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ΕΡΕΥΝΗΤΙΚΗ ΕΡΓΑΣΙΑ

The knowledge and personal hygiene behavior of Islamic boarding school students on COVID-19 prevention and transmission, and association with transmission of COVID-19

OBJECTIVES To assess the knowledge and personal hygiene behavior among students in Islamic boarding schools regarding the prevention and transmission of COVID-19, and correlate with the findings of the COVID-19 screening program. **METHOD** A cross-sectional study was carried out during January to March 2021 using a validated questionnaire. The knowledge and personal hygiene behavior were interpreted as good, moderate, and poor. The screening of COVID-19 was performed using the antibody rapid test. The association between the screening of COVID-19 and the degree of knowledge and personal hygiene behavior was assessed using multiple logistic regression. **RESULTS** Of a total of 294 participants in the study, ranging in age between 12 and 17 years, 202 (68.7%) were males. Of these, 18 tested positive for COVID-19 by rapid test. Overall, 61.2% participants had moderate knowledge regarding COVID-19 prevention, but we failed to show correlation between knowledge and the transmission of COVID-19 among the pupils. Good personal hygiene behavior was recorded in 41.8% participants, but its correlation with the transmission of COVID-19 was not clarified. **CONCLUSIONS** The majority of our boarding school student sample had good-moderate knowledge of COVID-19 prevention and adequate personal hygiene behavior. The transmission of COVID-19, however, in our participants was not correlated with their knowledge and personal hygiene behavior.

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Οι γνώσεις και η συμπεριφορά της προσωπικής υγιεινής των μαθητών του ισλαμικού οικοτροφείου στην πρόληψη και στη μετάδοση της COVID-19 και η συσχέτισή της με τη μετάδοσή της

Περίληψη στο τέλος του άρθρου

Key words

COVID-19 transmission
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Knowledge
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The COVID-19 pandemic has become a global crisis. The morbidity of this disease has affected more than 100 million people in over 210 countries and, to date, a mortality of over two million has been reported. While the management of this disease has developed over the pandemic period, the

morbidity rate remained unstable.¹ The main issue of high number of this disease is due to the fact that the transmission of COVID-19 is difficult to control.² A study revealed that the program involving a large society and community participation may provide better efficacy in preventing the

transmission of COVID-19.³ On the other hand, some special populations at high risk of COVID-19 transmission, such as market traders, prison inmates, residents in orphanages and nursing homes, and children and adolescents at boarding schools are often neglected in the institution of measures.^{4,5}

Islamic boarding school students have been identified as one of populations at high risk of COVID-19 transmission. Factors associated with high transmission of COVID-19 in Islamic boarding schools are prayers in congregation, reciting the Al-Quran in congregation, and dzikir together, which involve crowding.⁵ Studies have reported clusters of a high positive rate of COVID-19 in Islamic boarding schools in Malaysia and Indonesia.^{6,7} Indonesia, a country with a Muslim majority, has a large number of Islamic boarding schools; in 2020, 28,194 Islamic boarding schools were registered in Indonesia, with approximately 5 million students. As no study had been conducted to evaluate the prevention program and the knowledge of Islamic boarding schools students related to COVID-19 transmission, our study aimed to assess the knowledge and personal hygiene behavior among Islamic boarding school students and in correlation with the risk of COVID-19 transmission.

MATERIAL AND METHOD

Study designs

A cross-sectional study was conducted with a sample of students in two Islamic boarding schools in Malang City in the East Java province during January to March 2021. A validated questionnaire adapted from previous studies was administered by personal interview with the participants.⁸ The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) checklist was used to guide the protocols of our study.⁹

Ethical approval

The study protocols were conducted in accordance with the Declaration of Helsinki and were approved by the Institutional Review Board, Faculty of Medicine, Universitas Islam Malang, Malang, Indonesia (no 36/XI/2020/KEPK.RSIUNISMA). The aims, risks, and benefits of the study were explained to each participant, and they were asked to sign a consent form prior to enrolment in the study. The participants were informed that they could withdraw at any time during the interview session. After informed consent was obtained, the interviewers conducted the structured interviews. Participation in this study was voluntary and no incentive was given.

Participants and eligibility criteria

To represent the total population, 250 participants were

required as the minimum sample size based on the assumption that the prevalence of COVID-19 was 5–25% with a 5% margin of error and 95% confidence level. The recruitment of participants was conducted using a stratified random sampling procedure. Two Islamic boarding schools in Malang were randomly drawn and participants were selected by judgmental sampling procedure. Inclusion criteria were (a) registered as a student at the Islamic boarding school for more than one year, (b) following all programs in the Islamic boarding school, (c) having ability to communicate in Bahasa Indonesia. Participants were excluded if they had family history of COVID-19 or known recent contact with COVID-19 patients.

Data collection

Two individuals were recruited as interviewers. Data collection was performed in two Islamic boarding schools, Pesantren A and B, by LN and RSW, respectively. Data collection was performed during January to March 2021. To collect data regarding the knowledge and personal hygiene behavior among Islamic boarding school students on the prevention and the transmission of COVID-19, a set of validated questionnaires adapted from a previous study was used.⁸ All the students were screened using the COVID-19 rapid test.

Statistical analysis

Analysis was performed using the Statistical Package for Social Sciences software (SPSS for Windows, Chicago, USA), version 16. The questionnaires used in our present study were tested for reliability among 30 participants prior to use in the actual study. Cronbach's alpha 0.7 was used as the minimal cut-off for good internal consistency. The normality of the data was analyzed with the Kolmogorov-Smirnov test. The p value of more than 0.05 was considered that the data were homogeneously distributed. For assessing the knowledge and personal hygiene behavior among Islamic boarding school students on the prevention and the transmission of COVID-19, a multiple logistic regression was used. The p value of less than 0.05 was considered statistically significant.

RESULTS

The characteristics of participants

A total of 294 participants were included in our study, of which 202 (68.7%) were males. They ranged in age between 12 and 17 years. Initially, we recruited 318 participants, but 15 were excluded because they did not follow all the programs in Pesantren, and 9 because they were registered less than one year in Pesantren. Of all the participants, we tested 18 positive for COVID-19 using the COVID-19 rapid test. Details of the baseline characteristics of the participants in our present study are outlined in table 1.

Table 1. Baseline characteristics of Islamic boarding school students included in the study of knowledge and behavior related to COVID-19 prevention (n=294).

| Characteristics | n | (%) |
|---|-----|---------|
| <i>Sex</i> | | |
| Male | 202 | (68.7%) |
| Female | 92 | (31.3%) |
| <i>Age (years)</i> | | |
| 12 | 8 | (2.7%) |
| 13 | 65 | (22.1%) |
| 14 | 32 | (10.9%) |
| 15 | 59 | (20.1%) |
| 16 | 75 | (25.5%) |
| 17 | 55 | (18.7%) |
| <i>Education level</i> | | |
| Elementary school | 56 | (19.0%) |
| Junior high school | 106 | (36.1%) |
| Senior high school | 132 | (44.9%) |
| <i>Knowledge on COVID-19 prevention</i> | | |
| Good | 49 | (16.6%) |
| Moderate | 180 | (61.2%) |
| Poor | 65 | (22.2%) |
| <i>Hygiene behavior</i> | | |
| Good | 123 | (41.8%) |
| Moderate | 108 | (36.8%) |
| Poor | 63 | (21.4%) |
| <i>Rapid test COVID-19</i> | | |
| Reactive | 18 | (6.1%) |
| Non-reactive | 276 | (93.9%) |

The association between knowledge and COVID-19 transmission

Our study found that 16% participants had good knowledge, 61% participants had moderate knowledge, and 22% participants had poor knowledge on the prevention and transmission of COVID-19. Good knowledge was observed in participants with a higher educational level. The level of knowledge on the prevention and transmission of COVID-19 showed no correlation with the risk of COVID-19 transmission among these Islamic boarding school students (tab. 2).

The association between behavior and COVID-19 transmission

We also found that 42%, 37%, and 21% participants had good, moderate, and poor personal hygiene behavior, respectively. No correlation was detected between personal hygiene, behavior and the risk of COVID-19 transmission among the students (tab. 3).

DISCUSSION

Our study identified that, while more than a half of our study participants had moderate to good personal hygiene behavior and knowledge on the COVID-19 transmission and prevention, the implementation of their knowledge to the application of COVID-19 transmission and prevention was failed to prevent transmission. Our current findings were contradictory to the findings of other. A study in Nigeria revealed that the implementation of COVID-19

Table 2. The association between knowledge of COVID-19 prevention and the transmission of COVID-19 in Islamic boarding school students (n=294).

| Knowledge | COVID-19 rapid test | | OR | 95% CI | p | |
|---------------------------|---------------------|------------------|-----|--------|------------|-------|
| | Reactive (n) | Non-reactive (n) | | | | |
| <i>Overall</i> | Good | 3 | 46 | 0.93 | 0.26–3.35 | 0.912 |
| | Moderate | 10 | 154 | 0.86 | 0.33–2.25 | 0.759 |
| | Poor | 5 | 60 | 1.28 | 0.44–3.74 | 0.649 |
| <i>Elementary school</i> | Good | 1 | 6 | 1.87 | 0.18–19.68 | 0.600 |
| | Moderate | 4 | 35 | 1.83 | 0.19–17.70 | 0.602 |
| | Poor | 0 | 10 | 0.36 | 0.02–7.03 | 0.500 |
| <i>Junior high school</i> | Good | 0 | 21 | 0.27 | 0.01–5.14 | 0.386 |
| | Moderate | 3 | 32 | 2.48 | 0.39–15.68 | 0.333 |
| | Poor | 2 | 32 | 1.10 | 0.18–6.97 | 0.916 |
| <i>Senior high school</i> | Good | 2 | 19 | 1.84 | 0.35–9.82 | 0.474 |
| | Moderate | 3 | 87 | 0.26 | 0.06–1.12 | 0.071 |
| | Poor | 3 | 18 | 3.53 | 0.78–16.09 | 0.103 |

OR: Odds ratio, 95% CI: 95% confidence interval

Table 3. The association between personal hygiene behavior and the transmission of COVID-19 in Islamic boarding school students (n=294).

| Personal hygiene behavior | | COVID-19 rapid test | | OR | 95% CI | p |
|---------------------------|----------|---------------------|------------------|------|------------|-------|
| | | Reactive (n) | Non-reactive (n) | | | |
| <i>Overall</i> | Good | 5 | 126 | 0.53 | 0.18–1.52 | 0.236 |
| | Moderate | 7 | 116 | 1.00 | 0.38–2.66 | 0.994 |
| | Poor | 6 | 57 | 2.12 | 0.76–5.90 | 0.149 |
| <i>Elementary school</i> | Good | 1 | 20 | 0.68 | 0.07–6.41 | 0.732 |
| | Moderate | 1 | 35 | 0.28 | 0.03–2.61 | 0.263 |
| | Poor | 3 | 19 | 4.34 | 0.67–27.99 | 0.123 |
| <i>Junior high school</i> | Good | 1 | 42 | 0.35 | 0.04–3.23 | 0.357 |
| | Moderate | 3 | 45 | 1.87 | 0.29–11.66 | 0.504 |
| | Poor | 1 | 14 | 1.55 | 0.16–14.93 | 0.703 |
| <i>Senior high school</i> | Good | 3 | 64 | 0.56 | 0.13–2.46 | 0.444 |
| | Moderate | 3 | 36 | 1.47 | 0.33–6.46 | 0.613 |
| | Poor | 2 | 24 | 1.39 | 0.26–7.13 | 0.698 |

OR: Odds ratio, 95% CI: 95% confidence interval

prevention was related to the knowledge and attitude of COVID-19 prevention.¹⁰ A study conducted in Indonesia, with a population of university students, also revealed that the level of knowledge of participants showed positive correlation with the level of adherence to preventive measures against COVID-19 transmission.¹¹ The different findings between our study and previous studies might have several reasons. Firstly, our study population was an Islamic boarding school. Islamic boarding schools are closed communities, where all activities are carried out communally, without involving the outside community. Therefore, the knowledge from areas outside of their region is limited. On the other hand, the knowledge implementation is influenced by various factors, such as the level of education, information, culture, and experience. Therefore, the limited information from outside of the school region might have affected the implementation of knowledge. Secondly, the absence of a specific COVID-19 campaign in the Islamic boarding school might also have affected the low success of implementation of the knowledge about COVID-19 prevention.

This study was the first report on the knowledge and personal hygiene behavior and their correlation to the transmission of COVID-19 in the population of an Islamic boarding school in Indonesia. Our current findings indicate that the students of the Islamic boarding school were unable to transfer their knowledge to the prevention of COVID-19 transmission. These findings require special concern from the Government of Indonesia. Although the local Gov-

ernment in the region of the school had applied special regulations to inhibit the transmission of COVID-19, the regulations might not have affected the students in Islamic boarding schools, due to the fact that these populations are closed communities. The exposure of the boarding school students to the campaign of COVID-19 prevention might also have been inadequate. Further approaches might, therefore, be needed, for the Government to formulate the regulation of COVID-19 prevention in special populations; in this case, the students in Islamic boarding schools.

Our present study had several important limitations. First, several factors that might contribute the final findings on the COVID-19 transmission were not analyzed, including the history of COVID-19 illness in the family, the history of comorbidity such as asthma, hypertension, diabetes mellitus, and obesity. Second, the small sample size in our study might introduce the risk of bias, and our findings should be carefully interpreted. Thirdly, since the design of current study was cross-sectional, the potency of bias might be increased. Therefore, further studies in the form of randomized controlled trials (RCTs) might be required to clarify the situation in Islamic boarding schools.

In conclusion, the knowledge and hygiene behavior of students against COVID-19 do not affect the prevention and transmission of COVID-19 in Islamic boarding schools. Further studies with a holistic design are needed to elucidate the comprehensive factors governing the transmission of COVID-19 infection in Islamic boarding schools.

ΠΕΡΙΛΗΨΗ

Οι γνώσεις και η συμπεριφορά της προσωπικής υγιεινής των μαθητών του ισλαμικού οικοτροφείου στην πρόληψη και στη μετάδοση της COVID-19 και η συσχέτισή της με τη μετάδοσή τηςS. MUSTIKA,¹ R.S. WICAKSONO,^{2,3} L. NURHIDAYAT,⁴ B. SANTOSO,³ M.S. NIAM,⁵ J.K. FAJAR⁶¹Division of Gastroenterohepatology, Department of Internal Medicine, Faculty of Medicine, Universitas Brawijaya, Malang, ²Department of Internal Medicine, Faculty of Medicine, Universitas Brawijaya, Malang, ³Department of Internal Medicine, RSUD Bangil, Pasuruan, ⁴Faculty of Medicine, Universitas Islam Malang, Malang, ⁵Nahdlatul Ulama Doctor Association, ⁶Brawijaya Internal Medicine Research Center, Department of Internal Medicine, Faculty of Medicine, Universitas Brawijaya, Malang, *Ινδονησία**Αρχεία Ελληνικής Ιατρικής 2022, 39(6):767–771*

ΣΚΟΠΟΣ Η αξιολόγηση της γνώσης και της συμπεριφοράς της προσωπικής υγιεινής μεταξύ των μαθητών σε ισλαμικά οικοτροφεία σχετικά με την πρόληψη και τη μετάδοση της COVID-19 και συσχέτιση με τα ευρήματα του προγράμματος προσυμπτωματικού ελέγχου COVID-19. **ΥΛΙΚΟ-ΜΕΘΟΔΟΣ** Η μελέτη διεξήχθη από τον Ιανουάριο έως τον Μάρτιο του 2021 χρησιμοποιώντας ένα επικυρωμένο ερωτηματολόγιο. Η γνώση και η συμπεριφορά προσωπικής υγιεινής ερμηνεύτηκαν ως καλή, μέτρια και κακή. Ο έλεγχος της COVID-19 πραγματοποιήθηκε με τη χρήση των ταχείας δοκιμής αντισωμάτων. Η συσχέτιση μεταξύ του προσυμπτωματικού ελέγχου της COVID-19 και του βαθμού γνώσης και συμπεριφοράς προσωπικής υγιεινής αξιολογήθηκε, εφαρμόζοντας πολλαπλή λογιστική παλινδρόμηση. **ΑΠΟΤΕΛΕΣΜΑΤΑ** Συμπεριλήφθηκαν συνολικά 294 συμμετέχοντες στη μελέτη. Από αυτούς, 18 ήταν θετικοί στην COVID-19. Συνολικά, τα ευρήματά μας επιβεβαίωσαν ότι το 61,2% των συμμετεχόντων είχαν μέτρια γνώση σχετικά με το πρόγραμμα πρόληψης της COVID-19, ωστόσο δεν ήταν εφικτό να καταδειχθεί η συσχέτισή του με τη μετάδοση της COVID-19 μεταξύ των μαθητών. Επί πλέον, καλή συμπεριφορά προσωπικής υγιεινής βρέθηκε στο 41,8% των συμμετεχόντων, αλλά και πάλι η συσχέτισή της με τη μετάδοση της COVID-19 δεν κατέστη δυνατόν να διευκρινιστεί. **ΣΥΜΠΕΡΑΣΜΑΤΑ** Η πλειοψηφία του πληθυσμού της παρούσας μελέτης είχε καλή-μέτρια γνώση και συμπεριφορά προσωπικής υγιεινής. Ωστόσο, οι συμμετέχοντες στην εν λόγω μελέτη απέτυχαν να εφαρμόσουν τη γνώση και τη συμπεριφορά προσωπικής υγιεινής στη μετάδοση της COVID-19.

Λέξεις ευρητηρίου: Ισλαμικό οικοτροφείο, Μαθητές, Μετάδοση COVID-19, Προσωπική υγιεινή**References**

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