BKM Public Health & Community Medicine
(Berita Kedokteran Masyarakat)

Volume 38 **Number** 3, 2022
Pages 69-76
DOI: 10.22146/bkm.v38i03.1787

COVID-19 serological epidemiology study at the IG Supermarket cluster in the Special Region of Yogyakarta

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Submitted:
May 1st, 2021
Accepted:
March 13rd, 2022
Published:
March 31st, 2022

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Abstract

Purpose: IG supermarkets were one of the large clusters of COVID-19 transmission in the Special Region of Yogyakarta. This study aims to determine the risk factors associated with exposure to SARS-COV-2 in the trade sector and to estimate the Secondary Attack Rate (SAR) magnitude of the COVID-19 cluster at IG Supermarkets. **Methods:** This study used secondary data from the RDT antibody examination results of IG Supermarket employees and notes on epidemiological investigations of close contact tracing of employees confirmed by COVID-19. The research design used descriptive and analytic observational methods with a case-control design (ratio 1:3). **Results:** Work unit characteristics were significantly associated with exposure to the SARS-COV-2 ($p < 0.05$) exposure and employees who work in units that are directly related to consumers have a higher risk of reactive antibody RDT results than employees who are not directly related to consumers (OR = 3.786; 95% CI = 1.92-7. 69). The total number of close positive employee contacts with COVID-19 was 238 people (35.3% household contacts and 64.7% non-household contacts). The highest SAR was found in the household exposure setting, with an attack rate of 8.3% and a higher transmission potential in the female gender and the age group >60. **Conclusion:** Working in a unit with direct contact with consumers was a risk factor for exposure to SARS-COV-2 at the IG supermarket cluster in the Special Region of Yogyakarta. SAR COVID-19 was higher in household exposure settings, with a higher transmission potential at> 60 years of age. Therefore, the application of health protocols in supermarkets must be optimized to minimize the transmission of cases at home and home.

Keywords: characteristics of work units; COVID-19; secondary attack rate (SAR); supermarkets

INTRODUCTION

On December 31, 2019, pneumonia cases with unknown causes were reported in Wuhan, Hubei Province, China. On January 9, 2020, China's Centers for Disease Control and Prevention (CDC) reported the new Coronavirus as the agent causing the 2019 coronavirus disease (COVID-19) outbreak [1]. Positive cases of COVID-19 were first reported in Indonesia on March 2, 2020, with a total of 2 cases. As of June 15, 2020, the total reported cases reached 39,294 cases (38.5% recovered; 55.9% cases under treatment; 5.6% deaths) after experiencing an additional 1,017 cases from the previous date. Positive COVID-19 cases have been reported from 34 provinces in Indonesia [2].

The total number of reported positive cases of COVID-19 until June 15, 2020, was 272. Increases in the number of cases are still being reported every day. Cases are scattered in almost all districts in the Special Region of Yogyakarta. The most significant number of cases came from the Sleman district, with 104 cases (38.2%), and the least number of cases came from the Kulon Progo district, with 11 cases (4%) [3].

Several clusters are at the center of the spread of COVID-19 in the Special Region of Yogyakarta. The IG supermarket cluster is one of the clusters with the highest number of positive cases of COVID-19. Cases were scattered in several districts, but the largest number of cases was in the Sleman district. On April 30, 2020, at the public health center Depok, I received information from the Sleman District Health Office that one of its residents had confirmed COVID-19. The case was known to work as an employee at a supermarket that became a wholesale center in the Special Region of Yogyakarta.

One response by the Provincial Health Office of D.I.Y and Sleman Regency to combat COVID-19 in Claster was carrying out an antibody Rapid Diagnostic Test (RDT) on 357 IG Supermarket employees. From the results of these examinations, it was found that 67 employees were declared reactive with COVID-19. The examination results were followed up with a Polymerase Chain Reaction (PCR) examination. As of June 15, 2020, the number of employees who tested positive for COVID-19 was 40 cases spread across five districts in the Special Region of Yogyakarta. As many as 5 cases in Sleman Regency, 12 cases in Bantul Regency, 2 cases in Yogyakarta City, 2 cases in and Kulon Progo Regency. The spread of cases is not only found in employees, but transmission has also occurred to family members of employees (Slema District Health Office, 2020). This study aims to determine the risk factors associated with exposure to the SARS-COV-2 virus infection in the trade sector and to estimate the Secondary Attack Rate (SAR) magnitude of the COVID-19 cluster at IG Supermarkets.

METHODS

This research is a descriptive study. It follows the rules of investigation of extraordinary events to describe the respondent's characteristics and estimate the Secondary Attack Rate (SAR) based on close contact from the primary case. Meanwhile, an analytic observational research design with a Case-Control design was used to test the research hypothesis. The comparison of case and control groups is 1:3, meaning that every case sample requires three control samples.

The population in this study were all IG supermarket employees who had done antibody RDT. In addition, to calculate SAR from the spread of COVID-19 in this study, the population also includes close contact with supermarket employees who test positive for COVID-19. Cases were those exposed to the SARS-CoV-2 virus as indicated by RDT reactive antibody results. The controls were those not exposed to the SARS-CoV-2 virus, as shown by the RDT non-reactive antibodies, twice at intervals of 7 days. The inclusion criteria were domiciled in the Special Region of Yogyakarta.

This study uses secondary data in the form of epidemiological investigations of positive cases of COVID-19 that have been filled in by public health center surveillance officers as well as records of RDT antibody results for IG Supermarket employees available at each district/city health office in Special Region of Yogyakarta (Sleman Regency, Yogyakarta City, Bantul Regency, Kulon Progo Regency, and Gunungkidul Regency). Data analysis was performed with Stata IC 13 (64-bit) software.

RESULTS

There were 357 IG supermarket employees who participated in the antibody RDT. 67 people were declared reactive, and 290 were declared nonreactive. Based on the RDT result data in the Sleman District Health Office, only 61 people were in the case group with complete records, so the control group assigned in this study was 183 people.

Most respondents in cases and controls were aged 18-38 years, with proportions of 75.4% and 66.1%. The proportion of male respondents was more significant than that of female respondents, with 79.9%.

Table 1. Distribution of respondents' characteristics

Variable	IG supermarket employees		
	Case n=61 (%)	Control n=183 (%)	Total n=244 (%)
Age group (year)			
18-38	46 (75.4)	121 (66.1)	167 (68.4)
39-59	15 (24.6)	62 (33.9)	77 (31.6)
Gender			
Male	46 (754)	149 (81.4)	195 (79.9)
Female	15 (24.6)	34 (18.6)	49 (20.1)
Work unit characteristics			
Dealing directly with consumers	45 (73.8)	78 (42.6)	123 (50.4)
Not dealing directly with consumers	16 (26.2)	105 (57.4)	121 (49.6)
Districts			
Sleman	37 (60.7)	133 (72.7)	170 (69.7)
Bantul	13 (21.3)	14 (7.7)	27 (11.1)
Kulonprogo	4 (6.6)	6 (3.3)	10 (4.1)
Yogyakarta City	5 (8.2)	22 (12.0)	27 (11.1)
Gunungkidul	2 (3.3)	8 (4.4)	10 (4.1)

Table 2. Results of the analysis of factors for age, gender, and characteristics of work units with exposure to SARS-COV-2

Variable	IG supermarket employees			*p-value* (95%)	OR
	Case n=61 (%)	Control n=183 (%)	Total n=244 (%)		
Age group (year)					
18-38	46 (75.4)	121 (66.1)	167 (68.4)	0.310 (0.33-1.51)	0.699
39-59	15 (24.6)	62 (33.9)	77 (31.6)		
Gender					
Male	46 (75.4)	149 (81.4)	195 (79.9)	0.176 (0.78-3.27)	1.571
Female	15 (24.6)	34 (18.6)	49 (20.1)		
Work unit characteristics					
Dealing directly with consumers	45 (73.8)	78 (42.6)	123 (50.4)	*0.000 (1.92-7.69)	*3.786
Not dealing directly with consumers	16 (26.2)	105 (57.4)	121 (49.6)		

This was also reflected in the case and control groups, with 75.4% and 81.4%. The work unit characteristics of the case group indicate that the percentage of the work unit characteristics directly related to consumption is 73.8%. Meanwhile, in the control group, the majority worked in work units that did not require employees to have direct contact with consumers, 57.4%. Most case and control groups resided in the Sleman district (Table 1).

The results of the bivariable test between age, gender, and work unit characteristics with exposure to SARS-CoV-2 showed that only the risk factors for the work unit characteristics were significant with a p-value of 0.000 (p-value <0.05) with a confident interval range does not exceed number I (95% CI 3,786-3,611). The OR calculation result between work unit variables and SARS-CoV-2 exposure was 3,786. These results indicate that the opportunity to find employees who work in units directly related to consumers is 3.768 times more significant in the case group than in the control group (Table 2).

Table 3. Distribution of close contact of COVID-19 cases in a cluster of IG Supermarket employees

Close contact	n (%)
Household	84 (35.3)
Non-household	154 (64.7)
Total	238 (100.0)

The primary cases had 238 close contacts, 35% of whom were household contacts and 64% were non-household contacts, consisting of family members who were not at home, neighbors, and friends (Table 3). SAR for COVID-19 cases in the IG employee cluster amounted to 2.9%. Based on the age group, the highest SAR was found in the age group ≥ 60 years. Based on gender, the highest SAR was in the female group, with an attack rate of 5.1%. Based on the highest SAR exposure in the household setting, who lives in the same house as the primary case, with an attack rate of 8.3% (Table 4).

Table 4. Distribution of Secondary Attack Rate (SAR) COVID-19 cases based on close contact characteristics

Close contact characteristics	COVID-19 case	Non-case	Total of close contact	SAR (%)
Secondary attack rate	7	231	238	2.9
Age (year)				
0-19	0	51	51	0
20-39	3	82	85	3.5
40-59	2	74	76	2.6
≥ 60	2	24	26	7.7
Gender				
Male	2	138	140	1.4
Female	5	95	98	5.1
Contact setting				
Household	7	77	84	8.3
Non-household	0	154	154	0.0

DISCUSSION

The findings of this study indicate that age was not a risk factor for historical exposure to SARS-CoV-2 in IG supermarket employees. However, in some studies, age can be linked to the severity of the COVID-19 disease. In a systematic review of COVID-19 patients who are older (>60 years), the disease they are experiencing has become more serious, requiring more serious treatment and treatment [4]. Men who are older and have comorbidities such as chronic diseases, including hypertension, diabetes, heart failure, stroke, and renal insufficiency, tend to become more severe cases and die [5].

The risk of exposure to SAR-CoV-2 in male employees is 1.571 times greater than that of female employees. This is in line with research [6], which shows that the male gender is a risk factor for transmission of COVID-19. The incidence and death rate of COVID-19 in men is higher than in women. The factors that influence this difference are the differences in immunity that affect the immune response against SARS-CoV-2 infection. In addition, lifestyles such as alcohol consumption and smoking habits in men. Women have a more responsible attitude than men in their efforts to prevent SARS-CoV-2 infection [7]. Based on the results of the statistical tests, there was no significant relationship between gender and RDT antibody results among IG supermarket employees. The insignificant results of this study could be possible because the proportion of men is greater than the number of women, and the sample size is not too large.

The results of the analysis between the characteristics of the employee's work unit and the results of the history of exposure to SARS-CoV-2 show that employees who work in units that are directly related to consumers have a 3,786 times greater risk of having reactive antibody RDT results compared to employees who work in unrelated units directly with consumers. The statistical test also shows that the characteristics of the employee work unit have a statistically significant relationship with the RDT results for reactive antibodies. In line with previous research, employee work position has a significant relationship with the incidence of COVID-19 (p-value 0.009 and 95% CI range 1.1-24.8), with a 5.1 times greater risk of employees having direct interactions with consumers to have COVID-19 results -19 positive compared to employees who work in parts that do not require interaction or face-to-face with consumers [8].

The study results were significant, possibly related to the application of health protocols in supermarkets before the first case report at IG Supermarkets (30 April 2020). The results of epidemiological investigations carried out by the public health center in charge of the IG Supermarket area show that the situation of supermarkets before the cases were reported and the implementation of health protocols had not been optimal. Although efforts have been made to provide means of washing hands and screening to check body temperature for visitors, the obligation to use masks for workers and consumers has begun to be implemented. Still, crowds have not been avoided because there are no restrictions on the number of visitors. This results in difficulty enforcing the rules of keeping distance between employees who work in units that deal directly with consumers (security, cleaners, salesclerks, Deposit, Sales Promotion Girl (SPG), cashiers, checkers, and food), keeping distance was also tricky visitors to apply.

Workers at risk of exposure to COVID-19 in the workplace are those who do not observe a minimum distance of one meter when interacting with other people and often have physical contact with people infected with SARS-COV-2. Transmission can also occur indirectly through the surface of objects contaminated with SARS-COV-2 [9].

Secondary attack rates based on age groups showed varying results, with the highest SAR in the age group ≥60 years (7.7%) and the lowest in the age group <19 years (0%). In another study, the age group >60 was the most susceptible to infection with SARS-COV2 compared to the younger age group. Based on gender, SAR was higher in the female group (5.4%) than in the male group (1.4%) [10]. The underlying reasons: women play a more dominant role in the household in taking care of children and other family members, so it is possible to be exposed for longer and have a closer relationship with other family members; women also work more in the health sector, so it is possible to be exposed when treating patients who have been confirmed with COVID-19 [4].

In this study, the highest SAR was found in households living in the same house as the primary case, with an attack rate of 8.3%. Based on previous research in Guangzhou, China, the secondary attack rate in the household exposure setting (10.3%) was higher than in other settings, such as public transportation and health care centers. The risk factor for the high secondary attack rate in household settings is that people spend more time at home, so the time they are exposed at home is longer and more frequent. In addition, the recommendation to use masks as an effort to prevent the transmission of COVID-19 was only applied when in public places but not when they were at home [11].

This study has several limitations. The first one is that it has not been able to describe the transmission pattern of COVID-19 cases at IG Supermarkets due to difficulties obtaining permission to conduct direct interviews with employees. This is influenced by the negative stigmatization associated with COVID-19, which is relatively high circulating in the community. The source of transmission is complicated to describe because the data on the results of epidemiological investigations available at the public health center were incomplete. In addition, this study could not transfer more detailed information about risk factors related to supermarket employees' compliance with the prevailing health protocols because the data available at the health offices of each district is still very limited.

CONCLUSION

The risk factor significantly related to SARS-CoV-2 exposure in the IG Supermarket employee cluster was working in a unit directly related to consumers, with a risk of 3.786 times greater than that of employees who work in units that are not directly related to consumers. The highest secondary attack rate for COVID-19 in the GI employee cluster was found in the household exposure setting, with an attack rate of 8.3% and a higher potential for transmission to the female sex and the age group >60 years. Based on the results of this study, the implementation of health protocols in supermarkets should be optimized and tightened for visitors and employees who work there. The District/City Health Office should periodically monitor supermarket evaluations to see the consistency of supermarket compliance with the health protocols in the Special Region of Yogyakarta.

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