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Perspectives of women on screening and prevention of CMV in pregnancy

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ABSTRACT

Objective: To assess the choice and attitude of pregnant women regarding CMV serological screening and CMV prevention behaviors in pregnancy.
Study design: In this cross-sectional study, pregnant women were recruited in a single center during routine prenatal screening tests at 11–16 weeks. Participants filled out a questionnaire assessing knowledge about congenital CMV (cCMV) infection, risk perception and willingness to have CMV serological screening as well as their attitude toward CMV prevention behaviors.
Results: Among 234 pregnant women, 74.4 % (95 % confidence interval: 68.8–80.0 %) wanted CMV serological screening in pregnancy. The factors significantly associated with the desire for screening were perceived risk and perceived severity of cCMV. An informed choice regarding CMV screening (value-consistent, based on good knowledge and deliberated) was performed by 54 % of women who chose the screening and 30 % of women who declined the screening ($p = 0.039$). The median scores regarding attitudes toward CMV prevention behaviors were 3.7/5 for avoiding sharing behaviors and 4.0/5 for not kissing a child on the lips.
Conclusion: The majority of pregnant women want to have CMV serological screening once informed about congenital CMV infection. New tools need to be developed to allow for informed choice regarding CMV serological screening in pregnancy.

Introduction

Cytomegalovirus (CMV) is the most common cause of congenital infection and an important cause of sensorineural hearing loss and intellectual disability in children worldwide [1], but its importance is largely unknown to the general public. The prevalence of cCMV infection varies widely depending on maternal CMV seroprevalence, from 0.05 to 1 % [2]. Currently, there is no approved treatment that can be used to prevent cCMV infection when a pregnant woman is infected during pregnancy [3].

Guidelines and practices regarding CMV serological screening in pregnancy are very heterogeneous. Most North American and European guidelines do not recommend routine screening for CMV infection during pregnancy [4–8]. In practice, universal CMV serological screening is offered in some sites like in France, Italy and in some countries like Belgium [9] and Israel, while targeted screening is optional in Canada [9]. As several studies have reported the worse outcomes associated with first trimester CMV primary infection [10] and the benefice of early antiviral treatment [11], the question of CMV serological screening in pregnancy becomes critical.

Little is known regarding women's attitude towards CMV serological screening in pregnancy. This is important when assessing the risk-benefit of CMV serological screening in pregnancy.

The first aim of the study was to determine the percentage of pregnant women who have a positive attitude about CMV serologic screening and who wish to have this screening done during pregnancy after reading standardized information material, and the factors associated with screening choice, including the

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informed choice status. The second aim was to describe pregnant women's attitude regarding CMV prevention strategies.

Material and methods

We conducted a monocentric prospective observational study among pregnant women attending an obstetrics outpatient unit. Women were recruited between June 21 and August 23, 2019. Women ≥18 years old with an ultrasonographically confirmed evolutive pregnancy between 11 and 16 weeks were invited to participate. Women were excluded if they were not able to read information material in French or if they had a current or previous history of investigation for cCMV infection or a history of congenital anomaly at the current or previous pregnancy.

The information material was a brochure that has been developed by the team of the Mother and Children Infectious Diseases center [12], including two specialists in fetal-maternal medicine and reproductive infectious diseases, a microbiologist, a nurse and two patients-partners. It covered general information about CMV infection, including risk factors to get CMV, symptoms, risks of cCMV infection, implications of CMV congenital infection, and the pros and cons of screening in pregnancy.

After informed consent, participants were invited to read the brochure and then completed a self-administered questionnaire (Supplementary material). A research assistant was present to explain the brochure and help with questionnaire completion if needed. The questionnaire consisted of 30 questions assessing baseline demographic information, knowledge about CMV (using 5 yes/no items), choice to be screened, baseline awareness of CMV, attitudes toward prenatal CMV serologic screening and CMV prevention behaviors (using a validated Likert scale [13,14), uncertainty about the decision (using the O'Connor's Decisional Conflict Scale [14]), risk [13] and severity [15] perception, motivation [16] and anxiety using the short State Trait Anxiety Inventory [17,18] (Supplementary material 1). Informed choice was defined by good knowledge, value-consistent decision (positive attitude towards CMV screening associated with a desire to be screened for CMV- or already screened, and negative attitude associated with declining screening [19]) and deliberate decision (score 0–12 of the O'Connor's Decisional Conflict Scale [14]). Participants' medical charts were reviewed to collect background information (age, ethnicity, parity, Down syndrome screening, CMV screening).

Analyses: Descriptive statistics were performed. In particular the percentage of willingness to have the CMV serological screening and positive attitude towards this screening will be assessed, as well as their risk factors (age, CMV familiarity, CMV risk behavior score, perceived severity, risk perception, anxiety informed choice). Bivariate analyses will be performed using Chi-2 test, *t*-test or non-parametric tests as needed using a p-value of<0.05. Multivariate logistic regression models to predict outcomes were built using the purposeful variable selection process [20] including variables with p-value on bivariate analysis of 0.2 or less, and with an iterative process of variable selection. The covariates were removed from the model if they were non-significant and not a confounder.

Overall attitudes toward kissing on the lips and the sharing behaviors (sharing a cup, sharing eating utensils, and sharing food with a child) were each one calculated as the average of the four adjectives [21].

All Statistical analyses were performed using SPSS Statistic software (version 20, Armonk, NY: IBM Corp).

Sample size: Sample size calculations was based on estimate precision, i.e. the width of 95 % confidence intervals (CI) for relative frequencies (proportions) obtained from the survey data. As the relative frequencies to be expected was unknown, we conservatively assume an expected value of 0.5 to obtain upper boundaries for estimate precision. For a sample size of 300, estimate precision will be at least +/- 6%. We performed a planned intermediate analysis at 200 participants – as the precision of the estimate was +/- 6%, we stopped the recruitment.

This study was approved by the CHU Sainte-Justine ethics committee.

Results

In total 234 participants were recruited over the 2-month study period (Fig. 1). Among them, 74.4 % were not aware of the risk of

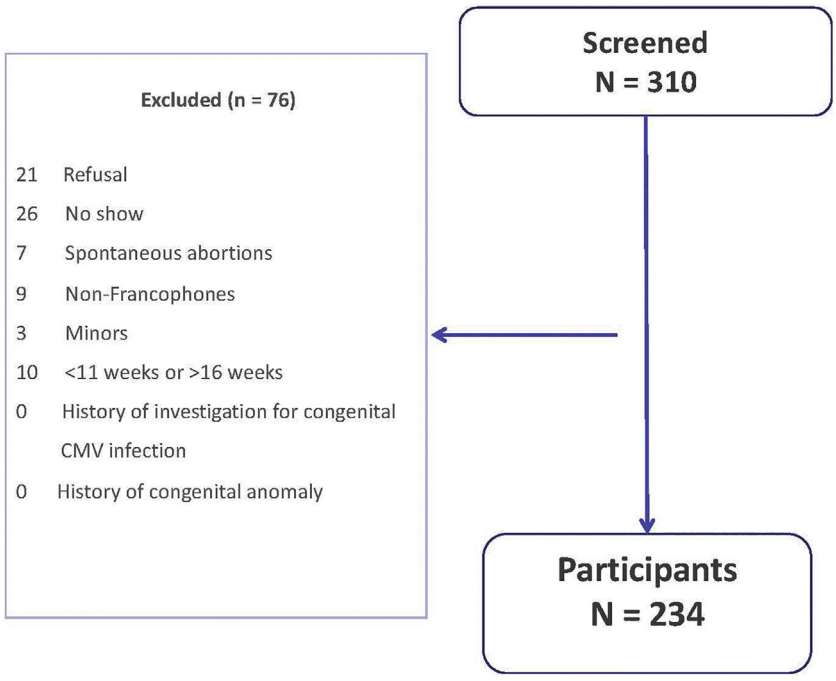

Fig. 1. Flow chart of the inclusion for the study.

Table 1
Comparisons of women who chose versus declined CMV screening.

Variables*	Chose screening n = 174	Declined screening n = 20	p**	missing
Age	33 (30–37)	34 (30–36)	0.785	1
Ethnicity			0.287	10
Caucasian	97 (57.7)	6 (37.5)		
Afro-Carribean	31 (18.5)	4 (25)		
Other	40 (23.8)	6 (37.5)		
Working in healthcare or childcare settings	34 (21.4)	2 (16.7)	1.000	0
In health care	21 (13.2)	2 (16.7)		
In child care	13 (8.2)	0 (0.0)		
Living with a Child <3 years old	92 (52.9)	15 (75.0)	0.06	0
House old income <80000 CAD	92 (64.8)	10 (52.6)	0.469	0
Academic degree	97 (56.4)	14 (70.0)	0.244	0
Accepted Down syndrome screening	166 (97.6)	18 (94.7)	0.415	5
CMV screening during current pregnancy	43 (25.1)	2 (10.0)	0.131	3
Heard about CMV before	48 (27.9)	3 (15.0)	0.216	2
Perceived risk (/5)	3.0 (2.0–3.7)	2.2 (1.0–2.5)	***0.001***	0
Perceived severity (/5)	3.7 (3.3–4.3)	3.0 (2.2–3.8)	***0.002***	0
Anxiety	−5 (−7 to −2)	−8 (-9—5)	***0.006***	7

* Results are reported as median (25-75th centile) for continuous variables and n(%) for categorical variables.
** T- test or Mann-Whithney test for continuous variables as appropriate, Chi-2 or Fisher test as appropriate for categorical variables.

cCMV infection, while once informed, the same percentage (74.4 %, 95 %CI 68.8–80 %), answered that they would choose to undergo CMV serology screening. Of note, 17.1 % (n = 40) did not know or did not answered when asked if they wanted CMV screening. Moreover, 70.9 % (n = 166) had a positive attitude towards CMV serological screening in pregnancy, while 20.9 % (n = 49) were neutral and 7.3 % (n = 17) had a negative attitude. While 94.8 % of the participants wanted to be informed on CMV by their prenatal care provider, almost half of them (47.4 %) declare themselves ready to pay 50$ CAD or more to get the screening.

There was no statistically significant difference in demographic variables between women who chose the screening and women who declined it (Table 1). Participants who chose CMV screening were statistically more anxious about CMV, perceived CMV infection as more severe and perceived themselves more at risk for CMV infection than the group of women who did not want the screening (Table 1). Making an informed choice was positively and significantly associated with the willingness to be screened (54 % versus 30 %, p = 0.039, Fig. 2). Among the 109 participants potentially at risk for CMV infection (having a child of 3-year-old or less or working in child care), 43.1 % (n = 47) considered themselves at risk, while 23.1 % (n = 22) of the 104 participants not at risk considered themselves at risk (p = 0.006).

In multivariate analysis, perception of risk (OR = 4.2 95 %CI1.2–14.1) and perception of severity (OR = 4.1 95 %CI 1.4–12.5) remained significantly associated with willingness to be screened, while informed choice and anxiety were not (respectively OR 2.4, 95 %CI 0.8–7.5 and 3.4, 95 %CI 0.9–13.1).

The median scores regarding attitudes toward CMV prevention behaviors among all participants were 3.75/5 (25th-75th centile: 2.7–5.0) for avoiding sharing behaviors and 4.0/5 (25th-75th centile: 2.5–5.0) for not kissing a child on the lips.

Discussion

In this study, even though 75 % of first trimester pregnant women were unaware of CMV, once informed, most of them wanted their prenatal care provider to discuss CMV, and wanted CMV screening. Most of them had a positive attitude regarding CMV preventive behaviors after being informed about it, whether they wanted to be screened or not.

These findings support those from a recent survey among 726 US non-pregnant women, who, after receiving information about CMV, nearly all indicated they believed prenatal screening should be offered [22]. Our results are also comparable to those of a previous similar study from Lim et al., where among 200 participants recruited in Singapore, 20 % were aware of CMV, 62 % wanted to be given the option of prenatal CMV screening and 72 % were keen to be screened [23]. The only factor associated with the desire for screening in their study was a higher income, where age and level of CMV awareness were borderline significant. In our participants, none of the demographics data were statistically

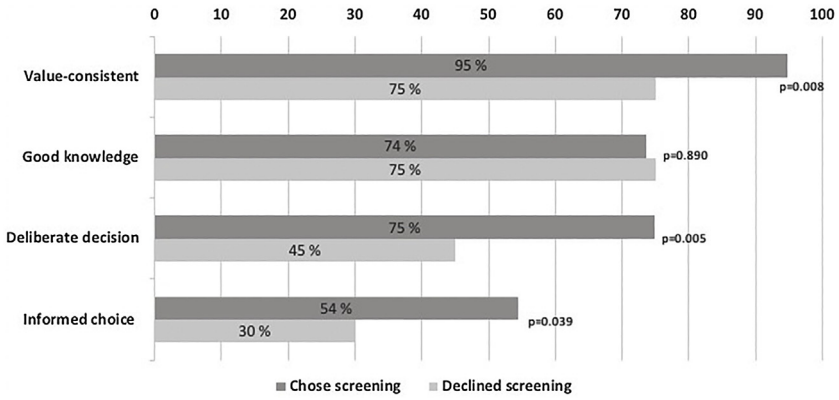

Fig. 2. Steps toward informed choice regarding CVM serological screening in pregnancy according to decision about screening.

associated with screening willingness. In Lim et al. study, the main reason for participants to want the screening was reassurance. Similarly, anxiety in our population was associated with the desire for screening in bivariate analyses. In comparison, one of the main reasons cited in the literature to accept screening for Down syndrome was 'gaining knowledge about the health of the foetus/ curiosity' [24].

In our study, less than half of the participants made an informed choice. The main reasons for this were that decisions were neither deliberate nor value-consistent. Pregnant women generally have a higher rate (51–89 %) of informed choice regarding screening for trisomy 21 in comparison with our participants for CMV, explained in part by a better knowledge of the disease (83–95 % for trisomy 21 vs 77 % for CMV) and more deliberate decision (75–92 % vs 68 %). Value-consistent decision seems to be similar in the choice of being screening for trisomy 21 or CMV (82 % vs 86 %). The main reason for an uninformed choice amongst population screened for trisomy 21 seems to be the lack of deliberation [14,19,25,26].

In our study, information on CMV was provided to participants using a brochure since a review about the existing literature on information for pregnant women about prenatal examinations on Down Syndrome [27] concluded that leaflets were valued as the preferred type of information of both screening and invasive diagnosis, only exceeded by face to face counselling with a doctor. Leaflets significantly improved knowledge, decreased decisional conflict, raised satisfaction with the amount of information received, enhanced perceived informed choice, and significantly decreased anxiety. Unfortunately, in our experience, a leaflet plus the presence of a research assistant who was highly qualified to answer participants' questions were not sufficient to achieve a high rate of informed choice, despite good knowledge. This highlights the need for education and awareness about CMV before pregnancy, to allow for more deliberate choice.

It has been shown in the past that simple hygiene advices can reduce the incidence of CMV primary infections in pregnancy and of cCMV [28]. Attitude of child bearing age women toward practicing CMV prevention behaviors has been reported to be generally good in a US multicultural setting [13], and our results point in the same direction. In the study from Lin et al. [23], 58 % of their participants cited "knowledge of immune status so that extra precautions could be taken if non-immune" as a reason to choose to undergo prenatal serologic CMV screening, despite the scientific community knowing that immunity does not protect against cCMV. Pregnancy care takers should therefore include in their counseling a part about CMV risk factors, screening and hygiene measures to prevent CMV, and at the same time raising awareness about the existence of a virus that could have potential serious complications on their fetus. In the past, there have been suggestions of mandatory prenatal CMV serological screening to ensure that obstetricians counsel their patients about CMV [29].

Strengths of our study were a high participation rate, number of participants and use of validated instruments to assess the various steps leading to informed consent. The external validity of this study limited, as it is a monocentric study in a hospital with a maternal-fetal medicine division, including 15 % of healthcare workers. Although this may have led to an overestimate of women's awareness of CMV, awareness of CMV was not a significant factor affecting women's attitudes and choice to screening.

Conclusions

In conclusion, many women would like CMV screening in pregnancy to be discussed by their prenatal care provider, and an equally important proportion would choose to do it if offered, although half of them may not make an informed choice. New tools for communication on CMV screening in pregnancy should focus on risk and severity perception. This should be considered when planning implementation of universal antenatal CMV serological screening policy.

Author's contribution

MLB contributed to the conception and design of the study, acquisition of data, analysis and interpretation of data, drafted the article, and approved the final version. CR, FK, SG and MB contributed to the analysis and interpretation of data, revised the article, and approved the final version. IB lead the conception and design of the study, supervised MLB for analysis and interpretation of data, revised the article, and approved the final version.

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Declaration of Competing Interest

The authors have no conflict of interest to disclose.

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Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:https://doi.org/10.1016/j.ejogrb.2021.01.035.

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