SARS-CoV-2 Vaccine Willingness

Subjects: Infectious Diseases

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As pregnant women are at high risk of severe SARS-CoV-2 infection and COVID-19 vaccines are available in Switzerland, this study aimed to assess the willingness of Swiss pregnant and breastfeeding women to become vaccinated. Through a cross-sectional online study conducted after the first pandemic wave, vaccination practices and willingness to become vaccinated against SARS-CoV-2 if a vaccine was available were evaluated through binary, multi-choice, and open-ended questions.

SARS-CoV-2   coronavirus   COVID-19   pregnancy   breastfeeding   vaccine willingness

1. Introduction

In 2020, the outbreak of a novel coronavirus, the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), was declared a pandemic with more than 166 million confirmed cases worldwide. In Switzerland, more than 680,000 people tested positive with more than 10,000 deaths reported [1].

Pregnant women are considered a vulnerable population for SARS-CoV-2 infection. Current evidence suggests that they are up to 70% more susceptible to infection. If infected, they are also at greater risk of developing complications [2][3][4] such as admission to an intensive care unit, mechanical ventilation, and death [5][6]. Increased risk of caesarian section, iatrogenic prematurity, post-partum hemorrhage, preeclampsia, and miscarriage have also been reported [7][8][9][10][11].

Currently, two SARS-CoV-2 mRNA vaccines approved by Swissmedic (the Swiss authority for the utilization and surveillance of therapeutic products) are used in the vaccine campaign in Switzerland [12]. However, vaccines cannot curb epidemics without widespread acceptance. The World Health Organization (WHO) has listed vaccine hesitancy as one of the top ten threats to global health [13], especially for populations at risk. In Switzerland, as in many countries, vaccination programs have already been established to protect pregnant women and their infants from serious infections such as influenza and pertussis. Both influenza and pertussis vaccines have proven to be effective in protecting mothers and their newborns [14][15]. However, immunization rates for influenza and pertussis have been disappointingly low in Switzerland [16] mainly due to a lack of adequate promotion and compliance [17]. Low uptake of vaccination in pregnancy has been reported worldwide [18][19] with several studies identifying inadequate knowledge about the disease threat; doubts about vaccine safety, efficacy, and benefits; and the lack of recommendations from vaccine providers, as the main obstacles among pregnant women [20][21][22]. Maternal characteristics may also play a role. Unemployment, younger age (<25 years old), and high perceived stress have

been associated with lower vaccination rates during pregnancy, whereas a history of depression increased the likelihood of being vaccinated [23].

SARS-CoV-2 vaccination has recently been recommended in Switzerland for pregnant women who have additional risk factors or are at high risk of exposure through their work. This vaccination strategy may represent a barrier to the successful vaccination of all members of this high-risk group, especially when compared to some countries where pregnant women are routinely vaccinated or considered a priority group. This is a glaring example of the need to better understand the many factors influencing the acceptance of and access to vaccination, especially among more vulnerable populations such as pregnant women to develop targeted information campaigns.

Thus, in a cross-sectional survey during the first wave of the pandemic, we investigated COVID-19 vaccine willingness among Swiss pregnant and breastfeeding women if a vaccine was available, as well as the factors contributing to their acceptance or hesitancy.

2. SARS-CoV-2 Exposure, Fears, and Beliefs

Data on SARS-CoV-2 exposure, fears, and beliefs are presented in **Table 1**. Almost 55% (850/1551) of participants reported having experienced symptoms potentially related to SARS-CoV-2 within the 3 months preceding the survey. Only 10.9% (170/1551) of the women had been tested for SARS-CoV-2 infection, among which 10.5% had a positive result (18/170) through a PCR-based nasopharyngeal swab, serology, or CT-scan. Less than 1.0% (9/1551) reported having been hospitalized due to COVID-19. Only 1.2% (18/1551) of participants reported living with someone older than 65 years old. Participants reported that the COVID-19 pandemic had a negative impact on their pregnancy or breastfeeding experience in 35.3% (97/275) and 8.0% (41/512) of cases, respectively. According to their responses, 11.0% (170/1551) of them experienced symptoms of severe depression (EDS ≥ 13), anxiety (GAD-7 ≥ 15), or high stress (PSS ≥ 27) over the last four weeks. More than half of pregnant women (53.4%; 275/515) declared that they feared an adverse fetal outcome in case of maternal infection.

Table 2. SARS-CoV-2 exposure, fears, and beliefs. Abbreviations: PCR, polymerase chain reaction.

	Pregnant Women		Breastfeeding Mothers		Total	
	n = 515	(%)	n = 1036	(%)	n = 1551	(%)
SARS-COV-2 exposure						
Symptoms during the 3 last months	296	(57.5)	554	(53.5)	850	(54.8)
Hospitalized for COVID-19	2	(0.4)	7	(0.7)	9	(0.6)
Tested for SARS-CoV-2 infection	48	(9.3)	122	(11.8)	170	(10.9)
PCR on nasopharyngeal swab	39	(7.6)	112	(108.0)	151	(9.7)
positive	5/39	(12.8)	6/112	(5.3)	11/151	(7.3)

		Pregnant Women		Breastfeeding Mothers		Total	
		n = 515	(%)	n = 1036	(%)	n = 1551	(%)
	negative	33/39	(84.6)	103/112	(92.0)	136/151	(90.1)
	unknown	1/39	(2.6)	3/112	(2.7)	4/151	(2.7)
Serology		7	(1.4)	21	(2.0)	28	(1.8)
	positive	3/7	(42.9)	2/21	(9.5)	5/28	(17.9)
	negative	3/7	(42.9)	16/21	(76.2)	19/28	(67.9)
	unknown	1/7	(14.2)	3/21	(14.3)	4/28	(14.3)
Scanner		2	(0.4)	2	(0.2)	4	(2.6)
	positive	2/2	(100.0)	0/2	(0.0)	2/4	(50.0)
	negative	0/2	(0.0)	2/2	(100.0)	2/4	(50.0)
Living with someone with symptoms		82	(15.9)	220	(21.2)	302	(19.5)
Living with someone tested positive		4	(0.8)	10	(1.0)	14	(0.9)
Living with someone > 65 years old		6	(1.2)	12	(1.2)	18	(1.2)
Negative impact of the COVID-19 pandemic on:							
Pregnancy or breastfeeding experience		97	(18.8)	41	(4.0)	138	(8.9)
	unknown	240	(46.6)	524	(50.6)	764	(49.3)
Life habits		350	(68.2)	700	(67.6)	1050	(67.7)
	unknown	8	(1.6)	25	(2.4)	33	(2.1)
Work		295	(57.3)	394	(38.0)	689	(44.4)
	unknown	100	(19.4)	320	(30.9)	420	(27.1)
Fear of an adverse fetal outcome		275	(53.4)	/			
Symptoms of severe depression, anxiety or high stress perceived during the 1st wave		53	(10.3)	117	(11.3)	170	(11.0)

Potential predictors of SARS-CoV-2 vaccine acceptance are shown in **Table 2**. Sociodemographic factors such as a maternal age above 40 years old (aOR 1.8 [1.1–3.2]), an educational level higher than high school (aOR 1.5 [1.2–2.0]), and Italian as a primary language (aOR 3.3 [1.4–8.0]) were associated with a higher rate of vaccine acceptance. On the other hand, German-speaking participants were less likely to get vaccinated (aOR 0.7 [0.5–0.9]).

Table 2. Factors associated with SARS-CoV-2 vaccine willingness among Swiss pregnant and breastfeeding women. Abbreviations: aOR, adjusted odds ratio; CI, confidence interval; CT, computed tomography; OR, odds ratio; RT-PCR, reverse-transcriptase polymerase chain reaction; T, trimester of gestation.

	Participants Willing to Get Vaccinated against COVID-19		Participants Not Willing to Get Vaccinated against COVID-19		OR	(95% CI)	*p*	aOR	(95% CI)	*p*
	N	(%)	N	(%)						
	553	(35.7)	998	(64.3)						
Baseline characteristics										
Maternal age >40 years	42	(7.6)	40	(4.0)	2.0	(1.3–3.0)	0.003	1.8	(1.1–3.2)	0.028
Educational level > highschool	300 *	(75.9)	421 *	(65.6)	1.7	(1.3–2.2)	<0.001	1.5	(1.1–2.0)	0.017
Professionally active	387 *	(87.4)	652 *	(83.6)	1.4	(1.0–1.9)	0.007	1.0	(0.7–1.5)	0.919
Primary language										
French	238	(52.8)	397	(49.7)	1.1	(0.9–1.4)	0.295			
German	159 *	(35.3)	346 *	(43.3)	0.7	(0.6–0.9)	0.005	0.7	(0.5–0.9)	0.015
Italian	19 *	(4.2)	12 *	(1.5)	2.9	(1.4–6.0)	0.005	3.3	(1.4–8.0)	0.007
Any maternal co-morbidity	58	(10.5)	93	(9.3)	1.1	(0.8–1.6)	0.457			
Impact of the SARS-COV-2 pandemic										
Tested positive for SARS-COV-2 (RT-PCR, serology and/or CT)	9	(1.6)	3	(0.3)	5.5	(1.5–20.4)	0.011	3.3	(0.8–13.7)	0.095

	Participants Willing to Get Vaccinated against COVID-19		Participants Not Willing to Get Vaccinated against COVID-19		OR	(95% CI)	*p*	aOR	(95% CI)	*p*
Living with someone >65 years old	10	(1.8)	8	(0.8)	2.3	(0.8–6.7)	0.076	2.0	(0.7–6.1)	0.094
Negative impact of the pandemic on										
Pregnancy	52	(19.9)	86	(16.3)	1.1	(1.0–1.2)	0.215			
Life habits	398 *	(72.8)	652 *	(67.2)	1.3	(1.0–1.7)	0.023	1.0	(0.8–1.4)	0.822
Work	244	(60.1)	445	(61.4)	1.0	(0.7–1.2)	0.672			
Symptoms of severe depression, anxiety or high stress	68	(12.3)	102	(10.2)	1.2	(0.9–1.7)	0.211			
Vaccination habits and beliefs										
Vaccinated against Influenza last year	197 *	(41.1)	137 *	(16.1)	3.6	(2.8–4.7)	<0.001	2.1	(1.5–2.8)	<0.001
Usually decline vaccination	30	(5.4)	294	(29.5)	0.1	(0.1–0.2)	<0.001	0.2	(0.1–0.3)	<0.001
Fear of side effects related to vaccines	51	(9.2)	114	(11.4)	0.8	(0.6–1.1)	0.179			
Supplementary model including pregnancy-related variables *(tested only in pregnant women, N = 515)*	N	(%)	N	(%)	OR	(95%CI)	*p*	aOR	(95%CI)	*p*
	153	(29.7)	362	(60.3)						

* Multiple imputations on missing values.

	Participants Willing to Get Vaccinated against COVID-19		Participants Not Willing to Get Vaccinated against COVID-19		OR	(95% CI)	p	aOR	(95% CI)	p
Follow-up by an obstetrician	144	(94.1)	324	(89.5)	1.9	(0.9–4.0)	0.101	3.6	(1.2–11.2)	0.027
Gestational age										
T1	25	(16.3)	54	(15.0)	1.1	(0.7–1.9)	0.691			
T2	47	(30.7)	147	(40.7)	0.6	(0.4–1.0)	0.033	0.6	(0.4–0.9)	0.015
T3	81	(52.9)	160	(44.3)	1.4	(1.0–2.0)	0.074	1.8	(1.1–2.7)	0.018
Fear of an adverse fetal outcome in case of infection	75	(49.0)	200	(55.3)	0.9	(0.8–1.0)	0.196			

women that participated in the survey were willing to get a SARS-CoV-2 vaccine during the first wave of the pandemic if one had been available. The positive predictors for SARS-CoV-2 vaccine acceptance among all participants were an age older than 40 years, a higher educational level, speaking Italian as their primary language, and having been vaccinated against influenza in the previous year. On the other hand, speaking German and usually declining influenza vaccination were negative predictors. Regarding pregnant participants, having an obstetrician following their pregnancy and being in their third trimester of pregnancy were two positive factors associated with the willingness to be vaccinated against SARS-CoV-2, whereas being in their second trimester of pregnancy was a negative predictor. No association was found between maternal co-morbidities and the participants' willingness to get vaccinated.

In terms of temporality, our study explored the experience of Swiss pregnant women during the first wave of the SARS-CoV-2 pandemic. Our study included a large number of participants from different parts of Switzerland, was conducted in three official languages, and is the first to address the question of SARS-CoV-2 vaccine willingness in the country. Selection bias might have occurred as the proportion of participants who are professionally active and highly educated was higher than the general population of Swiss pregnant women [24][25]. This could have led to an increased vaccination acceptance rate, as highly educated women tend to have a higher acceptance of vaccination, which would mean that the vaccine willingness in the overall perinatal population might be even lower than that reported here. The survey was conducted online and, although most Swiss women have good access to the internet, those that rely more on online resources may have come across the online survey more often when looking for information about their pregnancy or breastfeeding. Women hospitalized or severely ill might not have had the opportunity to participate. This could have biased the association between SARS-CoV-2 exposure and the

participants' willingness to get vaccinated toward the null. In addition, as only 5% of women declared speaking another language in our survey, we might have an under representation of the immigrant population.

Another limitation might be the overrepresentation of French-speaking participants, which could be explained by the CHUV (Centre Hospitalier Universitaire Vaudois, university hospital of the largest French-speaking canton) leading the present study. Since some studies have shown an increased vaccination acceptance among the French-speaking part of Switzerland, this could have overestimated the rate of SARS-CoV-2 vaccine willingness in our study. Overestimation of SARS-CoV-2 vaccination acceptance could have also happened since a high percentage of participants were healthcare workers, more likely to be exposed to SARS-CoV-2 positive patients, and thus, more prone to being immunized.

Factors reported to be associated with SARS-CoV-2 vaccine willingness, considered in other studies, were not measured [26][27]. Those include socioeconomic status; perceived risk of SARS-CoV-2 (likelihood of infection, self or infant); opinion on the importance to public health to get a vaccine and for the majority of people to get vaccinated; compliance with preventive measures; monitoring of SARS-CoV-2 news and updates; trust and satisfaction with health authorities; as well as trust in science. Further surveys including those variables would be needed to better specify the factors influencing SARS-CoV-2 vaccination acceptance among Swiss pregnant women.

Finally, this survey was conducted at a time when no SARS-CoV-2 vaccine had yet been accepted by Swissmedic nor recommended for pregnant women. This could represent an important bias, since participants were asked if they would accept a potential vaccine without information about its efficiency and safety. Since this survey, the first randomized controlled trial of SARS-CoV-2 vaccination in pregnancy has been initiated [28]. Additionally, following the example of several other countries, the Swiss Society for Gynecology and Obstetrics (SSGO) along with the Federal Public Health Office (OFSP) has recommended, up until the end of May 2021, SARS-CoV-2 vaccination during the second and third trimester for pregnant women at high risk of developing complications or at high risk of exposure [29]. Recent studies also showed robust immune responses and efficient passage of antibodies to newborns after SARS-CoV-2 vaccination of pregnant women [30][31], unlike transplacental immunization through infected mothers, which seems to be less effective [32]. As new guidelines and more data on vaccinated pregnant women become available every day [33], willingness to become vaccinated might evolve, and new studies are urgently needed.

5. Conclusions

Our study suggests disappointing SARS-CoV-2 vaccine willingness among Swiss pregnant and breastfeeding women, emphasizing the need to identify and reduce barriers toward immunization. Inclusion of pregnant women in clinical trials, improving access to vaccines, and providing tailored information for pregnant and breastfeeding women, especially for those of younger age with a lower educational level, are crucially needed to protect them from SARS-CoV-2 and other viral threats ahead.

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