

Supplementary Table S1. The descriptive statistical results of anti-SARS-CoV-2 IgG in the participants.

IgG (OD ₄₅₀)	Vaccines before pregnancy + Infection (Group I, n=101)	Vaccines before pregnancy + no infection (Group II, n=20)	No vaccines + infection (Group III, n=17)	Before SARS-CoV-2 (2019) (Group IV, n=20)	Adults Infection SARS-CoV-2 (Group V, n=20)
Minimum value	0.281	0.070	0.048	0.046	1.588
25th percentile value	2.688	0.135	0.057	0.054	2.847
Median value	3.017	0.218	0.066	0.059	3.101
75th percentile value	3.230	0.429	0.084	0.065	3.355
Maximum value	3.678	1.623	0.198	0.100	3.655
Mean	2.866	0.400	0.081	0.061	3.044
SD	0.553	0.431	0.039	0.012	0.484

Supplementary Table S2. The levels of anti-SARS-CoV-2 IgG subclasses in the participants.

IgG subclass (OD450)	Vaccines before pregnancy + Infection (Group I, n=101)	Vaccines before pregnancy + no infection (Group II, n=20)	No vaccines + infection (Group III, n=17)	Before SARS-CoV-2 (2019) (Group IV, n=20)	Adults Infection SARS-CoV-2 (Group V, n=20)
IgG1	0.66 (0.32-1.07)	0.05 (0.05-0.06)	0.04 (0.04-0.05)	0.04 (0.04-0.05)	0.84 (0.6-1.22)
IgG2	0.06 (0.06-0.07)	0.04(0.04-0.05)	0.05 (0.05-0.07)	0.05 (0.05-0.07)	0.04(0.04-0.05)
IgG3	0.05 (0.05-0.06)	0.05 (0.04-0.06)	0.04 (0.04-0.05)	0.04 (0.04-0.05)	0.05 (0.04-0.06)
IgG4	0.05 (0.04-0.05)	0.05 (0.05-0.06)	0.05 (0.04-0.06)	0.05 (0.04-0.06)	0.05 (0.05-0.06)

Supplementary Table S3. The descriptive statistical results of anti-SARS-CoV-2 IgG levels in infants born to mothers who received COVID-19 vaccination before pregnancy and experienced breakthrough infection, grouped based on the infants' age (<1 week, 1 month, and 2 months).

IgG (OD ₄₅₀)	<1 week (n=61)	1-month (n=19)	2-month (n=21)
Minimum value	1.348	2.342	0.281
25th percentile value	2.950	2.726	1.948
Median value	3.164	2.895	2.293
75th percentile value	3.298	3.057	2.687
Maximum value	3.678	3.281	3.161
Mean	3.083	2.882	2.219
SD	0.361	0.249	0.707

Supplementary Table S4a. The geometric mean titers (GMT) with 95% confidence interval (CI) of serum-neutralizing antibody in the participants.

Strain	Nab/Titer (OD₅₀)	Vaccinated & Infected mothers (Group I, n=101)	Uninfected mothers (Group II, n=20)	Unvaccinated mothers (Group III, n=17)	Pre-pandemic mothers (Group IV, n=20)	Adult convalescent (Group V, n=20)
D614G	GMT	463	19	32	9	548
	95% CI. Lower	376	13	18	7	403
	95% CI. Upper	569	27	58	13	746
Alpha	GMT	511	16	31	9	474
	95% CI. Lower	412	11	18	6	308
	95% CI. Upper	635	25	53	12	732
Beta	GMT	874	20	21	6	705
	95% CI. Lower	710	13	12	5	456
	95% CI. Upper	1077	31	37	8	1088
Delta	GMT	129	22	20	9	257
	95% CI. Lower	99	16	11	7	185
	95% CI. Upper	168	31	37	11	357
BA.4/5	GMT	231	8	12	7	231
	95% CI. Lower	177	6	8	5	154
	95% CI. Upper	300	12	17	10	346
BF.7	GMT	220	16	13	6	215
	95% CI. Lower	168	11	8	5	145
	95% CI. Upper	288	22	19	8	319

XBB.1	GMT	64	11	19	6	49
	95% CI. Lower	48	8	11	5	30
	95% CI. Upper	87	16	31	6	79

Supplementary Table S4b. The geometric mean ratio (GMR) with 95% CI of serum-neutralizing antibody in the participants.

Comparison	Values	D614G	Alpha	Beta	Delta	BA.4/5	BF.7	XBB.1
Group II vs. Group IV	GMR	2.11	1.78	3.33	2.44	1.14	2.67	1.83
	95% CI. Lower	1.41	1.19	2.22	1.63	0.76	1.78	1.22
	95% CI. Upper	3.16	2.66	5.00	3.66	1.71	4.00	2.75
Group I vs. Group V	GMR	0.84	1.08	1.24	0.50	1.00	1.02	1.31
	95% CI. Lower	0.56	0.72	0.83	0.33	0.67	0.68	0.87
	95% CI. Upper	1.27	1.62	1.86	0.75	1.50	1.53	1.96
Group I vs. Group III	GMR	14.47	16.48	41.62	6.45	19.25	16.92	3.37
	95% CI. Lower	9.65	11.00	27.77	4.30	12.84	11.29	2.25
	95% CI. Upper	21.69	24.71	62.39	9.67	28.86	25.37	5.05
Group I vs. Group II	GMR	24.37	31.94	43.70	5.86	28.88	13.75	5.82
	95% CI. Lower	16.26	21.31	29.15	3.91	19.26	9.17	3.88
	95% CI. Upper	36.53	47.87	65.51	8.79	43.28	20.61	8.72
Group III vs. Group II	GMR	1.68	1.94	1.05	0.91	1.50	0.81	1.73
	95% CI. Lower	1.12	1.29	0.70	0.61	1.00	0.54	1.15
	95% CI. Upper	2.52	2.90	1.57	1.36	2.25	1.22	2.59

Supplementary Table S5a. The geometric mean titers (GMT) with 95% CI of serum-neutralizing antibody in infants grouped by the maternal doses of COVID-19 vaccination before pregnancy.

Strain	Nab/Titer (OD ₅₀)	Group II		Group I	
		2-dose (n=12)	3-dose (n=8)	2-dose (n=31)	3-dose (n=66)
D614G	GMT	14	28	307	573
	95% CI. Lower	9	14	223	444
	95% CI. Upper	22	55	423	738
Alpha	GMT	14	22	331	649
	95% CI. Lower	8	10	227	506
	95% CI. Upper	24	47	482	832
Beta	GMT	13	38	623	1054
	95% CI. Lower	8	19	470	819
	95% CI. Upper	21	74	826	1358
Delta	GMT	18	31	70	171
	95% CI. Lower	11	22	42	126
	95% CI. Upper	29	44	115	232
BA.4/5	GMT	9	8	136	297
	95% CI. Lower	5	5	86	218
	95% CI. Upper	14	13	216	403
BF.7	GMT	15	17	109	297
	95% CI. Lower	9	8	67	218
	95% CI. Upper	24	34	176	404
XBB.1	GMT	12	10	30	88
	95% CI. Lower	7	6	18	62
	95% CI. Upper	20	17	51	126

Supplementary Table S5b. The geometric mean ratio (GMR) with 95% CI of serum-neutralizing antibody in infants grouped by the maternal doses of COVID-19 vaccination before pregnancy.

Comparison	Values	D614G	Alpha	Beta	Delta	BA.4/5	BF.7	XBB.1
3-dose vs. 2-dose in Group II	GMR	2.00	1.57	2.92	1.72	0.89	1.13	0.83
	95% CI. Lower	1.33	1.05	1.95	1.15	0.59	0.76	0.56
	95% CI. Upper	3.00	2.36	4.38	2.58	1.33	1.70	1.25
3-dose vs. 2-dose in Group I	GMR	1.87	1.96	1.69	2.44	2.18	2.72	2.93
	95% CI. Lower	1.25	1.31	1.13	1.63	1.46	1.82	1.96
	95% CI. Upper	2.80	2.94	2.54	3.66	3.27	4.08	4.40

Supplementary Table S6a. The geometric mean titers (GMT) with 95% CI of serum-neutralizing antibody in infants born to mothers who received COVID-19 vaccination before pregnancy and experienced breakthrough infection, grouped based on the infants' age (<1 week, 1 month, and 2 months).

Strain	Nab/Titer (OD ₅₀)	<1 week (n=61)	1 month (n=19)	2 month (n=21)
D614G	GMT	578	600	192
	95% CI. Lower	451	442	115
	95% CI. Upper	742	814	320
Alpha	GMT	710	543	187
	95% CI. Lower	559	375	107
	95% CI. Upper	901	786	326
Beta	GMT	1149	876	394
	95% CI. Lower	904	606	225
	95% CI. Upper	1461	1268	691
Delta	GMT	191	85	61
	95% CI. Lower	142	46	32
	95% CI. Upper	257	157	118
BA.4/5	GMT	357	217	69
	95% CI. Lower	266	129	37
	95% CI. Upper	477	368	127
BF.7	GMT	306	194	95
	95% CI. Lower	217	114	52
	95% CI. Upper	431	331	172

XBB.1	GMT	86	44	40
	95% CI. Lower	58	23	20
	95% CI. Upper	127	83	79

Supplementary Table S6b. The geometric mean ratio (GMR) with 95% CI of serum-neutralizing antibody in infants born to mothers who received COVID-19 vaccination before pregnancy and experienced breakthrough infection, grouped based on the infants' age (<1 week, 1 month, and 2 months).

Comparison	Values	D614G	Alpha	Beta	Delta	BA.4/5	BF.7	XBB.1
1month vs. <1week	GMR	1.04	0.76	0.76	0.45	0.61	0.63	0.51
	95% CI. Lower	0.69	0.51	0.51	0.30	0.41	0.42	0.34
	95% CI. Upper	1.56	1.15	1.14	0.67	0.91	0.95	0.77
2month vs. <1week	GMR	0.33	0.26	0.34	0.32	0.19	0.31	0.47
	95% CI. Lower	0.22	0.18	0.23	0.21	0.13	0.21	0.31
	95% CI. Upper	0.50	0.39	0.51	0.48	0.29	0.47	0.70

Supplementary Table S7a. The geometric mean titers (GMT) with 95% CI of serum-neutralizing antibody in infants aged up to 1 week born to the mothers infected at the second (n=19) or third trimester (n=42).

Strain	Nab/Titer (OD ₅₀)	Trimester with age<1 week in Group I	
		Second trimester (n=19)	Third trimester (n=42)
D614G	GMT	615	562
	95% CI. Lower	365	420
	95% CI. Upper	1037	751
Alpha	GMT	790	676
	95% CI. Lower	491	509
	95% CI. Upper	1273	898
Beta	GMT	1457	1032
	95% CI. Lower	839	799
	95% CI. Upper	2532	1332
Delta	GMT	226	177
	95% CI. Lower	122	125
	95% CI. Upper	418	250
BA.4/5	GMT	354	358
	95% CI. Lower	172	265
	95% CI. Upper	726	483
BF.7	GMT	337	292
	95% CI. Lower	152	202
	95% CI. Upper	748	424
XBB.1	GMT	103	79

95% CI. Lower	45	51
95% CI. Upper	238	123

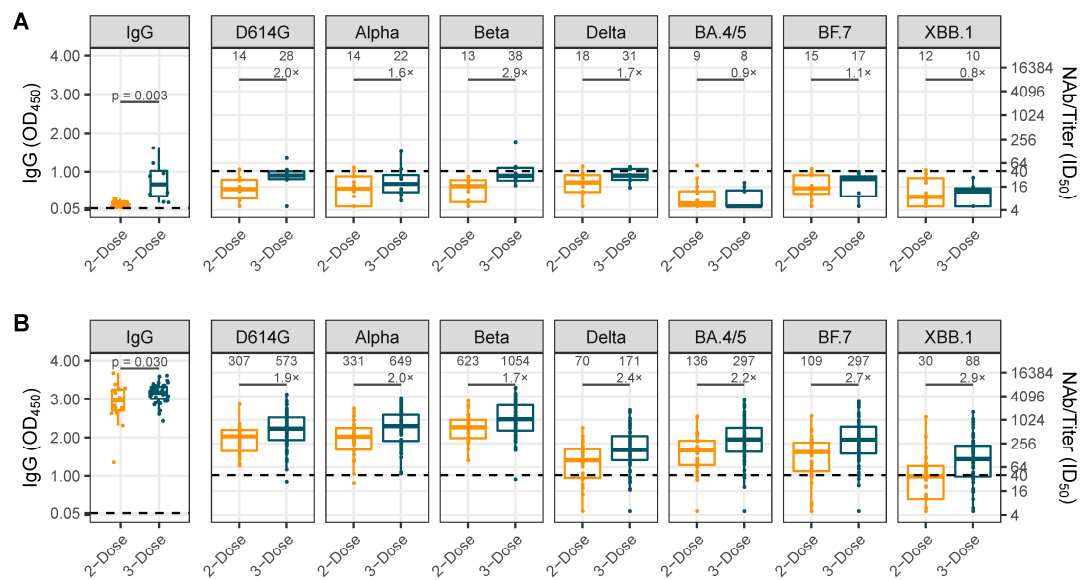
Supplementary Table S7b. The geometric mean ratio (GMR) with 95% CI of serum-neutralizing antibody in infants aged up to 1 week born to the mothers infected at the second (n=19) or third trimester (n=42).

Comparison	Values	D614G	Alpha	Beta	Delta	BA.4/5	BF.7	XBB.1
Third vs. Second Trimester with age<1 week in Group I	GMR	0.91	0.86	0.71	0.78	1.01	0.87	0.77
	95% CI. Lower	0.61	0.57	0.47	0.52	0.67	0.58	0.51
	95% CI. Upper	1.37	1.28	1.06	1.17	1.52	1.30	1.15

Supplementary Figure S1. Comparison of SARS-CoV-2 IgG titers and serum-neutralized antibody against D614G, Alpha, Beta, Delta, BA.4/5, BF.7, and XBB.1 variants in infants grouped by the maternal doses of COVID-19 vaccination before pregnancy.

A). Comparison of SARS-CoV-2 IgG titers and serum-neutralized antibody against different variants in infants born to the mothers received 2- or 3-dose of vaccination before pregnancy and with no breakthrough infection during pregnancy.

B). Comparison of SARS-CoV-2 IgG titers and serum-neutralized antibody against different variants in infants born to the mothers received 2- or 3-dose of vaccination before pregnancy and with breakthrough infection during pregnancy.



Supplementary Figure S2. The titers of SARS-CoV-2 IgG and serum-neutralized antibody against D614G, Alpha, Beta, Delta, BA.4/5, BF.7, and XBB.1 variants in infants aged up to 1 week born to the mothers infected at the second (n=19) or third trimester (n=42).

A). The distribution of SARS-CoV-2 IgG titers in infants with the time difference from maternal infection to delivery.

B). Comparison of SARS-CoV-2 IgG titers in infants born to the mothers infected at the second or third trimester.

C). Comparison of serum-neutralized antibody against D614G, Alpha, Beta, Delta, BA.4/5, BF.7, and XBB.1 variants in infants born to the mothers infected at the second or third trimester.

