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Attitude of Pregnant Women for Covid-19 Vaccination

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ABSTRACT

Objective: Coronavirus disease 19 (COVID-19) Vaccination is critical approach in restricting the COVID-19 epidemic in order to curb infections and diminishseverity of illnessparticularly among most vulnerable group such as pregnant women. Therefore, this study was intended to assess the attitude of women in pregnancy toward COVID-19 vaccination.

Methodology: This was a cross-sectional observational study conducted in the outpatient Department of Gynecology and Obstetrics of Abbasi Shaheed Hospital, Karachi by using non-probability convenient sampling technique. The duration of the study was about 6 months from October 2021 to March 2022. A total of 325 pregnant women having pregnancy of after 14 weeks and before 34 weeks, who were physically and mentally fit with no past history of acute or chronic systemic disorder were included in the study. For quantitative variables mean and standard deviation was recorded and for qualitative variables frequency and percentages were reported.

Results: The study results showed thatthe mean age of the participants was 28.92 ± 5.18 years, mean parity was 2.61±1.80, and mean gravidity was 3.66±1.86. When asked about their intention to receive the COVID-19 vaccine, 167(51.4%) participants indicated fear of pregnancy complication while 158(48.6%) had no fear. 170(52.3%) participants showed fear of complication related to baby. About 65(20.0%) were concerned about safety of vaccine. Most of the participants 290(89.2%) agreed that isolation methods and social distancing are not enough. 235(72.3%) believed that COVID-19 vaccine can protect from the infection only 90(27.7%) participants did not believe on effectiveness of vaccine.

Conclusion: This study concluded that despite the low educational level of pregnant women, most of the participants showed positive attitude and willing to be vaccinated. However, majority pregnant women had fear of detrimental effects for the fetus and mother that were two major concerns among pregnant women when considering COVID-19 vaccination.

Key Words: Coronavirus disease 2019, Pregnant women, COVID-19 vaccines, Vaccine acceptance

INTRODUCTION

Coronavirus disease 2019 (COVID-19), the extremelycommunicable viral disease that is caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), has had a terribleinfluence on the globe's demographics leading to above 3.8 million demisesinternationally, evolving as the most substantialuniversal health catastropheas the period of the influenza epidemic of 1918.[1] According to WHO (World Health Organization), it is predicted that more than 2 million deaths were documented in a year or so. Therefore, it is vital to protect individual from getting this contagion. Most effective means for protecting from infection are the implementation of Standard operating procedures (SOPs) for instanceuse of face masks, social distancing and maintenance of individualcleanliness, but to keep such actions for prolong duration basically is unmanageable.[2]

Internationally, COVID-19 has executedhugeencumbrances of morbidity and mortality amongst the general populace.[3] In Pakistan, it is predicted that 560,000 cases were diagnosed wherein 12,218 deaths were reported [4]. In

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spite of the implementation of SOPs, it is imperative to be vaccinated for COVID-19 in order to restrict the spread of contagion in Pakistani population.[5]

Vaccination is a critical approach in restricting the spread of COVID-19 epidemic and reducing the disease severity. As in other viral endemicinfections in an earlier years, vaccination has definitelydeveloped a substantialinfluence to human and animal wellbeing, particularly in emergingnations. [6] Vaccination would be more effective on recognition of vaccination barriers in the population, particularlyin more susceptible groups such as pregnant women.Commendations from the Society for Maternal-Fetal Medicine and American College of Obstetricians and Gynecologists (ACOG) have retained that pregnant and lactating women should be vaccinated based on their risk, so vaccines based on mRNA are believed to pose less harm to the fetus because of degradation of mRNA in the circulation.[7,8]

According to the statistics, pregnant women are at greater risk to develop severe COVID-19 infection.[9] According to a report from the Centers for Disease Control and Prevention (CDC), it is stated that pregnant women were three folds more expected to be hospitalized in critical condition or need intubation as compared to non-pregnant women, and death occurs from COVID-19 exceeds more probably one and half times.[10]

Vaccination's acceptancebased on society's awareness of disease risk, attitudes and acquaintance about vaccine, and is essential for vaccination programs to attain high vaccination reportage rates, predominantly for newly evolvinginfectious diseases.[11] Even before the existing COVID-19 endemic, the WHO recognized vaccine hesitancy that is characterized by the deferral in accepting vaccines or rejection of them that are one of the top ten dangers to world health.[12]

In general population of China, it is estimated that acceptance of the COVID-19 vaccine was 90%, [13] in the United States it is reported 70%, [14] and in France, it is predicted 75% .[15] This is contrary to a formerresearch piloted in the United States in year of 2020 wherein not more than half of pregnant women indicated they were expected to get the COVID-19 vaccination.[16] Similarly, one more research stated that pregnant participants had a 44.3% acceptance rate of vaccine which was lower as compared to non-pregnant women (76.2%).[17]

In order to augment the vaccine acceptance, counselingexhibits a key role in alleviatinguncertainties and supports women deal withhealth concerns associated with pregnancy. Providers should aware about concerns and current knowledge of their patient for appropriatecounseling.[18]A lot of researches explored the influence of social media on vaccineacceptance thatdirected different advices of this impact, as media stands may hastenthe infodemic in public health emergencies to an extent that hampers healthydecisions from being made [19-21]. Social media platforms can also be used to lessenthe possibility of misrepresentation by presenting high-quality evidences from reliable and appealingmeans to pregnant and lactating women [22].

COVID-19 infection is ever-so rising in incidence and severity along with the rising rate of occurrence of COVID-19 infectionin pregnant women. Formerly,pregnant women stay un-vaccinated owing to misperception and lack of acquaintance provided by public health expertsconcerning COVID-19 vaccination. Therefore, the present study was planned to evaluate and attain insight into the attitude of pregnant females regarding their choice of preference of COVID-19 vaccination.

METHODOLOGY

This was a cross-sectional observational study conducted in the outpatient Department of Gynecology and Obstetrics of Abbasi Shaheed Hospital, Karachi by using non-probability convenient sampling technique. The duration of the study was about 6 months from October 2021 to March 2022. This study was ethically approved by the concerned ethical committee. A total of 325 pregnant women having pregnancy of after 14 weeks and before 34 weeks, who were physically and mentally fit with no past history of acute or chronic systemic disorder were included in the study whereas pregnant women below 18 or above 35 years of age, intrauterine pregnancies having stillbirth, intrauterine growth retardation, miscarriage and medical complications, having contraindication to COVID-19 vaccine, refusing to participate in the study, pregnancy of before 14weeks and after 34 weeks were excluded from the study.

Demographics details included age, weight, gravidity, parity, gestational week, estimated date of delivery, residence, socioeconomic status, past obstetrics history complication, risk factor in current pregnancywere documented. After demographics details,pregnant women were asked about their acceptance for COVID-19 vaccination, In case of refusal of vaccination, the reasons and causes behind refusal were recorded.

Data analysis was performed by using SPSS version 23.0. For quantitative variables mean and standard deviation was documented and for qualitative variables frequency and percentages were reported.

RESULTS

A total of 325 pregnant women were participated in this study. The mean age of the participants was 28.92 ± 5.18 years. The mean parity was 2.61±1.80. The mean gravidity was 3.66±1.86. The mean of estimated date of delivery

was 27.45±3.58 weeks. The mean weight of participants was 73.48±11.46 kg. Women 42(12.9%) residing in rural areas and 283(87.1%) belonging to urban areas were ready to take the vaccine. About 81(24.9%) who never visited school were accepted the vaccination during pregnancy, 74(22.8%) women with matric level 74(22.8%) women who studied primary level, 39(12.0%) middle pass accepted the vaccination. Concerning profession, 209(64.3%) housewives and 51(15.7%) maid were aware about vaccination. Past pregnancies had complications such as 62(19.1%) participants had anemia, Pregnancy-induced hypertension 21(6.5%), Diabetes Mellitus 6(1.8%), Postpartum hemorrhage 17(5.2%), Preterm Birth 3(0.9%), Abortion 3(0.9%), 21(6.5%) had 1 Cesarean section, 30(9.2%) had 2 Cesarean section, 24(7.4%) had 3 Cesarean section. High-risk pregnancies such as anemia was reported in 133(40.9%) participants, gestational diabetes was reported in 6(1.8%) participants, Pregnancy-induced hypertension was reported in 6(1.8%) participants whereas most of the participants 177(54.5%) had no risk factor in pregnancy, as shown in Table I.

When asked about their intention to receive the COVID-19 vaccine, 167(51.4%) participants indicated fear of pregnancy complication while 158(48.6%) had no fear. 170(52.3%) participants showed fear of complication related to fetus. About 65(20.0%) were concerned about safety of vaccine. Almost57(17.5%) Participants did not accept vaccination due to husband refusal. Up to 35(10.8%) felt that social Distancing and implement of Isolation means are enough to prevent the infection; however most of the participants 290(89.2%) agreed that isolation methods and social distancing are not enough. In contrast to, 235(72.3%) believed that COVID-19 vaccine can protect from the infection only 90(27.7%) participants did not believe on effectiveness of vaccine, as shown in Table II.

Table I: Demographic details of pregnant women. (n=325)

Variable		Mean±SD n(%)
Age (years)		28.92±5.18
Parity		2.61±1.80
gravidity		3.66±1.86
Estimated date of Delivery (weeks)		27.45±3.58
Weight (kg)		73.48±11.46
Residence	Rural	42(12.9%)
	Urban	283(87.1%)
Education Level	Primary	74(22.8%)
	Middle	39(12.0%)
	Matric	74(22.8%)
	Inter	33(10.2%)
	B. A	12(3.7%)
	B. Com	9(2.8%)
	M.A	3(0.9%)
	Never Visited School	81(24.9%)
Profession	House Wife	209(64.3%)
	Maid	51(15.7%)
	Cook	14(4.3%)
	Beautician	21(6.5%)
	Receptionist	3(0.9%)
	Teacher	27(8.3%)
Past Obstetrics History Complication	Anemia	62(19.1%)
	Pregnancy-induced hypertension	21(6.5%)
	Diabetes Mellitus	6(1.8%)
	Eclampsia	3(0.9%)
	Postpartum hemorrhage	17(5.2%)
	Preterm Birth	3(0.9%)
	Abortion	3(0.9%)
	1 Cesarean section	21(6.5%)
	2 Cesarean section	30(9.2%)
	3 Cesarean section	24(7.4%)
	Nil	135(41.5%)
Risk Factor in Current Pregnancy	Anemia	133(40.9%)
	Pregnancy-induced hypertension	6(1.8%)
	Gestational Diabetes Mellitus	6(1.8%)
	Cervical Incompetence	3(0.9%)
	Nil	177(54.5%)

Table II: Prevalence of acceptance and refusal attitude towards the COVID-19 Vaccine of pregnant women.

Variable		n(%)
Fear of Pregnancy Complication	Yes	167(51.4%)
	No	158(48.6%)
Fear of Complications to Baby	Yes	170(52.3%)
	No	155(47.7%)
Need Further Reassurance regarding Safety of Vaccine	Yes	65(20.0%)
	No	260(80.0%)
Husband Refusal for Vaccination	Yes	57(17.5%)
	No	268(82.5%)

Table II: ***(Continued)***

Variable		n(%)
Feels Social Distancing and Isolation are Enough	Yes	35(10.8%)
	No	290(89.2%)
Does not Believe in Vaccination	Yes	90(27.7%)
	No	235(72.3%)

DISCUSSION

Vaccination programs can implemented effectively only with high level of acceptance and coverage. Evaluating COVID-19 risk awareness is critical to attaining this, as considering the appropriateness of COVID-19 vaccination and reliance on the health system and media sources, mainly those used to acquire about the COVID-19 disease.[23]

One of the studies focused that the women living in rural areas have low rate of vaccine acceptance. [24] This is troublesome as nearly 70% of theIndian peoplebelong to rural areas [25]. Therefore, delivery of proper evidence-based information is essential for awareness of the rural people. The present study was inconsistent with the above reported researches and showed that most of the participants 283(87.1%) were resident of urban areas had good information about COVID-19 vaccination.

The educational level of pregnant women is animportant predictor for their vaccinationacceptance and their situation on professionals' suggestions;[26] On the contrary, one study by Mohan et al., in 2021 conducted in Qatar reported that vaccine acceptance is not dependent on level of education [27] whereasChinese research investigated pregnant women found that low education level was related with higherCOVID-19 vaccine acceptance [28].As far as the present study is concerned, mostly participants had low education level but they were willing to accept COVID-19 vaccine.

It was suggested in another research that most concerned priority related to vaccine is theprotection of fetuses from the harmful effects of COVID-19 vaccines.[26]An internationalresearch bySkjefte et al., in 2021 revealed that the main cause for COVID-19 vaccine hesitancyin pregnant women was the possiblydetrimental adverse effects of vaccines for unborn babies [29]. These findings were endorsed by the present study and revealed that majority of the participants 170(52.3%) had fear of complication associated with the fetus.

Similarly, another most significant priority is theprotection of pregnant women from the harmful effects of COVID-19 vaccines; [26] these results were corroborated with the researchers conducted in China and Turkeyamongst pregnant women where safety of vaccine was a robustelement of vaccine reluctance [28,30]. These findings were consistent with the present study as most of the pregnant women showed vaccination hesitancy due to fear of pregnancy complication.

Interestingly, the role of partner is a critical element in acceptance of vaccines. Likewise, in one research, male partners have a positive attitude towards the COVID-19 vaccine acceptance among pregnant women. [26] Furthermore, another study by Meharryet al., conducted in 2013 reported the negative role of husbandsamongpregnant womenvaccine acceptance owing to inadequate acquaintance or lower vaccine application [31]. In the present study, the role of husbands was positive 268(82.5%) in acceptance of COVID-19 vaccine among pregnant women due to awareness of consequences of COVID-19 infection.

In spite of national programs to encourage vaccination against COVID-19, the rate of acceptance of vaccination for COVID-19 among Thai pregnant women was about 60%. [32] This research was similar to the Vietnamese pregnant cohort in which 60% acceptance rate was observed [33]. These findings were contradictory to other Asian countries with moderate socio-economic status whereinhigher acceptance rate was reported in Chinese (77%), Indian (82%), and Filipino (65%) pregnant women [28,29]. The major cause for the low acceptance rates in Thai couples was the doubtfulobservationregarding safety of vaccine, just because of detrimental effects related to vaccines transmitted to fetus and mother as well. Moreover, additional factor for vaccine refusal was uncertaintyof vaccine effectiveness. Thai research indicated that <50% of the couples reported that they were assuredabout effectiveness of COVID-19 vaccination. These results showed consistency with the effects of formerresearches [28,33,16], advocated that the people anxiety of novel COVID-19 vaccines was animportanthurdle to effective vaccination. Our results showed that most of the participants had fear of complications associated with fetus and mother and 90(27.7%) believed that COVID-19 vaccination is not effective to protect from infection.

Similarly, one research assessed pregnant women who believed that the vaccine is potentially harmful for the babies eventually showed reluctance to vaccination.[34]According to the CDC,efficacy and safety of COVID-19 vaccination for pregnant women has been authentically proved.[35] In addition to, ACOG reported no indication of complications related to mother or fetus from immunizing pregnant women withCOVID-19 vaccines.[36]Similarly, the WHO suggested that Pfizer-BioNTech COVID-19 vaccine is appropriate vaccinein pregnant women wherein the advantages of vaccinationbypass the risks. Therefore, to make decision, evidences about the risks of COVID-19 in pregnancy, the probablebenefits of vaccination, and the prevailingboundaries of safety indication should be delivered.[37] As far as the present study is concerned, majority participants were reluctant for vaccination owing to harmful effects on mother as well as

on baby. They also worried about the safety and efficacy of COVID-19 vaccination for pregnant women.

Persistent public health campaigns, like educational television programs and awareness programsrelevant to safety of the COVID-19 vaccine in pregnant women, are mandatory to increaseresponsiveness. Further researches are needed on safety and efficacy of COVID-19 vaccine in pregnant women should be planned to overwhelming these difficulties and decline vaccine hesitancy.

CONCLUSION

This study concluded that despite the low level of education of pregnant women, most of the participants showed positive attitude and willing to be vaccinated.However, majority pregnant women had fear of detrimental effects for the fetus and motherthat were two major concerns among pregnant women when considering COVID-19 vaccination. Therefore, therepresentatives should promote, explore, and advertisesignificantinformation on vaccine effectiveness and safety among pregnant women because safety of COVID-19 vaccine during pregnancy is a fundamentalreasonthat leads to vaccine hesitancy.

REFERENCES

1. Cascella M, Rajnik M, Aleem A, Dulebohn SC, Di Napoli R. Features, Evaluation, and Treatment of Coronavirus (COVID-19). 2022 Feb 5. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan–. PMID: 32150360.
2. Peng F, Tu L, Yang Y, Hu P, Wang R, Hu Q, et al. Management and treatment of COVID-19: the Chinese experience. Canadian Journal of Cardiology. 2020 Jun 1;36(6):915-30.
3. Nersesjan V, Amiri M, Christensen HK, Benros ME, Kondziella D. Thirty-Day Mortality and Morbidity in COVID-19 Positive vs. COVID-19 Negative Individuals and vs. Individuals Tested for Influenza A/B: A Population-Based Study. Front Med (Lausanne). 2020 Nov 30;7:598272. doi: 10.3389/fmed.2020.598272.
4. National Command Operation. National Command Operation Center [Internet]. 2020 [cited 2021 Feb 16];Available from: https://ncoc.gov.pk/sitrep.php.
5. Tabah A, Ramanan M, Laupland KB, Buetti N, Cortegiani A, Mellinghoff J, et al. Personal protective equipment and intensive care unit healthcare worker safety in the COVID-19 era (PPE-SAFE): An international survey. J Crit Care. 2020 Oct;59:70-75. doi: 10.1016/j.jcrc.2020.06.005.
6. Greenwood B. The contribution of vaccination to global health: past, present and future. *Philos Trans Roy Soc B Biol Sci*. 2014;369(1645):20130433. doi:10.1098/rstb.2013.0433.
7. Rasmussen SA, Jamieson DJ. Pregnancy, Postpartum Care, and COVID-19 Vaccination in 2021. JAMA. 2021 Mar 16;325(11):1099-1100. doi: 10.1001/jama.2021.1683.
8. The American College of Obstetrics and Gynaecology. Vaccinating pregnant and lactating patients against COVID-19 – practice advisory; 2020. Available from: www.acog.org/clinical/clinical-guidance/practice advisory/articles/2020/12/vaccinating-pregnant-and-lactating-patients-against-covid-19. Accessed March 9, 2022.
9. Ellington S, Strid P, Tong VT, Woodworth K, Galang RR, Zambrano LD, et al. Characteristics of Women of Reproductive Age with Laboratory-Confirmed SARS-CoV-2 Infection by Pregnancy Status - United States, January 22-June 7, 2020. MMWR Morb Mortal Wkly Rep. 2020 Jun 26;69(25):769-775. doi: 10.15585/mmwr.mm6925a1.
10. Zambrano LD, Ellington S, Strid P, Galang RR, Oduyebo T, Tong VT, et al; CDC COVID-19 Response Pregnancy and Infant Linked Outcomes Team. Update: Characteristics of Symptomatic Women of Reproductive Age with Laboratory-Confirmed SARS-CoV-2 Infection by Pregnancy Status - United States, January 22-October 3, 2020. MMWR Morb Mortal Wkly Rep. 2020 Nov 6;69(44):1641-1647. doi: 10.15585/mmwr.mm6944e3.
11. Butt M,Mohammed R, Butt E, Butt S, Xiang J. Why Have Immunization Efforts in Pakistan Failed to Achieve Global Standards of Vaccination Uptake and Infectious Disease Control?Risk Manag Healthc Policy. 2020; 13: 111–124.doi: 10.2147/RMHP.S211170
12. World Health Organization. Ten threats to global health in 2019; 2019. Available from: https://www.who.int/news-room/spotlight/ten-threats-to-global-health-in-2019. Accessed March 9, 2022.
13. Wang J, Jing R, Lai X, Zhang H, Lyu Y, Knoll MD, et al. Acceptance of COVID-19 Vaccination during the COVID-19 Pandemic in China. *Vaccines* 2020;*8*(3):482. https://doi.org/10.3390/vaccines8030482
14. Fisher KA, Bloomstone SJ, Walder J, Crawford S, Fouayzi H, Mazor KM. Attitudes Toward a Potential SARS-CoV-2 Vaccine : A Survey of U.S. Adults. Ann Intern Med. 2020 Dec 15;173(12):964-973. doi: 10.7326/M20-3569.
15. Detoc M, Bruel S, Frappe P, Tardy B, Botelho-Nevers E, Gagneux-Brunon A. Intention to participate in a COVID-19 vaccine clinical trial and to get vaccinated against COVID-19 in France during the pandemic. Vaccine. 2020 Oct 21;38(45):7002-7006. doi: 10.1016/j.vaccine.2020.09.041.
16. Sutton D, D'Alton M, Zhang Y, Kahe K, Cepin A, Goffman D, et al. COVID-19 vaccine acceptance among pregnant, breastfeeding, and nonpregnant reproductive-aged women. Am J Obstet Gynecol MFM. 2021 Sep;3(5):100403. doi: 10.1016/j.ajogmf.2021.100403.
17. Battarbee A, Stockwell M, Varner M, Newes-Adeyi G, Daugherty M, Gyamfi-Bannerman C, et al. Attitudes toward COVID-19 illness and COVID-19 vaccination among pregnant women: a cross-sectional multicenter study during August–December 2020. *medRxiv*. 2021. doi:10.1101/2021.03.26.21254402
18. Yassa M, Birol P, Yirmibes C, Usta C, Haydar A, Yassa A, et al. Near-term pregnant women's attitude toward, concern about and knowledge of the COVID-19 pandemic. J Matern Fetal Neonatal Med. 2020;33(22):3827–3834. doi: 10.1080/14767058.2020.1763947.
19. Hsu AL, Johnson T, Phillips L, Nelson TB. Sources of Vaccine Hesitancy: Pregnancy, Infertility, Minority Concerns, and General Skepticism. Open Forum Infect Dis. 2021 Aug 18;9(3):ofab433. doi: 10.1093/ofid/ofab433.
20. Jarrett C, Wilson R, O'Leary M, Eckersberger E, Larson HJ; SAGE Working Group on Vaccine Hesitancy. Strategies for addressing vaccine hesitancy - A systematic review. Vaccine. 2015 Aug 14;33(34):4180-90. doi: 10.1016/j.vaccine.2015.04.040.
21. Benis A, Seidmann A, Ashkenazi S. Reasons for Taking the COVID-19 Vaccine by US Social Media Users. Vaccines. 2021;*9*(4):315. https://doi.org/10.3390/vaccines9040315
22. Daley MF, Glanz JM. Using Social Media to Increase Vaccine Acceptance. Acad Pediatr. 2021 May-Jun;21(4S):S32-S33. doi: 10.1016/j.acap.2020.10.018.

23. Malik A, Malik J, Ishaq U. Acceptance of COVID-19 vaccine in Pakistan among health care workers. PLoS ONE. 2021;16(9): e0257237. https://doi.org/10.1371/journal.pone.0257237.
24. Kumari A, Mahey R, Kachhawa G, Kumari R, Bhatla N. Knowledge, attitude, perceptions, and concerns of pregnant and lactating women regarding COVID-19 vaccination: A cross-sectional survey of 313 participants from a tertiary care centre of North India. Diabetes Metab Syndr. 2022 Mar;16(3):102449. doi: 10.1016/j.dsx.2022.102449.
25. Data world bank org. Rural population (% of total population) - India | Data.2022 [online] Available at: https://data.worldbank.org/indicator/SP.RUR.TOTL. ZS?locations¼IN. [Accessed 23 February 2022].
26. Riad A, Jouzová A, Üstün B, Lagová E, Hruban L, Janků P, et al. COVID-19 Vaccine Acceptance of Pregnant and Lactating Women (PLW) in Czechia: An Analytical Cross-Sectional Study. Int J Environ Res Public Health. 2021 Dec 19;18(24):13373. doi: 10.3390/ijerph182413373.
27. Mohan S, Reagu S, Lindow S, Alabdulla M. COVID-19 vaccine hesitancy in perinatal women: a cross sectional survey. J Perinat Med. 2021 Apr 28;49(6):678-685. doi: 10.1515/jpm-2021-0069.
28. Tao L, Wang R, Han N, Liu J, Yuan C, Deng L, et al. Acceptance of a COVID-19 vaccine and associated factors among pregnant women in China: a multi-center cross-sectional study based on health belief model. Hum Vaccin Immunother. 2021;17(8):2378–88.
29. Skjefte M, Ngirbabul M, Akeju O, Escudero D, Hernandez-Diaz S, Wyszynski DF, et al. COVID-19 vaccine acceptance among pregnant women and mothers of young children: results of a survey in 16 countries. Eur J Epidemiol. 2021;36(2):197–211.
30. Goncu Ayhan S, Oluklu D, Atalay A, Menekse Beser D, Tanacan A, Moraloglu Tekin O, et al. COVID-19 vaccine acceptance in pregnant women. Int J Gynaecol Obstet. 2021 Aug;154(2):291-296. doi: 10.1002/ijgo.13713.
31. Meharry PM, Colson ER, Grizas AP, Stiller R, Vázquez M. Reasons why women accept or reject the trivalent inactivated influenza vaccine (TIV) during pregnancy. Matern Child Health J. 2013 Jan;17(1):156-64. doi: 10.1007/s10995-012-0957-3. PMID: 22367067.
32. Pairat, K., Phaloprakarn, C. Acceptance of COVID-19 vaccination during pregnancy among Thai pregnant women and their spouses: a prospective survey. Reprod Health.2022;19(74):1-11. https://doi.org/10.1186/s12978-022-01383-0.
33. Nguyen LH, Hoang MT, Nguyen LD, Ninh LT, Nguyen HTT, Nguyen AD, et al. Acceptance and willingness to pay for COVID-19 vaccines among pregnant women in Vietnam. Trop Med Int Health.2021;26(10):1303-13.
34. Ghamri RA, Othman SS, Alhiniah MH, Alelyani RH, Badawi AM, Alshahrani AA. Acceptance of COVID-19 Vaccine and Associated Factors Among Pregnant Women in Saudi Arabia. Patient Prefer Adherence. 2022 Apr 2;16:861-873. doi: 10.2147/PPA.S357653.
35. Centers for Disease Control. New CDC data: COVID-19 vaccination safe for pregnant people; 2021. Available from: https://www.cdc.gov/media/ releases/2021/s0811-vaccine-safe-pregnant.html. Accessed March 9, 2022.
36. American College of Obstetricians and Gynecologists. COVID-19 vaccines and pregnancy: conversation guide for clinicians; 2021. Available from: https://www.acog.org/covid-19/covid-19-vaccines-and-pregnancy-conversation-guide-for-clinicians. Accessed March 9, 2022.
37. World Health Organization. Interim recommendations for use of the Pfizer–BioNTech COVID-19 vaccine, BNT162b2, under emergency use listing: interim guidance; 2021. Available from: https://apps.who.int/iris/handle/10665/338484. Accessed March 9, 2022.