

Congenital infections prevention knowledge and practices among Romanian pregnant women

Abstract

Objectives. The study purpose is to evaluate the knowledge among pregnant women in Romania regarding congenital infections. **Methods.** We developed a survey consisting of 35 questions in which we surveyed 267 pregnant women regarding their knowledge about toxoplasmosis, listeriosis and rubella. Statistical data were analyzed using EpiInfo software. **Results.** About 68.7% had heard about toxoplasmosis, 48.9% about listeriosis and 90.8% about rubella. Most of the respondents did not know the preventive measures; 35% know that consuming undercooked meat is a way of getting toxoplasmosis, only 26% know that must not consume unpasteurized dairy products for preventing listeriosis and about 40% don't know that vaccination is the way of preventing rubella. Behavior during pregnancy assessed overall and does not promote prevention of congenital infections. **Conclusions.** Prevention of congenital infections should be a national priority and all childbearing and pregnant women should be informed about.

Keywords: congenital infections, knowledge, pregnant women

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Introduction

Congenital infections occur during pregnancy and cause devastating consequences to the fetus. This is a worldwide known fact since more than half a century ago. The acronym TORCH was introduced in 1971 grouping the most frequent infectious agents responsible for congenital infections: *Toxoplasma gondii*, *Rubella Virus*, *Cytomegalovirus*, *Herpes Simplex virus*.

World Health Organization (WHO) recognized the importance of congenital infections by setting the goal to eliminate congenital rubella syndrome by 2015⁽¹⁾.

Center for Disease Control and Prevention (CDC) estimates that 400-4000 cases of congenital toxoplasmosis are reported in US, annually, with an incidence of 0.1 to 1 in 1000 live births. France, one of the few countries in Europe with a National Surveillance System for congenital toxoplasmosis, in 2010 reported an incidence of 2.9 cases to 10.000 live births⁽²⁾.

Toxoplasmosis is caused by *Toxoplasma gondii* protozoa, and the domestic cat is its primary host. Pregnant women can become infected by ingesting oocysts present in cat litter and contaminated undercooked meat, fruits and vegetables, water, soil. An European multicentre case-control study regarding sources of *T. gondii* infection in pregnant women found that consume of undercooked meat is the most frequent way of transmission⁽³⁾.

In US 85% women of childbearing age are susceptible to infection with *T. gondii*. This can easily be prevented by following simple rules of hygiene. CDC guidelines include: cooking food to safe temperatures, peeling and washing fruits and vegetables thoroughly before eating, washing carefully utensils after contact with food, hand washing with soap for at least 20 seconds, avoiding drinking untreated water, wearing gloves during contact with soil, avoiding changing cat litter, keeping cats indoors and feeding them with dried commercial food only, avoiding stray cats⁽⁴⁾.

Listeriosis is a food-borne disease associated with ready-to-eat foods and one of the congenital infections included in TORCH acronym to 'O-other' together with HIV, HBV, Syphilis, Parvovirus B19. Listeriosis is produced by *Listeria monocytogenes*, an ubiquitous bacterium to which pregnant women are 20 times more likely to become infected due to immunological changes that occur during pregnancy. About 27% of all cases of listeriosis are diagnosed in pregnant women⁽⁵⁾. Epidemiological investigations demonstrated that *Listeria* can contaminate almost any kind of food, but most of the infections are associated with unpasteurized dairy products, ready-to-eat food, deli meats and soft cheeses⁽⁶⁾. Avoiding these types of food is the best safety measure for preventing congenital listeriosis, as long as there is no vaccine against it. CDC strongly recommends to all pregnant women to carefully keep these rules.

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Rubella results from infection with rubella virus which is spread by contact with an infected person through coughing and sneezing. Congenital rubella syndrome (CRS) results from rubella infection during pregnancy. It is estimated that annually, 110.000 children from developed countries are affected by CRS. WHO target regarding CRS established for 2015 is less than 1 case in 100.000 live births⁽¹⁾. The strategy adopted in order to achieve this goal consists of offering protection to childbearing women through vaccination. 90% of the European states included the anti-rubella vaccine in their national program of immunization. In Romania, the measles-mumps-rubella (MMR) vaccine was introduced in May 2004 in national immunization program to all children with 12-15 months of age. Vaccination is the only effective way of preventing CRS, and the Scandinavian countries proved that eradication of CRS can possible.

The purpose of our study is to evaluate the level of knowledge about toxoplasmosis, listeriosis and rubella among pregnant women in Romania and to determine if measures are needed to be taken, as by now there are now studies in Romania regarding knowledge of pregnant women about congenital infections.

Methods

We developed a survey consisting of 35 questions with predefined answers and applied it to 267 pregnant women from different demographic regions after their written informed consent.

The questions were meant to evaluate the knowledge and practices among pregnant women in Romania regarding toxoplasmosis, listeriosis and rubella. The questionnaire had 6 parts: information about the study and written consent, general information about the participant, questions about toxoplasmosis, questions about listeriosis, questions about rubella and questions about the practices since being pregnant. The questionnaire was anonymous and was applied by the authors and some medical students individually to each participant; it took approximately 30 minutes to complete. 203 out of 267 questionnaires have been applied in 3 maternities from Bucharest: Clinical Hospital of Obstetrics-Gynecology "Prof. Dr. Panait Sarbu", Filantropia and Bucur Maternity from Clinical Hospital "Sfantul Ioan". The study took place in March - June 2013. The survey data were analyzed using EpiInfo software. The sample size was computed with a 95% confidence level and 0.01 standard error for a population of 200.000 pregnant women, and was determined to be 185.

Results

About 65% of the pregnant women participating in the study were aged between 27 and 35 years, with a median age of 29 years. Three-quarters of pregnant women were interviewed in the 3rd trimester of pregnancy, near term birth and the median parity

was 1. More than 50% of the respondents graduated university studies, 2.3% are illiterate (all of them were rroma) and 75% reside in urban areas.

Study participants were asked if they had ever heard/seen/read about 3 infectious diseases and 68.7% responded affirmatively for toxoplasmosis, 48.9% for listeriosis and 90.8% for rubella. Apparently, rubella seems to be very well known. However, about 50% believe that they have been tested for rubella and toxoplasmosis and 35.5% for listeriosis. For almost half of the pregnant women who affirmed that have been tested for listeriosis the results were available. Studying the results we observed that all of these pregnant women have been tested using serological tests which are unreliable.

Regarding the risk of transmission of these 3 infectious diseases to fetus, the responses varied: 53.6% didn't know about rubella, 82.2% didn't know about listeriosis and 38.5% didn't know about toxoplasmosis. The lack of knowledge about the risk they are exposed to reflects an overall low level of knowledge.

About 70-80% of the pregnant women surveyed don't know the symptoms of toxoplasmosis and listeriosis and about 50-70% don't know the symptoms of rubella.

Most of the respondents were uncertain about the preventive measures. Only 45% know that hand washing, utensils washing after contact with raw meat, washing fruits and vegetables represent important measures of preventing toxoplasmosis. About 45-50% know that changing cat litter can cause toxoplasmosis and that avoiding stray cats is a good way of preventing it. Therefore, most of the women surveyed associate toxoplasmosis with cats, but only 35% know that consuming undercooked meat is the principal way of getting toxoplasmosis.

Most of the answers to the questions about listeriosis were 'I don't know'. Therefore, only 26% know that in order to prevent listeriosis they must not consume unpasteurized dairy products and deli meats. However, 16% think listeriosis is caused by tick bite and a good way to prevent it is avoiding wooded areas.

While 68% of respondents know that rubella is caused by a virus spread by air, 9.5% believe rubella is caused by anti-rubella vaccine and 12% think is a food-borne disease. Popularly known as a childhood disease, 19% of pregnant women believe that it cannot be transmitted to adults. Moreover, about 40% of surveyed women don't know that vaccination is the way of preventing rubella. Also, 40% believe they had been vaccinated against rubella in childhood or adolescence, and therefore they are protected against it.

The survey contained a part about the practices of the participants in their pregnancy time. Behavior during pregnancy assessed overall, does not promote prevention of congenital infections. Thus, 70% of

pregnant women consumed meat and deli meats, increasing the risk of toxoplasmosis and listeriosis, more than 40% had consumed unpasteurized dairy products, increasing the risk of listeriosis and more than 60% had contact with children communities, increasing the risk of rubella and congenital CMV infection. Only 40% affirm that have taken steps to prevent infections caused by germs that are transmitted through coughing or sneezing.

Most of the pregnant women surveyed, respectively 70-85%, admit that had never asked the medical personnel about the congenital infectious diseases (toxoplasmosis, listeriosis, rubella, CMV, HSV, VHB, syphilis). Toxoplasmosis is of more interest; therefore 32% requested information about it during pregnancy, and only 18.6% before pregnancy.

The respondents were asked to check all information sources for the 3 congenital infections discussed and multiple answers were accepted. For toxoplasmosis and listeriosis, the principal sources were medical personnel and internet. The next sources according to frequencies are books and magazines about pregnancy and friends and family. Most of the respondents had heard about rubella from both health professionals and friends and family. None of them had heard about the congenital infections from Government agencies (Figure 1).

Discussion

The results of this survey show a general lack of knowledge about toxoplasmosis, listeriosis and rubella among pregnant women in Romania. Although the majority answered that they had heard/seen/read about these 3 infections, few knew that these can be transmitted to the fetus in case a pregnant woman becomes infected. Moreover, much fewer believe that they had been tested for toxoplasmosis, listeriosis and rubella during pregnancy. However, we observed that all of these pregnant women have been tested for listeriosis using serological tests which are unreliable because of antigenic cross-reactivity between *L. monocytogenes* and other gram-positive bacteria. As long as in Romania is still used the serology for listeriosis screening in pregnant women, the right diagnosis and prevention measures will not be adopted⁽⁷⁾.

There is a low level of knowledge regarding the prevention measures. Comparing our data to an USA National study, more Romanian pregnant women seem to have heard about toxoplasmosis: 68.7% versus 48%⁽⁸⁾. However, there is little difference regarding the preventive measures for toxoplasmosis (Table 1).

We observed the same tendency, most of the women both from Romania and USA associate toxoplasmosis

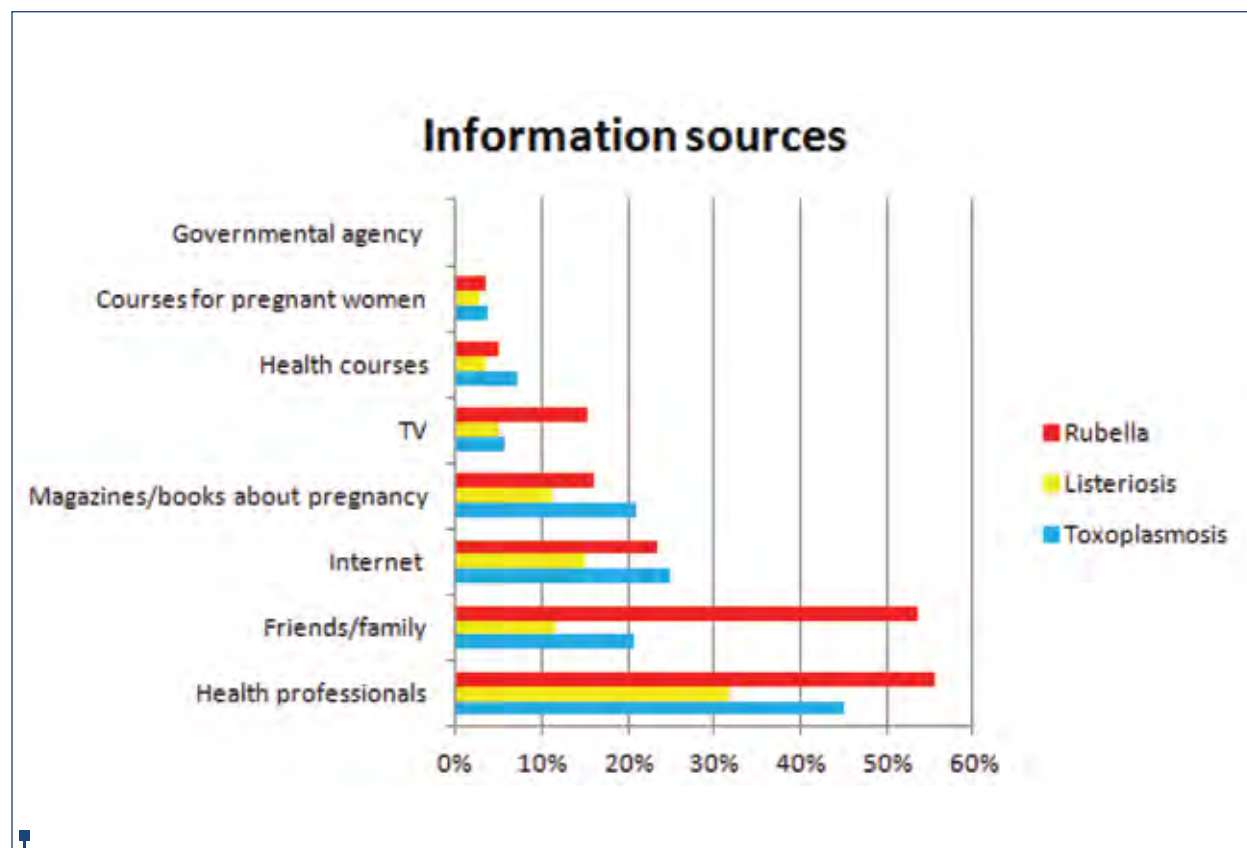


Figure 1. The sources pregnant women surveyed used to inform themselves about rubella, listeriosis and toxoplasmosis

Table 1

Knowledge about preventive measures regarding toxoplasmosis among pregnant women in Romania vs USA

| Preventive measures for toxoplasmosis | % of pregnant women who know about it | |
|--|---------------------------------------|-----|
| | Romania | USA |
| Feeding the cat dry or commercial cat food and not letting it kill and eat rodents | 29.9 | 29 |
| Avoiding stray cats | 45.8 | 47 |
| Letting someone else to change cat`s litter box | 40.8 | 65 |
| Cooking meat until no pink is seen and the juices run clear | 35.9 | 48 |
| Thoroughly washing and/or peeling all fruits and vegetables before eating them | 45.4 | 39 |
| Cleaning cutting boards thoroughly after each use | 43.9 | 49 |

Table 2

Knowledge about preventive measures regarding listeriosis among pregnant women in Romania vs USA

| Preventive measures for listeriosis | % of pregnant women who know about it | |
|---|---------------------------------------|-----|
| | Romania | USA |
| Avoid deli meats and soft cheeses | 26 | 33 |
| Thoroughly reheat all leftover foods | 11 | 29 |
| Eat only properly pasteurized dairy foods | 30.9 | 31 |
| Avoid wooded areas where ticks live | 16 | 13 |

with cats, and little know about the most important way of preventing toxoplasmosis, which is consuming adequate cooked meat.

Another study regarding listeriosis prevention knowledge among pregnant women in the USA had been conducted by the American College of Obstetricians and Gynecologists (ACOG) and CDC. Our data are quite similar to the results of this study⁽⁹⁾. Therefore, both show a general lack of knowledge about listeriosis among pregnant women. A difference between studies is noticed regarding the question if they had ever heard about listeriosis. In the National survey conducted in USA, 18% answered ‘Yes’, while in our study, 48.9% affirm that had heard. In what concerns the preventive measures, we could not observe significant differences (Table 2).

However, a study from Australia reports that 89% of the pregnant women had heard about listeriosis,

and those who hadn` t heard have a low education level or live in rural areas.

Although listeriosis appears as sporadic and very rare cases occur, it is not non-existent and must not be ignored. In 2011, in Switzerland, there were reported 9 cases of listeriosis and the source of infection was the ham⁽¹⁰⁾. In a study conducted in Canada to determine the level of knowledge of the medical staff on the listeriosis, only a third of them provided information about preventing listeriosis to the pregnant women and the main reason for the lack of counseling is lack of knowledge about listeriosis and the concept that it is a rare, unimportant disease for pregnant women⁽¹¹⁾. Most likely this situation applies to Romania, also.

The knowledge regarding rubella seems to be to a higher level compared to the other 2 infections. However, the problem related to rubella is vaccina-

tion: some believe rubella is caused by anti-rubella vaccine, almost half don't know that vaccination is the way of preventing rubella, and 40% believe they had been vaccinated against rubella in childhood or adolescence, and therefore they are protected against it. Because MMR vaccination was introduced in Romania in 2004, women of childbearing age could not have been vaccinated. Though, there was cohort of adolescents from Bucharest born in 1988-1987 who were vaccinated in 2003, in our study there might have been included just a few of them.

Rubella is indeed a major problem in Romania, especially regarding CRS. In 2013 report of National Institute for Public Health regarding surveillance of CRS, there have been reported 84 possible cases of CRS, and 85.7% of mothers of children with CRS had not been vaccinated⁽¹²⁾.

Our results indicate the need for education of pregnant women but also all childbearing age women concerning congenital infections. Prevention of congenital infections should be a national priority and all women should be informed about it.

All health professionals should collaborate in the fight against congenital infections and inform the childbearing women of the ways to prevent congenital infections in any occasion and by any means. Our study shows that physicians are the main source of information about the 3 congenital infections surveyed. The results of this study also indicate that Internet is a good source of information.

As long as there are no vaccines for toxoplasmosis and rubella, the only way of preventing the congenital infections is education. As for rubella, a more effective measure of prevention is available, the vaccine. However, vaccination represents a problem of public health since more and more people turn against it due to lack of knowledge or misleading myths.

Therefore, the key to prevention of toxoplasmosis, listeriosis and rubella is education, starting from disseminating informative materials to population and ending with considering each visit to a physician, regardless of his specialty as a great opportunity to inform and immunize susceptible childbearing age women.

We strongly believe that our study reveals a major public health problem which urges the necessity of implementing a national education program about congenital infections.

Our study is subject to several limitations:

- participation in the study was voluntary, so the results may not be representative of the population of pregnant women in Romania;
- the study participants had a higher level of education than the average level of education of women in Romania, so the result may be exaggerated;
- motivation of participants to respond to questions is subject to doubt as most questionnaires were applied in hospitals.

Conclusions

Our results indicate a low level of knowledge among pregnant women regarding toxoplasmosis, listeriosis and rubella.

There is an imperative and immediate need for education of pregnant women and childbearing age women concerning congenital infections.

The 'vectors' that should be used so that the information could reach the pregnant women are: health professionals, Internet, books and magazines about pregnancy. There is an important need for collaboration in order to prepare and distribute the needed information at national level.

There will continue to appear cases of congenital infections in Romania as long as important prevention and control measures will not be implemented. ■

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