunal M, Trzcinska A, Siennicka J. Wirus Cytomegalii – problem zakażeń wrodzonych. Postępy mikrobiologii 2013; 52,1 :17-21.
6. El Hasbaoui B, Bousselamti A, Redouani M, Barkat A. Severe neonatal cytomegalovirus infection: about a case. Pan Afr Med. J. 2017; 27:161.
7. Feire AL, Koss H, Compton T. Cellular integrins function as entry receptors for human cytomegalovirus via a highly conserved disintegrin-like domain. Proc. Natl. Acad. Sci. USA 2004;101: 15470–15475.
8. Gibson W. Structure and formation of the cytomegalovirusvirion. Current Topics in Microbiology and Immunology 2008;325: 187–204.
9. Głkowska M, Dobrzańśka A.Trudności w rozpoznawaniu cytomegalii wrodzonej. Poradnik Lekarza 2008; 2: 41.
10. Lisowska-Mikołajków D, Mikołajków A, Reczuch J, Królak-Olejnik B. Zakażenie wrodzone wirusem cytomegalii – problem wciąż aktualny (na podstwie doświadczenia własnego oraz literatury). Developmental Period Medicine 2018; XXII: 55.
11. Milewska-Bobula B. Toksoplazmoza i cytomegalia – postępowanie w okresie ciąży. Medycyna praktyczna. Ginekologia i Położnictwo 2004; 6: 69-80.
12. Oszukowski P, Pięta-Dolińska A. Cytomegalia. W: Zakażenia perinatalne. Red: Słomko Z, Drews K. Polskie Towarzystwo Medycyny Perinatalnej PTMP. Poznań 2001; 392-403.
13. Simani M, Bonil E, Zador P, Levis D, Kilgo Ch,Cannon M. Educating women about congenital cytomegalovirus: assessment of health education materials through a web-based survey. BMC Women's Health 2014; 14: 144.
14. Śmiechura M, Stużycka M, Konopka Ł, Konopka W. Czuciowo-odbiorcze uszkodzenie słuchu oraz powikłania okulistyczne w przebiegu wrodzonego zakażenia wirusem cytomegalii u dzieci. Ann Acad Med. Siles.2014; 68(3):169-175.