

Food related risks during pregnancy: how much do women know about it?

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ABSTRACT

Aim: Infection with *Toxoplasma gondii* and *Listeria monocytogenes* during pregnancy can lead to severe illness in the foetus but it can be prevented by simple hygienic measures. This study analysed women’s knowledge about food related risk and the sources used to collect those information.

Methods: We surveyed pregnant women and new mothers in “Le Scotte” Hospital in Siena (Italy) using a questionnaire approved by Health Direction, processed by an optical reader and analysed using χ^2 test and Odds Ratio.

Results: 149 women participated in the study; 78.5% of them received information from the gynaecologist, 45% from Internet and the others from books/pamphlets. 67.8% felt well informed about food-related risks. 94% of them were aware of *Toxoplasma*, while 39.5% didn’t know *Listeria*. Our results showed that graduated women tend to identify all foods as less safe and had better attitudes towards cleaning the fridge, respecting temperatures, avoiding consumption of undercooked foods, protecting food before consumption.

Conclusions: Pregnant women have good awareness of food-related risks. However there’s a huge confusion, due to the use of Internet and other not reliable sources. This study demonstrates that it’s necessary to improve the organisation of nutritional education by adequately trained health personnel.

Key words: Pregnancy Nutrition, Toxoplasmosis, Listeria, Nutrition Surveys, Public Health

INTRODUCTION

Pregnancy is a particular period for women and a proper nutrition is really important; so they tend to search for more specific information about pregnancy [1] and nutrition in order to protect foetus' health and this higher awareness could become a new "post-partum routine", a new lifestyle [2]. In this perspective, pregnancy can be considered as an important change in the lives of women with low level of awareness or interest about nutrition [1] and food related risks.

Surveys to verify the eating habits of pregnant women are useful to verify information's quality and how it has been understood, but only a few studies in literature focused on women's knowledge about food related risks. A survey from Piedmont Region, Italy, showed that majority of women (95.2%) knew how important is the food security, for themselves and for their child, but 56.5% of them thought not to be correctly informed, or to have received information limited to some aspects of food safety [3].

Another study, from USA, showed that women know not so much about toxoplasmosis, about its symptoms and its prevention. Only 48% of them knew what toxoplasmosis is, however 43% never heard about it, 8% was uncertain [4]. Toxoplasmosis is a widespread antropozoonosis [5], whose incidence is very variable: in fact from 3% to 70% of adults are positive to the tests for *Toxoplasma gondii*'s detection [6].

In Italy, it's calculated that almost 60% of pregnant women are not immunised against toxoplasmosis, so they can spread the infection to the foetus [7]. Toxoplasmic foetopathy leads to an increased risk of preterm childbirth, of low foetal growth and, in its most serious form, to a plurivisceral diffusion of parasite [5]. In the USA toxoplasmosis prevention is based on health education, with the aim to avoid the exposition to the parasite. In Italy the recommendations provided by Ministry of Health, ISS, "Centro Valutazione Efficacia Assistenza Sanitaria" (CeVEAS), "Guidelines for a physiologic pregnancy" are followed to prevent it [8].

A study conducted in British Columbia showed also that *Listeria* is known only by 54.3% of women. Participants affirmed that the lack of knowledge creates great confusion: it's not clear what kind of food can be eaten or not, how to prepare food and what are infection's consequences [9]. Therefore it's necessary a better formation for pregnant women about risks and sources of listeriosis in pregnancy [10].

Listeriosis is a food associated toxoinfection, which can especially affect immunodepressed persons, patients affected by cancer, diabetes, AIDS, seniors, babies and pregnant women [5]. The latter is the group with the highest risk and most susceptible to the disease. Listeriosis is a relatively rare disease, but with a high mortality rate [11]. In fact, foetus colonisation leads to abortion, meningitis, encephalitis or meningoencephalitis, which are often fatal. This is the systemic form of listeriosis with a

mortality rate between 20% and 30% [12]. In Italy primary prevention is performed by health personnel according to the Guidelines on physiological pregnancy SNLG-ISS [8].

The aim of this study was to evaluate the perception of food related risks during pregnancy; in particular, women's knowledge about these risks, and the used information sources.

METHODS

Our study included all pregnant women and new mothers (on their first, second and third day of hospitalisation) admitted in the Obstetrics and Gynaecology wards at "Le Scotte" Hospital, Siena, since September 2013 to February 2014. A prevalence study was carried out, administering a questionnaire approved by Health Direction. Questionnaires were also previewed and approved by "University Centre for the Customer Satisfaction in Health Services". An information letter with survey's description and an informed consent form were given too. Both interviewer and respondent signed the informed consent form.

The questionnaire was anonymous and self compiled; it was used by a previous study based on the project "Food in Pregnancy" done in ASL TO5 Chieri (formerly ASL8). This questionnaire contained eight questions in order to investigate the level of concern about food safety in pregnancy and the level of knowledge about the risk factors and the methods to prevent them.

The questionnaire used in our survey was slightly different from the original one, and each questionnaire was identified by a code in order to ensure traceability and anonymity.

The first part of the questionnaire contained some respondent's personal information: age, nationality, education and parity. The first two questions were formulated to identify the proportion of women interested in food safety and their information about it. The third question investigated the information sources. The questions from the fourth to the tenth, were formulated with the aim to estimate the dietary risks awareness and the knowledge about these risks by pregnant women. The final question (the eleventh) focused on the sources of information that women believe to be useful or not for purchase, storage and preparation of food. Finally, there was a section dedicated to suggestions.

The sample was calculated with the software EpilInfo 7 using the following formula:

$$n = [1 - (1 - a)^{1/d}] \times [N(d - 1/2)]$$

where n is the sample number (138); a is the power (we set 80%); d is the expected frequency (60%); and N is the total number of hospitalised women for childbirth in a year in the hospital of the study (1100). We

delivered a total of 260 questionnaires in order to be sure to reach the sample number. A small pilot study was conducted before the beginning of the study, to ensure that questions and answers were not ambiguous. Finally the questionnaires were delivered to women. They could fill the questionnaires and insert them in a box which was placed in every ward. Questionnaires were processed by an optical reader, using Remark Office Software version 7.0 (Gravic Inc., Malvern, PA, USA), which allowed us to standardise questionnaire reading methods in an efficient way. All questionnaires were automatically stored in a database and then exported for statistical analysis. These procedures were successfully used in a previous study for the evaluation of food service in hospital [13].

Percentages, means and standard deviations were calculated, followed by the creation of charts and tables for a descriptive purpose. χ^2 test and Odds Ratio were performed in order to identify any significant difference between the compared groups ($p < 0.05$). The data collected from the questionnaires were organised and processed using the software Stata® SE, version 12.1 (StataCorp, College Station, Texas, USA).

RESULTS

260 questionnaires were distributed, 153 returned, 4 were blank; so 149 (57.3%) were considered for the analysis.

The average age of the sample was 32.8 years, DS (5.29), the youngest was 18 years and the oldest 45 years. Most of them (83.2%) were Italian; with a medium – high education level; and primiparous (62.4%) (Table 1).

The first question “Have you ever been interested in food safety in pregnancy?” showed that 91.9% of women had interest in food safety. The second question “Did you receive information on food safety?” showed that 93.2% of women received this kind of information; and the majority of women (78.5%) answered to the question “If yes, by whom?” that they received information from the gynaecologist, from Internet (45%)

and from books and pamphlets (34.2%) (Figure 1).

In regards to the fourth question “How much does food safety affect your foetus’ health and yours?” 77.2% of women believed that food safety affects the health conditions of both.

In regards to the fifth question “How much were you informed about the risks associated with the consumption of food?” 67.8% of women felt very well informed about it.

In regards to the eighth question “Which of the following bacteria/parasites can affect your health and that of your foetus?” there was the possibility to answer “I don’t know”. Toxoplasma was the most known problem (94% of women); Listeria was unknown by 39.5% of women instead.

Graduated women had a better knowledge of the effects of Staphylococcus compared with non-graduated (OR=2.34; P=0.03), as well as effects of Listeria (OR=0.386; P=0.002). Moreover, multiparous women compared to primiparous were less informed about Listeria (OR=0.34; P=0.002).

Table 2 shows the Odds Ratio performed in order to identify any differences between the compared groups.

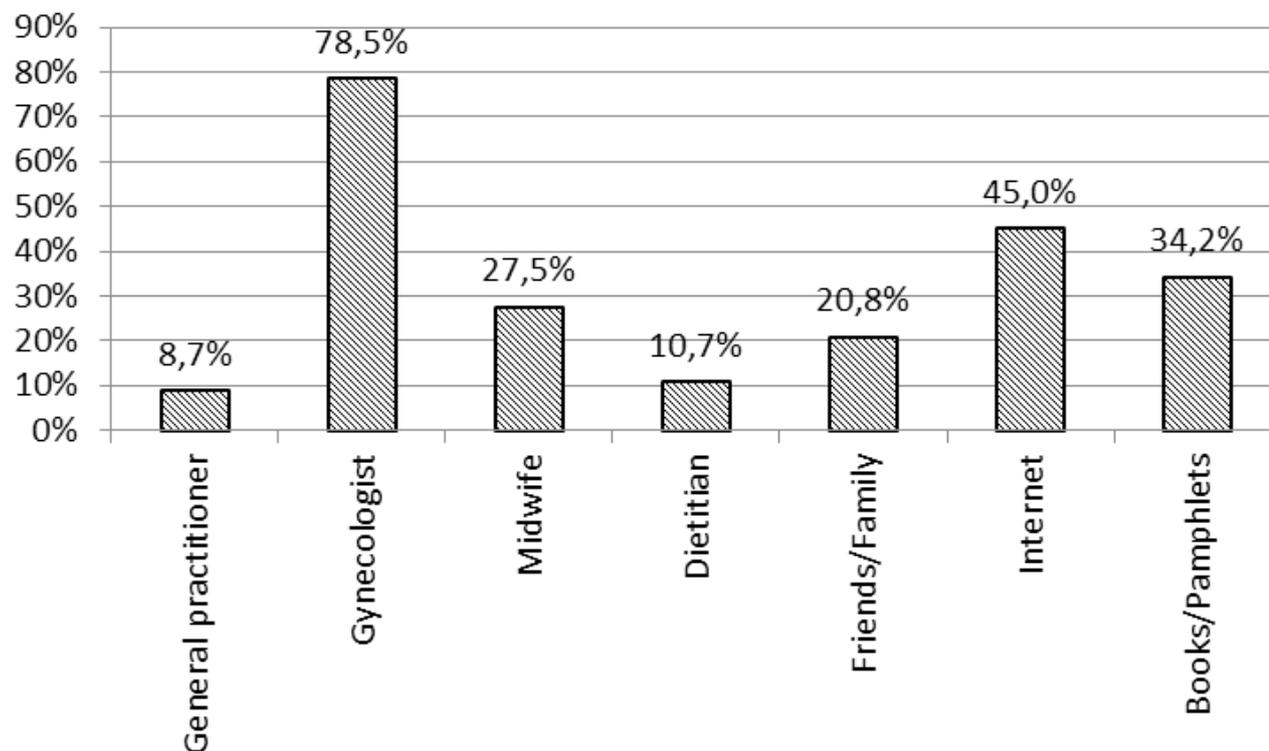
Cross-checking the answers given to the sixth question “How much do you consider these foods safe?” with women’s education level and their nationality, it was evident that graduated women identified all foods as less safe, especially meat and pork (P=0.015), milk and cheese (P=0.052), bread and carbohydrates (P=0.009).

Italian women, compared with foreigners, considered fruit and vegetables less safe (P=0.017), but considered bread and carbohydrates safer (P=0.018).

The tenth question “What methods do you think to be useful to maintain foods’ safety?” showed that the most informed women, according to the answers given in the fifth question (“Have you ever been interested in food safety in pregnancy?”), had significantly better attitudes towards cleaning the fridge (P=0.031), respecting temperatures (P=0.004), avoiding the consumption of raw or undercooked foods (P<0.001) and properly protecting the food before consumption (P=0.001).

TABLE 1. Characteristics of surveyed women in “Le Scotte” Hospital, Siena.

VARIABLE		FREQUENCY	PERCENTAGE
Place of birth	Abroad	25	16.8%
	Italy	124	83.2%
Education	Elementary	1	0.7%
	Middle	12	8.0%
	High school	66	44.3%
	Graduation	70	47.0%
	Parity	Primiparous	93
	Multiparous	56	37.6%

FIGURE 1. Sources used by women to have information about food safety*.

*More than one answer could be given.

DISCUSSION

The study showed that 91.9% of women was interested in food safety and received information about it; however, a small but not negligible part (8.1%) said the opposite.

Gynaecologists play an important role for 78.5% of women as the third question revealed.

A study conducted in Netherland analysed what information sources women used in pregnancy. The most consulted source was Internet (33%), followed by midwives (23%) and books (12%); only 2% of women considered General Practitioner important [14].

Another study, in British Columbia, demonstrated that women considered health personnel as a reliable information source, but they used Internet, social networks and books at the same time [9].

A particular aspect, that emerged from the third question, is that graduated women, compared to those with lower educational levels, tended to search for information in addition to those given by professionals, especially using Internet and books/pamphlets. This phenomenon was found by a Dutch study which showed that women with a higher education level, often needed more detailed information and relied on Internet and books [1].

On the one hand Internet is a very convenient source of information, because of the easy access, on the

other hand there is a high possibility to find false or not reliable information. Considering the particular period that women live during pregnancy, conflicting information from unreliable sources could only create confusion and mistrust in the health workforce; it would be better that women receive reliable information by qualified and trained professionals like midwives and gynaecologists.

Very interesting results emerged from the answers given to the eighth question: "Which of the following bacteria/parasites can affect your health and that of your foetus?". Toxoplasma was the most known problem, but a large percentage of women (39.5%) was not aware of Listeria.

The study previously conducted in Piedmont, affirmed that informed women were more afraid from viruses and bacteria, especially Listeria, compared to non-informed ones [3]. Similarly in our study graduated women were more aware of Listeria compared to not graduated ones.

Through the tenth question, we tried to understand which prevention measure women believed to be the most important. There were contrasting answers to the question "Avoid contact between different foods", suggesting a lack of knowledge about it. Almost 89% of women, instead, identified the consumption of low cooked food as an important risk factor. Overall women had a good knowledge of the hygienic and prophylactic rules to be applied in the kitchen.

TABLE 2. Differences in information sources, according to nationality, education and pregnancies.

BIRTHPLACE ¹	DEPENDENT VARIABLE	OR	P>chi2	CI (95%)
Abroad	General practitioner	1,55	0,52	0,39-6,15
	Gynaecologist	0,32	0,01	0,13-0,83
	Midwife	1,30	0,58	0,51-3,30
	Dietician	1,78	0,35	0,52-6,09
	Friends/Family	0,94	0,91	0,32-2,76
	Internet	2,08	0,10	0,86-5,04
	Books/Brochures	0,89	0,80	0,35-2,23
	High influence/low influence ²	0,56	0,23	0,22-1,46
	Well Informed/less informed ³	0,66	0,36	0,27-1,62
EDUCATION ⁴	DEPENDENT VARIABLE	OR	P>chi2	CI (95%)
Graduated	General practitioner	0,68	0,52	0,21-2,22
	Gynaecologist	1,01	0,99	0,46-2,21
	Midwife	1,10	0,79	0,54-2,28
	Dietician	1,15	0,80	0,40-3,24
	Friends/Family	2,08	0,07	0,92-4,73
	Internet	1,47	0,25	0,76-2,83
	Books/Brochures	2,66	<0,01	1,30-5,46
	High influence/low influence ²	0,99	0,99	0,46-2,15
	Well Informed/less informed ³	1,21	0,59	0,61-2,43
PREGNANCIES ⁵	DEPENDENT VARIABLE	OR	P>chi2	CI (95%)
Multiparous	High influence/low influence ²	2,86	0,02	1,13-7,26
	Well Informed/less informed ³	0,41	0,01	0,20-0,84

1 Reference category: Italian

2 Question 4: How much does the food security influence your health conditions and those of the foetus?

3 Question 5: How do you feel informed about the risk associated with the consumption of foods?

4 Reference category: non-graduated

5 Reference category: primiparous

The main limitation of our study was the exiguous number of returned questionnaires. Our study had a great prevalence of drop out (more than 40%). This phenomenon could be explained by the method of data collection: we chose to leave a box in the ward to insert the compiled questionnaires. This choice led to a higher number of drop out, however, we decided to avoid a guided interview for three reasons:

- an interview required trained personnel;
- the interviews guided by not well trained personnel could be less spontaneous and the answers could be inhomogeneous;
- women felt more protected in their privacy through the box, instead of a direct interview.

Results are limited to a population composed mostly by Italian women (83.2%), probably because foreigners in hospital had difficulty (due to language) in the compilation with a consequent non-return of the questionnaires.

Concluding, pregnant women claimed to have good awareness of food-related risks. However, considering our results, this is not always the right awareness, in fact their answers often differ from what is the scientific evidence. According to other studies, a high percentage of women uses Internet or other not reliable sources.

Our study showed that it's necessary to improve the organisation of nutritional education given to pregnant women, with a higher presence of adequately trained health personnel. This includes collaboration between professionals, such as midwives, gynaecologists and dieticians, in order to properly inform women.

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