

The impact of variant and vaccination on SARS-CoV-2 symptomatology; three prospective household cohorts

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Aim

To compare the age-stratified SARS-CoV-2 symptomatology of wild-type/Alpha versus Omicron BA.1/BA.2 variant infected individuals, and to assess the impact of COVID-19 booster vaccination on Omicron symptom burden.

Methods

Data from three European prospective household cohorts were used. Standardized outbreak protocols included (repeated) PCR testing, paired serology, and daily symptom scoring for all household members. Comparative analyses were performed on 346 secondary household cases from April 2020 to April 2021 (Wild-type/Alpha) and January to March 2022 (Omicron).

Results

Children <12 years (all unvaccinated) experienced more symptoms and higher severity scores during Omicron compared with wild-type/Alpha period ($P \leq 0.01$; Figure 1 and Table 1). In adults, Omicron disease duration and severity were reduced ($P \leq 0.095$). Omicron was associated with lower odds for loss of smell or

taste (adjusted odds ratio [aOR]: 0.14; 95% CI 0.03-0.50) and higher but non-significant odds for upper respiratory symptoms, fever, and fatigue (aORs: 1.85-2.23). No differences were observed in any symptom, disease severity or duration between primary series ($n=18$) versus booster-vaccinated adults ($n=45$; $P \geq 0.12$).

Figure 1: Symptom frequency by age category and variant (wild-type/Alpha vs Omicron BA.1/BA.2)

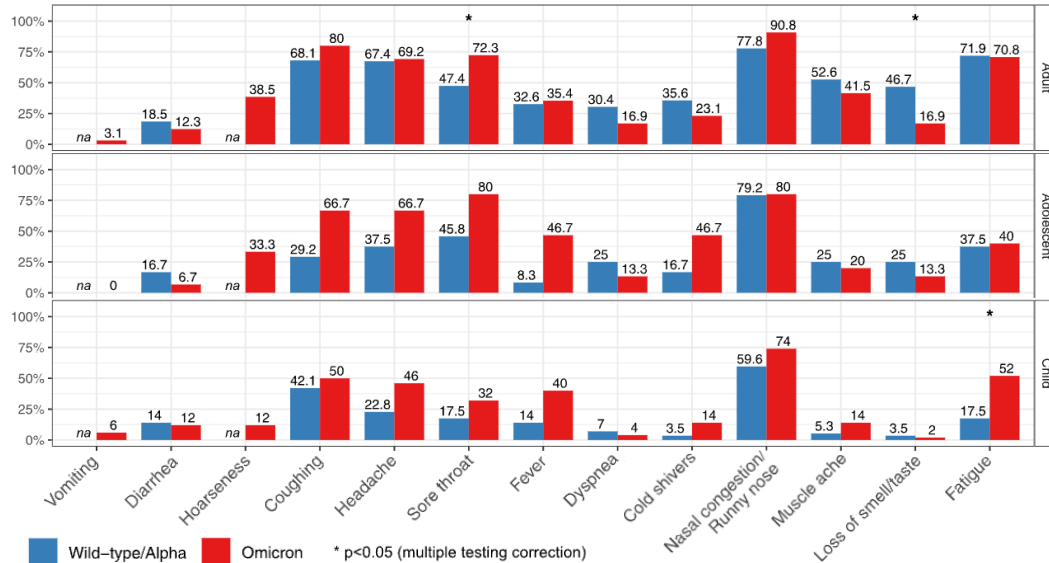


Table 1: Symptom burden of SARS-CoV-2 infections wild-type/Alpha vs Omicron BA.1/BA.2 variant per age group.

Disease category	Adult > 18 years		Adolescent 12-17 years		Child < 12 years	
	Wild-type/alpha period	Omicron period	Wild-type/alpha period	Omicron period	Wild-type/alpha period	Omicron period
	n = 135	n = 65	n = 24	n = 15	n = 57	n = 50
Symptomatic disease	103 (76.3%)	55 (84.6%)	14 (58.3%)	13 (86.7%)	20 (35.1%)	30 (60.0%)*
Pauci-symptomatic	20 (14.8%)	10 (15.4%)	7 (29.2%)	2 (13.3%)	24 (42.1%)	12 (24.0%)
Asymptomatic	12 (8.9%)	0 (0.0%)	3 (12.5%)	0 (0.0%)	13 (22.8%)	8 (16.0%)
Days with symptoms	13 (7.5-21)	10 (6-18)	7 (1-12)	6 (4-8)	3 (1-7)	6 (4-11.5)*
Number of symptoms	6 (3-6)	5 (4-7)	2.5 (1-5.5)	4 (3-6.5)	2 (1-3)	3 (1.5-5)**
Maximum symptom severity score ^a	14 (10-18)	11 (9.5-15)	11 (7.5-19.5)	10 (10-12)	7 (4-11)	10 (8.5-14)**
Cumulative symptom severity score ^a	80.5 (55.5-128)	54.0 (33.5-115)	40.5 (22-128)	34 (28-62)	20.5 (14-49)	40.5 (28-69.5)

^a Calculated for cases with symptomatic disease.
 * Indicate significant differences
 ** Indicates significant differences after correction for multiple testing.

Conclusion

The Omicron variant causes higher symptom burden in children compared with wild-type/Alpha and lower in adults, possibly due to previous vaccination. Omicron causes less loss of smell and taste compared to wild-type/Alpha variant. No significant differences were observed in adolescents. No additional effect of booster vaccination on Omicron symptom burden was observed in adults.

