Supplementary file 1. Results of the sensitivity analysis

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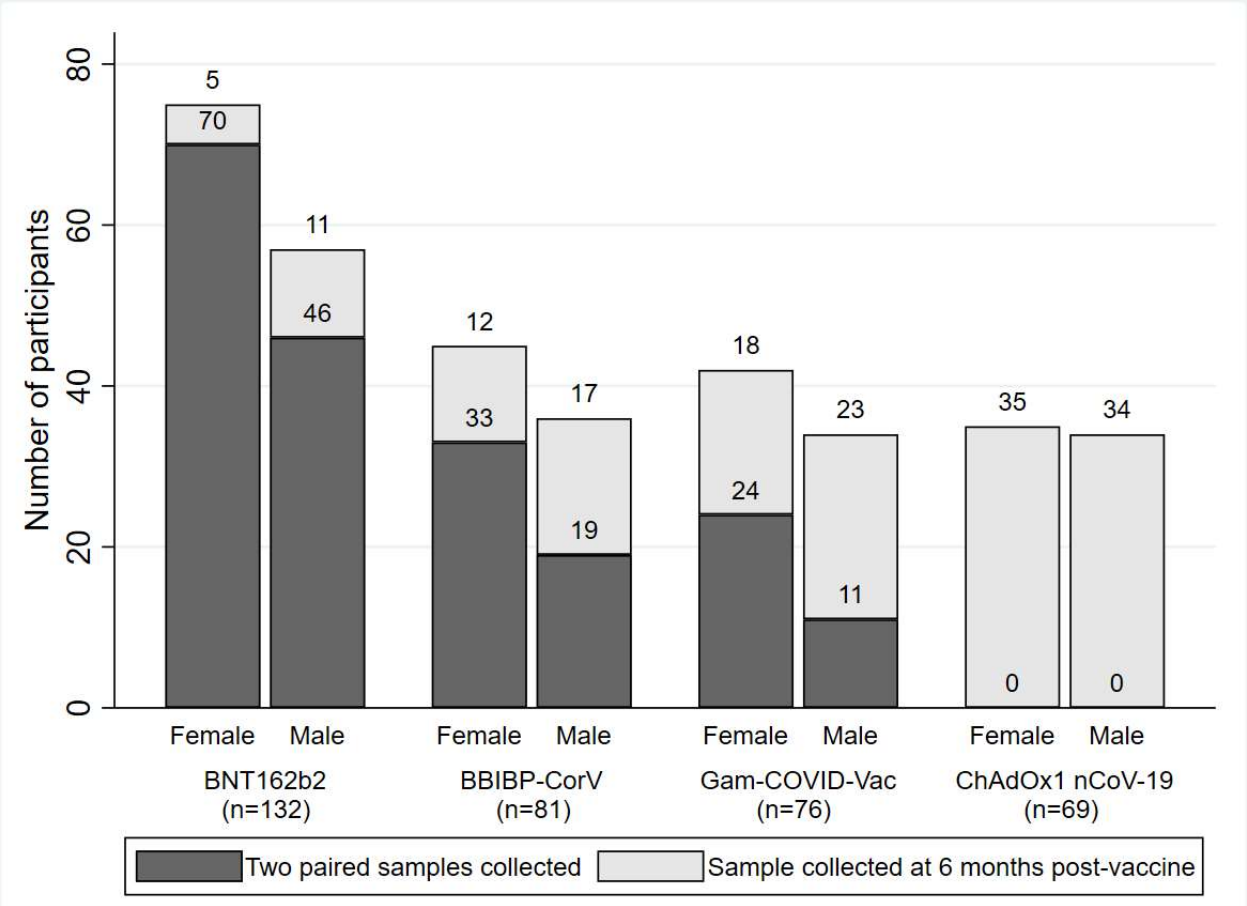

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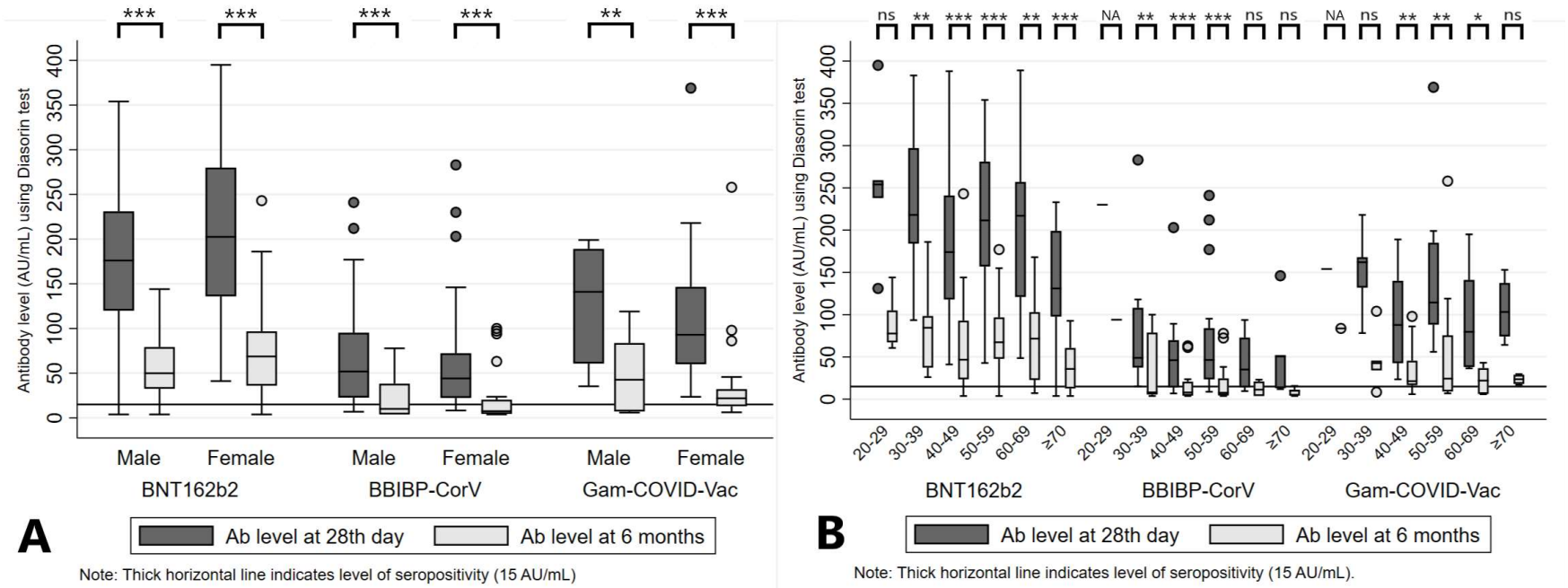

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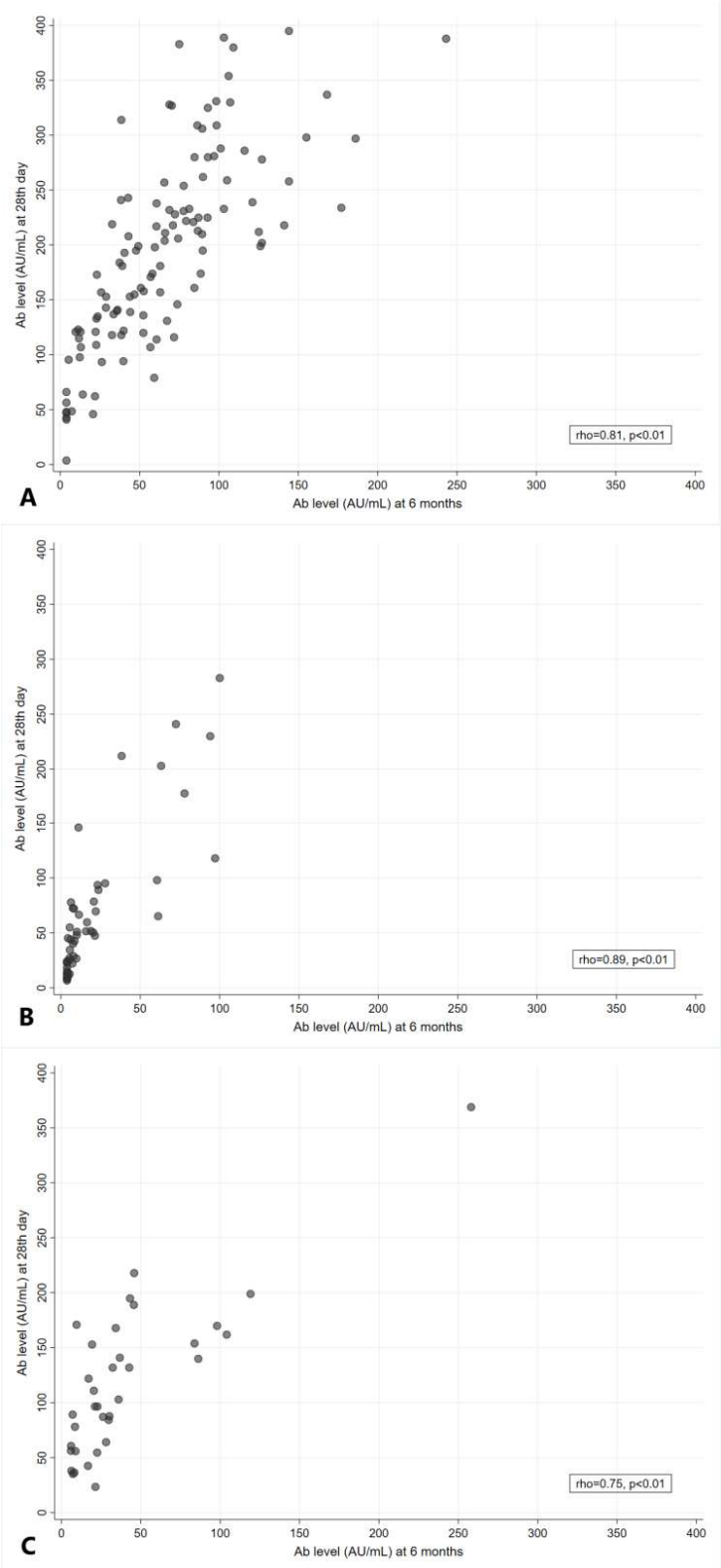

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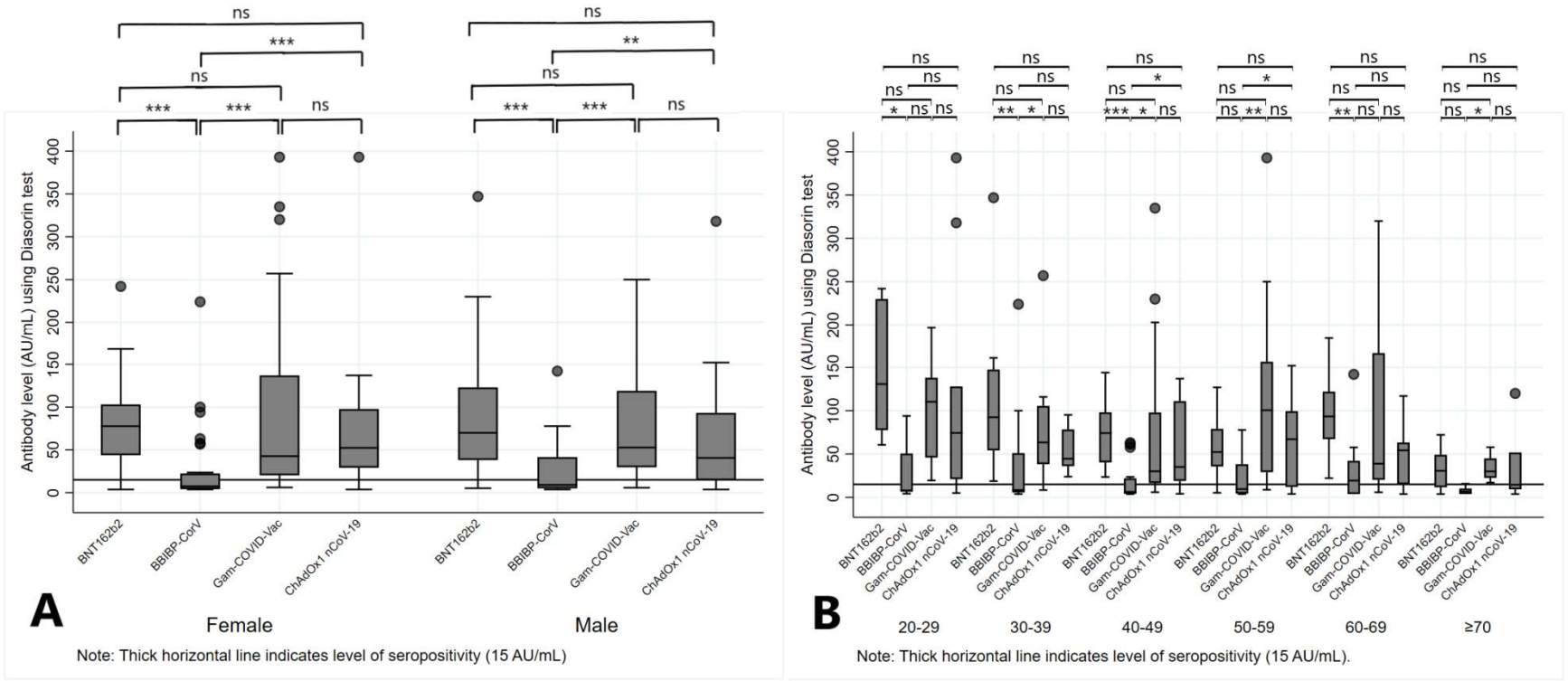

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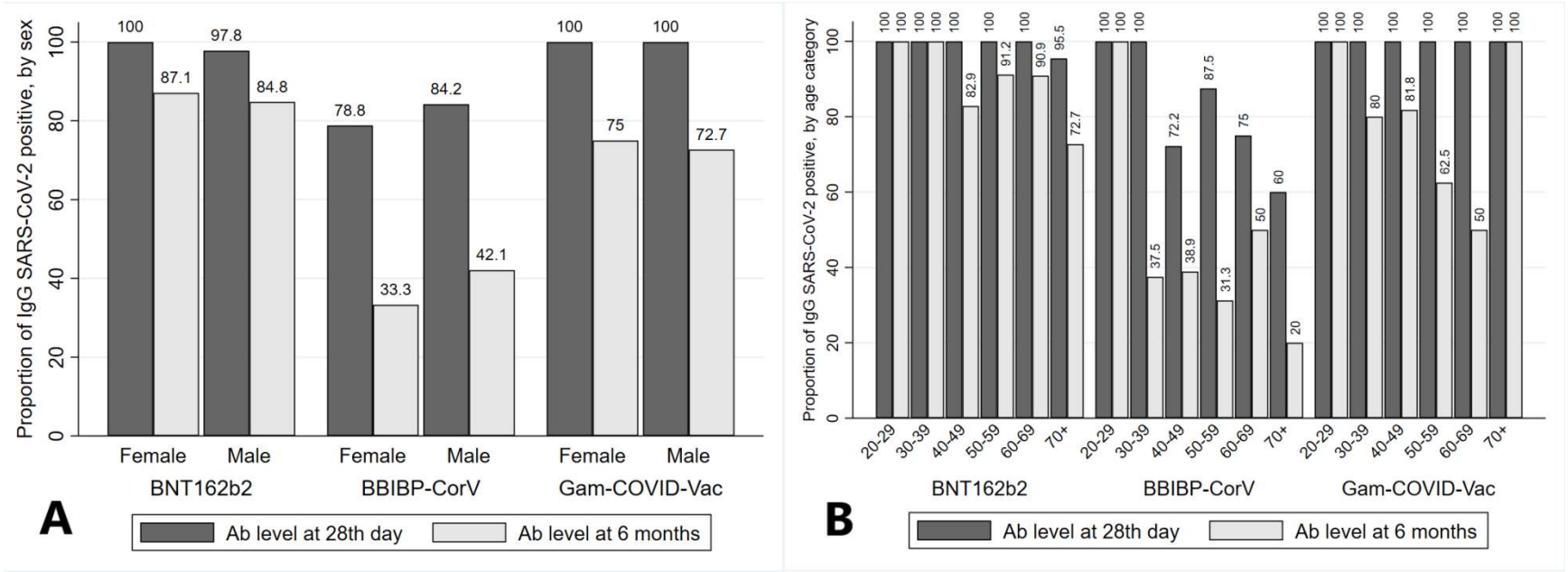

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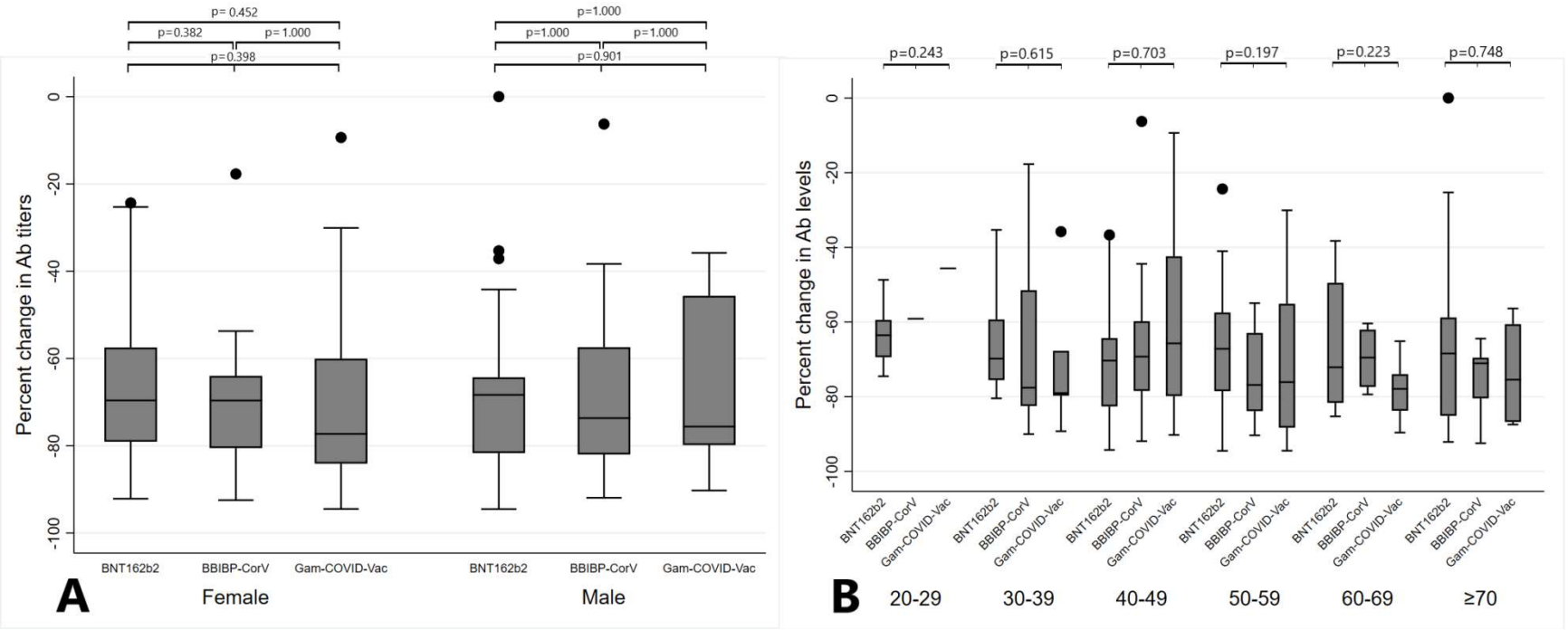

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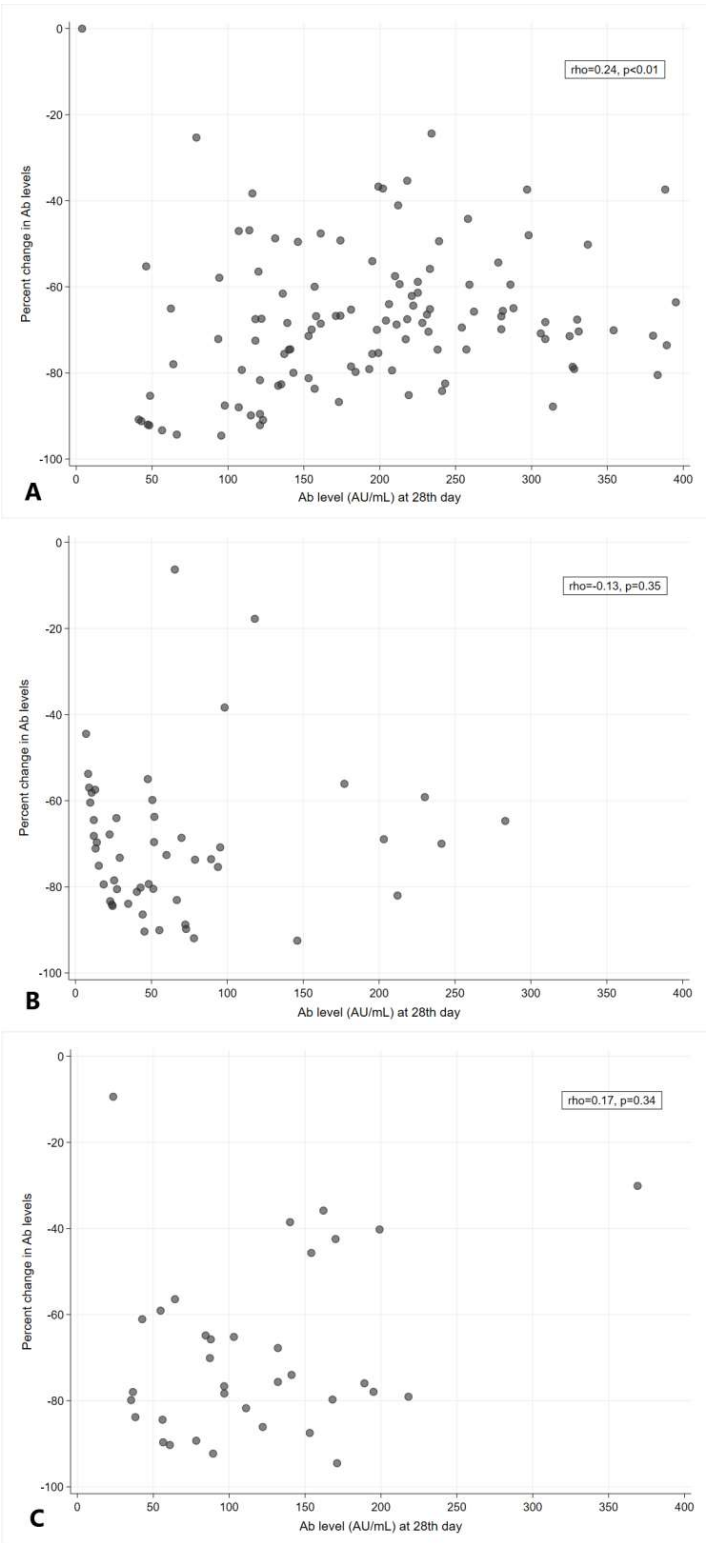

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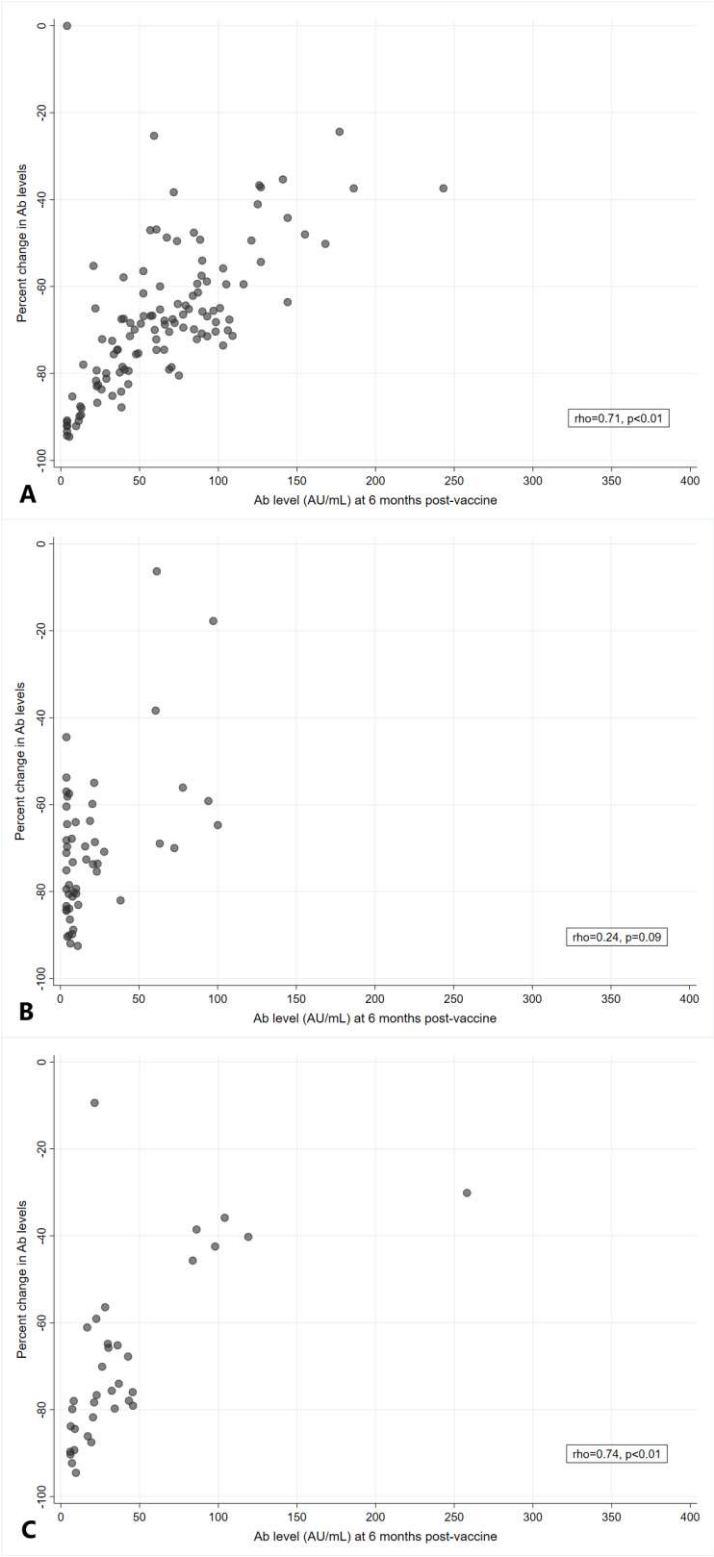

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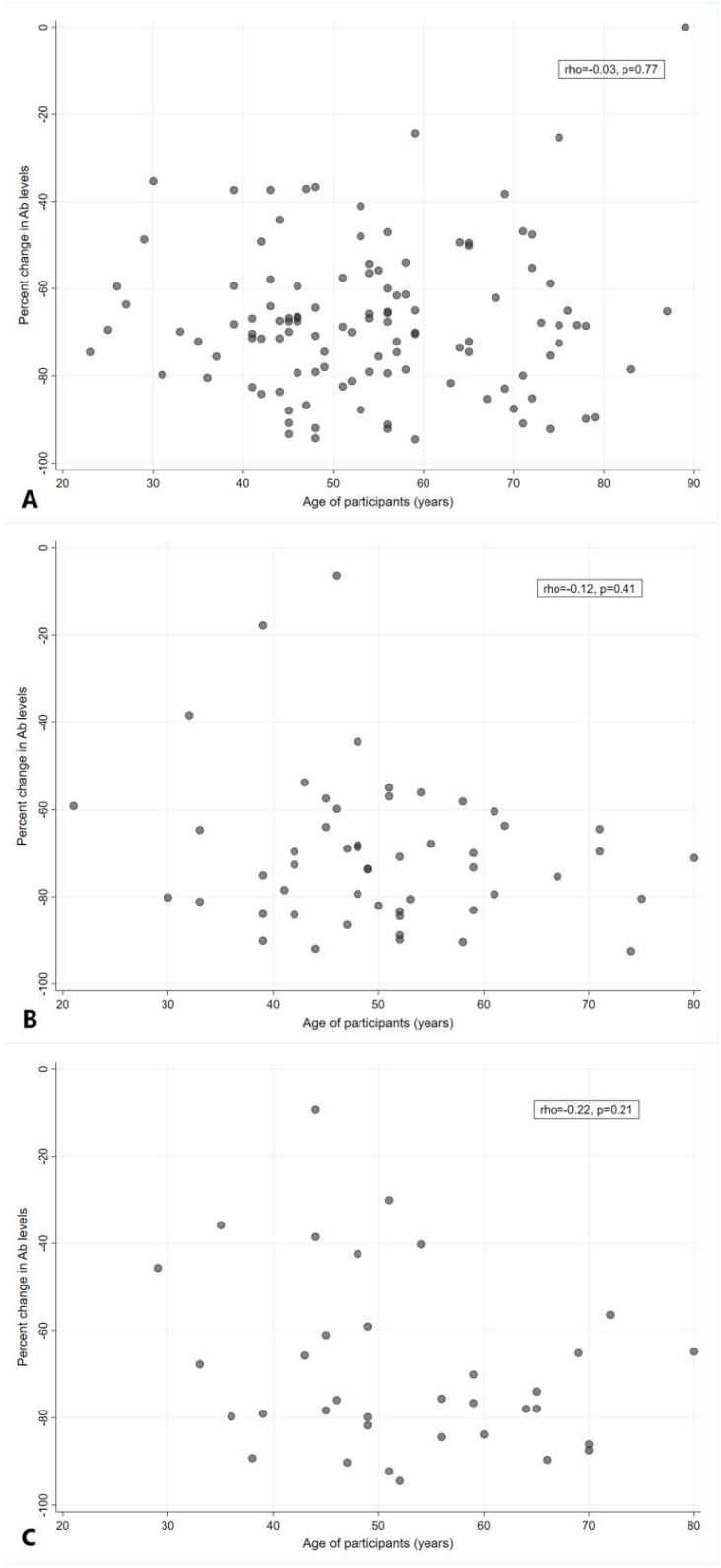

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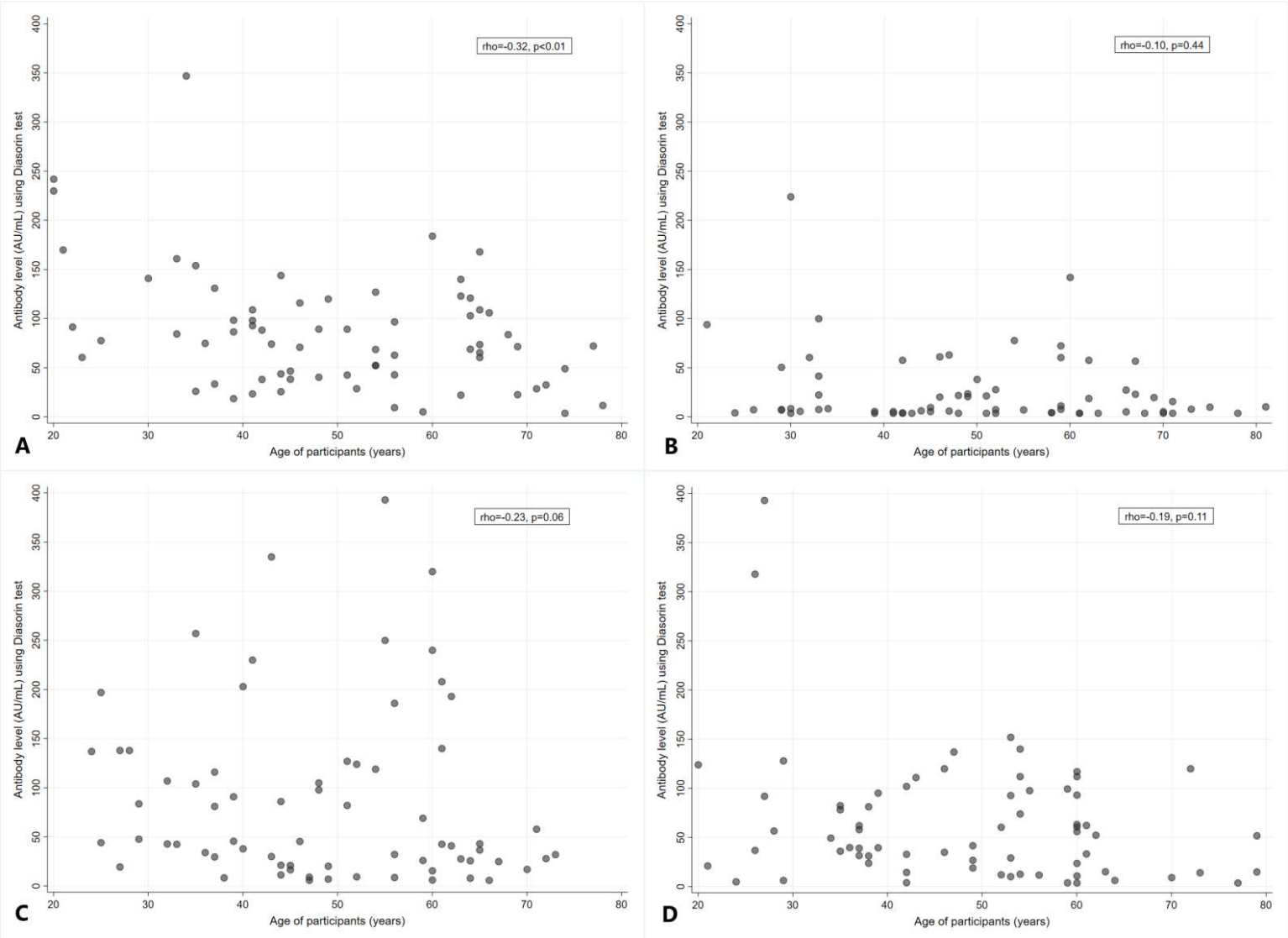

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Supplementary Note Table 1. Antibody levels on 28th day and 6 months after administration of the second dose of vaccine, stratified by sex and age groups of the participants, after exclusion of the participants with Ab levels above the test's upper limit of quantitation (>400 AU/mL).

Vaccine	At 28th day after the second dose							At 6 months after the second dose					
	N	%	Mean (AU/mL)	SD	Median (AU/mL)	IQR (25-75)		Mean (AU/mL)	SD	Median (AU/mL)	IQR (25-75)		p-value[1]
BNT162b2													
Total	116	100	194.29	88.88	196.5	122.5	248.5	65.37	44.25	60.6	33.05	89.55	**<0.001**
Sex													
Female	70	60.34	206.26	92.9	202.5	136	280	72.09	47.64	68.7	36	96.8	**<0.001**
Male	46	39.66	176.08	79.95	176	120	231	55.14	36.71	49.9	32.5	79.2	**<0.001**
Age category													
20-29	5	4.31	255.40	93.92	254.00	238.00	259.00	90.90	34.18	77.70	67.20	105.00	0.063
30-39	9	7.76	234.94	91	218	184	297	85.37	52.46	84.5	37.3	98.4	**0.008**
40-49	35	30.17	186.4	92.24	174	118	241	62.96	50.39	46.7	23.5	92.9	**<0.001**
50-59	34	29.31	216.95	77.67	211.5	157.00	281.00	72.57	39.42	67.35	47.70	96.8	**<0.001**
60-69	11	9.48	202.24	101.76	217	121	257	72.65	46.91	71.6	22.7	103	**0.003**
≥70	22	18.97	137.32	65.34	131.00	97.80	199.00	40.47	27.48	35.80	12.70	60.60	**<0.001**
BBIBP-CorV													
Total	52	100	66.43	66.17	47.8	22.5	78.25	20.6	26.65	7.95	4.3	21.65	**<0.001**
Sex													
Female	33	63.46	62.33	66.06	44.1	22.30	72.2	18.91	27.52	7.45	4.37	20.3	**<0.001**
Male	19	36.54	73.55	67.55	51.80	22.70	95.20	23.52	25.52	10.00	3.79	38.20	**<0.001**
Age category													
20-29	1	1.92	230.00	..	230.00	..	..	94.00	..	94.00	..	..	NA
30-39	8	15.38	85.88	86.65	48.9	37.45	108.05	36.07	42.91	8.05	5.53	78.8	**0.008**
40-49	18	34.62	50.87	46.57	46.10	13.90	69.70	16.08	18.19	7.98	4.22	20.70	**<0.001**
50-59	16	30.77	73.39	72.96	46.40	23.50	83.95	19.05	24.01	7.61	4.39	24.60	**<0.001**
60-69	4	7.69	43.37	38.17	35.10	13.99	72.75	12.37	10.06	11.30	3.79	20.95	0.125
≥70	5	9.62	54.74	54.59	51.10	13.10	51.60	8.94	4.99	10.00	4.23	11.00	0.063
Gam-COVID-Vac													
Total	35	100	117.64	69.3	103	60.8	162	40.15	48.14	26.1	9.44	43.1	**<0.001**
Sex													
Female	24	68.57	110.87	74.16	92.95	60.1	146.5	36.66	52.23	21.85	13.02	32.1	**<0.001**
Male	11	31.43	132.41	57.71	141	60.8	189	47.79	38.87	42.6	7.12	83.7	**0.003**

Age category													
20-29	1	2.86	154.00	..	154.00	..	..	83.70	..	83.70	..	..	NA
30-39	5	14.29	151.64	51.38	162.00	132.00	168.00	46.96	35.09	42.60	34.10	45.70	0.063
40-49	11	31.43	91.94	55.6	87.8	42.6	140	34.02	30.68	21.3	16.6	45.5	**0.003**
50-59	8	22.86	150.01	100.32	114.3	88.25	185	60.38	87.83	24.35	9.1	75.6	**0.008**
60-69	6	17.14	95	63.76	79.7	38.10	141	22.63	17.65	21.98	6.18	36.7	**0.031**
≥70	4	11.43	105.90	39.49	103.20	74.30	137.50	23.48	6.31	23.60	18.10	28.85	0.125

Notes: [1]Wilcoxon matched-pairs signed-rank test (exact test, where applicable), p-value refers to difference between matched groups at two time points of measurements within the same vaccine. In bold are presented statistically significant at $p<0.05$. NA = not applicable, SD = standard deviation, IQR = interquartile range.

Supplementary Note Table 2. Percent change in Ab levels between 28th day and at 6 months, stratified by sex and age groups, after exclusion of the participants with Ab levels above the test's upper limit of quantitation (>400 AU/mL).

	BNT162b2 vaccine					BBIBP-CorV vaccine					Gam-COVID-Vac vaccine				
	Mean (SD), %-change	**Median, %-change**	**IQR (25-75)**		**p-value[1]**	**Mean (SD), %-change**	**Median, %-change**	**IQR (25-75)**		**p-value[1]**	**Mean (SD), %-change**	**Median, %-change**	**IQR (25-75)**		**p-value[1]**
Total	-67.46 (16.71)	-68.61	-79.17	-59.39	NA	-69.95 (17.01)	-71.82	-81.55	-62.05	NA	-68.74 (20.31)	-75.93	-83.78	-59.05	NA
Sex															
Female	-66.68 (16.16)	-69.61	-79.07	-57.48	0.50	-71.08 (14.88)	-69.64	-80.51	-63.99	0.98	-68.90 (21.23)	-77.27	-84.08	-60.04	0.78
Male	-68.64 (17.63)	-68.34	-81.65	-64.32		-68.00 (20.50)	-73.66	-81.98	-57.42		-68.41 (19.14)	-75.61	-79.83	-45.65	
Age category															
20-29	-63.13 (9.89)	-63.54	-69.41	-59.46	0.84	-59.13	-59.13	..	..	0.69	-45.65	-45.65	..	..	0.72
30-39	-64.20 (17.03)	-69.82	-75.55	-59.34		-66.37 (25.37)	-77.60	-82.51	-51.50		-70.31 (20.74)	-79.04	-79.70	-67.73	
40-49	-70.01 (15.52)	-70.33	-82.59	-64.32		-66.72 (19.14)	-69.28	-78.46	-59.80		-62.01 (23.86)	-65.72	-79.83	-42.41	
50-59	-67.19 (15.07)	-67.17	-78.53	-57.48		-74.37 (12.67)	-76.86	-83.85	-62.95		-70.46 (23.47)	-76.1	-88.31	-55.13	
60-69	-65.4 (16.27)	-72.12	-81.65	-49.52		-69.71 (9.10)	-69.53	-77.37	-62.05		-78.06 (8.37)	-77.92	-83.78	-73.97	
≥70	-67.18 (22.48)	-68.43	-85.11	-58.80		-75.60 (11.06)	-71.07	-80.43	-69.57		-73.68 (15.50)	-75.44	-86.76	-60.60	

Note: [1]Wilcoxon rank-sum or Kruskal–Wallis test; p-value refers to difference between the groups of participants vaccinated with the same vaccine, in bold statistically significant p<0.05; SD=standard deviation, IQR = interquartile range, NA = not applicable.

Supplementary Note Table 3. Antibody levels at 6 months from the administration of the second dose of vaccine, stratified by sex and age of the participants, after exclusion of one participant with Ab level above the test's upper limit of quantitation (>400 AU/mL) and three age- and sex-matching participants.

	BNT162b2 vaccine				BBIBP-CorV vaccine				Gam-COVID-Vac vaccine				ChAdOx1 nCoV-19 vaccine				
	N (%)	**Mean (SD), AU/mL**	**Median (IQR, 25-75), AU/mL**	**p-value [1]**	**N (%)**	**Mean (SD), AU/mL**	**Median (IQR, 25-75), AU/mL**	**p-value [1]**	**N (%)**	**Mean (SD), AU/mL**	**Median (IQR, 25-75), AU/mL**	**p-value [1]**	**N (%)**	**Mean (SD), AU/mL**	**Median (IQR, 25-75), AU/mL**	**p-value [1]**	**p-value [2]**
Total	69 (100)	85.33 (60.45)	74.20 (42.70-109.00)	NA	69 (100)	25.48 (37.14)	7.91 (4.37-27.40)	NA	69 (100)	86.79 (88.95)	44.20 (25.00-124.00)	NA	69 (100)	63.85 (65.70)	49.40 (19.00-93.20)	NA	**<0.01**
Sex																	
Female	35 (50.72)	81.47 (47.87)	77.70 (43.80-103.00)	0.90	35 (50.72)	24.86 (42.68)	7.59 (4.22-22.40)	0.54	35 (50.72)	90.44 (103.47)	42.70 (20.30-137.00)	0.59	35 (50.72)	68.12 (69.11)	52.40 (29.20-97.70)	0.41	**<0.01**
Male	34 (49.28)	89.31 (71.68)	69.95 (38.20-123.00)		34 (49.28)	26.11 (31.06)	9.22 (5.20-41.60)		34 (49.28)	83.02 (72.42)	57.85 (29.70-119.00)		34 (49.28)	59.45 (62.72)	40.65 (14.50-93.20)		**<0.01**
Age category																	
20-29	6 (8.70)	145.30 (79.72)	130.75 (77.70-230.00)	**<0.01**	6 (8.70)	28.44 (36.64)	7.45 (7.04-50.50)	0.68	8 (11.59)	100.65 (61.23)	110.35 (46.00-138.00)	0.33	10 (14.49)	118.10 (133.92)	74.35 (21.10-128.00)	0.62	0.06
30-39	12 (17.39)	113.06 (88.31)	92.50 (54.20-147.50)		12 (17.39)	40.99 (64.81)	8.47 (5.65-51.05)		12 (17.39)	79.95 (65.90)	63.40 (38.35-105.50)		14 (20.29)	53.44 (22.88)	44.60 (36.10-78.30)		**0.01**
40-49	17 (24.64)	74.10 (36.76)	74.20 (40.40-98.20)		17 (24.64)	18.87 (21.19)	6.30 (4.22-21.90)		17 (24.64)	75.49 (94.79)	30.10 (16.60-97.90)		11 (15.94)	58.55 (48.52)	35.00 (19.00-111.00)		**<0.01**
50-59	12 (17.39)	56.56 (35.50)	52.40 (35.75-79.00)		14 (20.29)	24.86 (26.81)	9.54 (4.40-38.20)		12 (17.39)	118.89 (113.21)	100.55 (29.15-156.50)		14 (20.29)	64.87 (51.82)	67.20 (12.10-99.40)		**<0.01**

60-69	16 (23.19)	95.19 (45.83)	93.40 (67.25-122.00)		12 (17.39)	30.50 (40.08)	19.30 (3.79-42.10)		16 (23.19)	86.17 (100.15)	38.85 (20.30-166.50)		14 (20.29)	50.73 (37.65)	54.25 (15.20-63.30)		**<0.01**
≥70	6 (8.70)	33.02 (24.99)	30.65 (11.70-49.10)		8 (11.59)	7.58 (4.26)	6.64 (3.79-10.15)		4 (5.80)	33.73 (17.32)	30.00 (22.50-44.95)		6 (8.70)	35.67 (44.66)	14.60 (9.25-51.80)		**0.04**

Note: For statistical processing and presentation of data, results below the minimum detectable value of the assay (<3.8) were interpreted as 3.79. NA=not applicable.[1]Wilcoxon rank-sum or Kruskal–Wallis test; p-value refers to difference between groups within the same vaccine. [2]Kruskal-Wallis test; p-value refers to difference between groups across different vaccines. SD=standard deviation, IQR = interquartile range, NA = not applicable.

Supplementary Note Table 4. Serological profile of the study participants at 6 months from the administration of the second dose of four different SARS-CoV-2 vaccines, after exclusion of one participant with Ab level above the test's upper limit of quantitation (>400 AU/mL) and three age- and sex- matching participants.

	Total sample	BNT162b2 vaccine (n=69)				BBIBP-CorV vaccine (n=69)				Gam-COVID-Vac vaccine (n=69)				ChAdOx1 nCoV-19 vaccine (n=69)			
		Sero-negative	Equi-vocal	Sero-positive	p-value [1]	Sero-negative	Equi-vocal	Sero-positive	p-value [1]	Sero-negative	Equi-vocal	Sero-positive	p-value [1]	Sero-negative	Equi-vocal	Sero-positive	p-value[1]
Total, n (%)	276 (100)	4 (5.80)	0	65 (94.20)	NA	41 (59.42)	0	28 (40.58)	NA	10 (14.49)	0	59 (85.51)	NA	11 (15.94)	4 (5.80)	54 (78.26)	NA
Sex, n (%)																	
Female	140 (100)	2 (5.71)	0	33 (94.29)	1.00	22 (62.86)	0	13 (37.14)	0.56	5 (14.29)	0	30 (85.71)	1.00	4 (11.43)	2 (5.71)	29 (82.86)	0.56
Male	136 (100)	2 (5.88)	0	32 (94.12)		19 (55.88)	0	15 (44.12)		5 (14.71)	0	29 (85.29)		7 (20.59)	2 (5.88)	25 (73.53)	
Age (years), mean (SD)	49.93 (15.13)	66.75 (10.87)	NA	48.89 (14.80)	**0.02**	50.32 (15.79)	NA	49 .54 (13.86)	0.83	52.30 (9.06)	NA	47.92 (13.88)	0.34	54.00 (16.30)	55.25 (12.95)	46.59 (14.11)	0.82
Age category, n (%)																	
20-29	30 (100)	0	0	6 (100)	**<0.01**	4 (66.67)	0	2 (33.33)	0.52	0	0	8 (100)	0.72	2 (20.00)	0	8 (80.00)	0.17
30-39	50 (100)	0	0	12 (100)		7 (58.33)	0	5 (41.67)		1 (8.33)	0	11 (91.67)		0	0	14 (100)	
40-49	62 (100)	0	0	17 (100)		10 (58.82)	0	7 (41.18)		4 (23.53)	0	13 (76.47)		1 (9.09)	1 (9.09)	9 (81.82)	
50-59	52 (100)	2 (16.67)	0	10 (83.33)		8 (57.14)	0	6 (42.86)		2 (16.67)	0	10 (83.33)		3 (21.43)	2 (14.28)	9 (64.29)	
60-69	58 (100)	0	0	16 (100)		5 (41.67)	0	7 (58.33)		3 (18.75)	0	13 (81.25)		3 (21.43)	0	11 (78.57)	
≥70	24 (100)	2 (33.33)	0	4 (66.67)		7 (87.50)	0	1 (12.50)		0	0	4 (100)		2 (33.33)	1 (16.67)	3 (50.00)	

Note: participants were classified based on the Ab levels at 6 months after vaccination as: seronegative (<12.0 AU/mL), equivocal (12.0 – 15.0 AU/mL), seropositive (>15.0 AU/mL). [1]Pearson's chi-squared test (Fisher's exact test) for categorical and t-test or ANOVA-analysis of variance for continuous variables. Significance levels are given in bold for $p<0.05$. NA = not applicable.