

# Prevalence and risk factors of Post-COVID Conditions (PCC) among adults in Busan, South Korea



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This study suggests the prevalence of PCC in the community-dwelling individuals of South Korea (19.8%). An additional our finding is that female sex and the presence of underlying disease are risk factors for PCC.

## BACKGROUND

Many people continue to experience symptoms even after the acute phase of COVID-19. The Centers for Disease Control and Prevention (CDC) defined the wide range of health consequences that can be present 4 or more weeks after infection with SARS-CoV-2, the virus that causes COVID-19, as an umbrella term for Post-COVID Conditions (PCC). Currently, there is a shortage of studies on post-COVID conditions in South Korea that use representative community samples. Therefore, the purpose of this study is to identify the prevalence and risk factors of Post-COVID Conditions (PCC) using a representative sample.

## METHODS

We used raw data from the 2022 Korean Community Health Survey (KCHS), an annual survey of adults aged ≥19 years in South Korea conducted by the Korea Disease Control and Prevention Agency (KDCA). Of the 14,513 participants from Busan in the 2022 survey, 8,573 were excluded due to missing data, resulting in 5,940 participants who provided information about experience PCC were included in the final analysis. The survey consisted of questions on persistence of COVID-19 symptoms, vaccination status, underlying disease, and other related factors. PCC was defined by the CDC as the wide range of health consequences that can be present 4 or more weeks after infection with SARS-CoV-2.

## RESULTS

The prevalence of PCC was 19.8% (1,174/5,940), with 24.3% (875/3,608) among females and 12.8% (299/2,332) among males (Table 1). The logistic regression analysis results showed that the odds ratio (OR) of having PCC symptoms was higher among females, as compared to males (OR, 2.09; 95% CI, 1.79-2.45). And OR was higher in people with underlying disease than those without (OR, 1.46; 95% CI, 1.24-1.72) (Table 2). The most prevalent symptom was cough and sputum symptom (10.6%), followed by fatigue symptoms (6.2%). Eye redness symptom (0.4%) was the least prevalent (Figure 1).

Table 1. Demographics, health, and COVID-19-related characteristics of survey participants

Characteristic	Total N (column %)	PCC N (%)	Non-PCC N (%)	p-value
<b>Total</b>	5,940	1,174 (19.8)	4,766 (80.2)	
<b>Sex</b>				<0.001
Male	2,332 (39.3)	299 (12.8)	2,033 (87.2)	
Female	3,608 (60.7)	875 (24.3)	2,733 (75.7)	
<b>Age</b>				<0.001
19-29	768 (12.9)	134 (17.4)	634 (82.6)	
30-39	940 (15.8)	202 (21.5)	738 (78.5)	
40-49	1,134 (19.1)	260 (22.9)	874 (77.1)	
50-59	954 (16.1)	184 (19.3)	770 (80.7)	
60-69	1,157 (19.5)	241 (20.8)	916 (79.2)	
≥70	987 (16.6)	153 (15.5)	834 (84.5)	
<b>Household income, monthly (10,000KRW)</b>				0.007
< 100	17 (0.3)	6 (35.3)	11 (64.7)	
100 to < 300	1,771 (29.8)	331 (18.7)	1,440 (81.3)	
300 to < 500	1,521 (25.6)	272 (17.9)	1,249 (82.1)	
≥500	2,631 (44.3)	565 (21.5)	2,066 (78.5)	
<b>BMI (kg/m<sup>2</sup>)</b>				0.009
Underweight (<18.5)	245 (4.1)	56 (22.9)	189 (77.1)	
Normal (18.5-22.9)	2,460 (41.4)	527 (21.4)	1,933 (78.6)	
Overweight (23-24.9)	1,420 (23.9)	273 (19.2)	1,147 (80.8)	
Obesity (≥25)	1,806 (30.4)	317 (17.6)	1,489 (82.4)	
<b>Presence of underlying conditions</b>				0.012
No	4,329 (72.9)	821 (19.0)	3,508 (81.0)	
Yes	1,611 (27.1)	353 (21.9)	1,258 (78.1)	
<b>Smoking (Current)</b>				<0.001
No	5,292 (89.1)	1,094 (20.7)	4,198 (79.3)	
Yes	648 (10.9)	80 (12.3)	568 (87.7)	
<b>Treatment place</b>				0.216
Home treatment	5,755 (96.9)	1,129 (19.6)	4,626 (80.4)	
Living treatment center treatment	61 (1.0)	13 (21.3)	48 (78.7)	
Inpatient treatment	115 (1.9)	30 (26.1)	85 (73.9)	
<b>Vaccination status</b>				0.784
Vaccinated	5,693 (95.8)	1,123 (19.7)	4,570 (80.3)	
Unvaccinated	247 (4.2)	51 (20.6)	196 (79.4)	

## RESULTS CONTINUED

Table 2. Results of risk factors associated with PCC

Independent Variables	OR	95% CI
<b>Sex</b>		
Male	1	
Female	2.09	1.79 - 2.45
<b>Age</b>		
19-29	1	
30-39	1.27	0.99 - 1.63
40-49	1.27	1.00 - 1.61
50-59	0.93	0.72 - 1.21
60-69	1.00	0.77 - 1.29
≥70	0.69	0.52 - 0.91
<b>Household income, monthly (10,000KRW)</b>		
< 100	1	
100 to < 300	0.41	0.15 - 1.15
300 to < 500	0.37	0.13 - 1.06
≥500	0.48	0.17 - 1.35
<b>BMI (kg/m<sup>2</sup>)</b>		
Normal (18.5-22.9)	1	
Underweight (< 18.5)	0.99	0.72 - 1.36
Overweight (23-24.9)	1.02	0.86 - 1.21
Obesity (> 25)	0.92	0.78 - 1.08
<b>Presence of underlying disease</b>		
No	1	
Yes	1.46	1.24 - 1.72
<b>Smoking (current)</b>		
No	1	
Yes	0.77	0.59 - 1.00
<b>Treatment place</b>		
Home treatment	1	
Living treatment center treatment	1.26	0.67 - 2.37
Inpatient treatment	1.46	0.95 - 2.25
<b>Vaccination status</b>		
Vaccinated	1	
Unvaccinated	0.96	0.70 - 1.33

OR = odds ratio, CI = confidence interval.

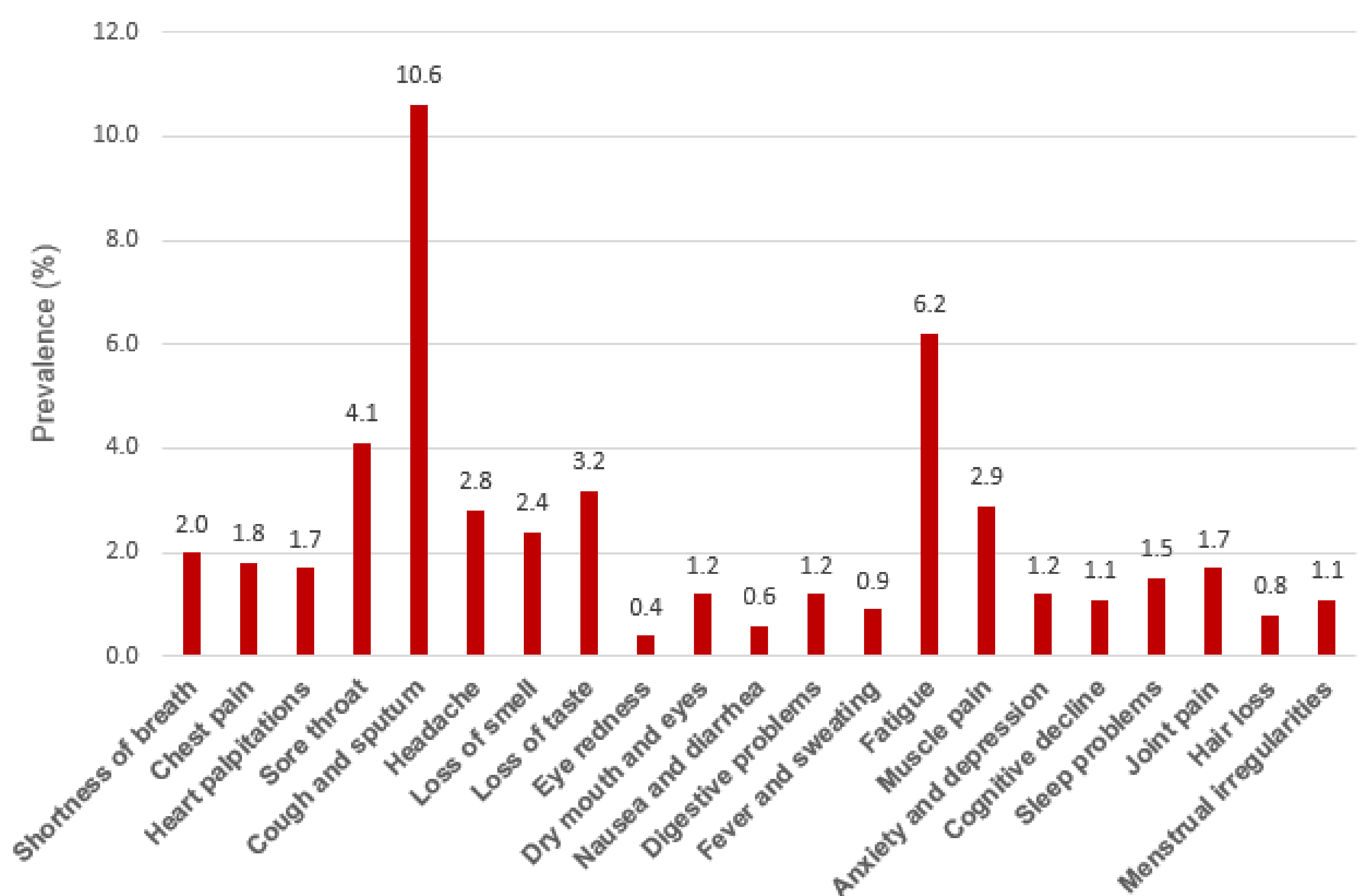


Figure 1. Prevalence by symptom of PCC (with duplicates)

## CONCLUSIONS

This study suggests the prevalence of PCC in the community-dwelling individuals of South Korea (19.8%). Another finding is that female sex and the presence of underlying disease are risk factors for PCC. There is a need for elucidating the pathophysiologic mechanisms and developing programs aimed at prevention and treatment of symptoms that persist in the community population.

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