## ORIGINAL ARTICLE

# Relationship Between Closed Contact and Pediatric COVID-19 in Panjatan II Health Center Kulon Progo

**Hubungan antara Kontak Erat dengan Anggota Keluarga Kasus Terkonfirmasi dan COVID-19 pada Anak di Puskesmas Panjatan II Kulon Progo**

Anggita Bintari Handayaningrum[1], Tubagus Ferdi Fadilah[2]✉

[1] Medical Undergraduate Program, Faculty of Medicine, Universitas Trisakti, Jakarta, Indonesia
[2] Department of Pediatrics, Faculty of Medicine, Universitas Trisakti, Jakarta, Indonesia

✉ tb_ferdi_md@trisakti.ac.id

## ABSTRACT

### Background

It is estimated that the positive infection rate of COVID-19 in Indonesia is 4.261.412 cases confirmed. Indonesian Pediatric Society noted that since May 2021, cases of pediatric COVID-19 infection have been rising; it is related to many factors such as host immunity, nutrition, sociodemographics, and close contact. Our research evaluated the closed contact factor with confirmed cases in a family member or household contact and pediatric COVID-19 infection, the incidence of pediatric COVID-19, the association between closed contact with confirmed cases in family members and pediatric COVID-19 infection.

### Methods

Our research uses the observational analytics method, cohort retrospective design, based on medical records, 242 samples collected, period November 2020-November 2021, with sampling technique consecutive nonrandom sampling; our inclusion criteria are 0-18 years old, have positive or negative antigen swab or RT-PCR, wholly followed up by the health center.

### Results

Using chi-square in SPSS application, our research stated Mother and Father are the main sources of household contact transmission, children 12-18 years old, women sex are the highest number the incidence, statistical result $p<0,05$.

### Conclusions

Accordingly, there is an association between closed contact with confirmed cases in family members and pediatric COVID-19 infection.

**Keywords**: COVID-19, Pediatric COVID-19, Closed Contact, Family Cluster, Family Member Confirmed Cases

**ABSTRAK**

**Latar Belakang**

Diperkirakan bahwa saat ini, jumlah angka positif COVID-19 di Indonesia adalah sebanyak 4.261.412 kasus konfirmasi. Ikatan Dokter Anak Indonesia (IDAI) mencatat sejak bulan Mei 2021 kasus infeksi COVID-19 pada anak kian meningkat di Indonesia, peningkatan tersebut dapat dipengaruhi oleh banyak faktor, seperti faktor imunitas, faktor status gizi, faktor sosiodemografi, faktor kontak erat. Kami meneliti dan menilai mengenai faktor kontak erat anggota keluarga terkonfirmasi, insidensi COVID-19 pada anak, dan hubungan antara kontak erat anggota keluarga terkonfirmasi dengan infeksi COVID-19 pada anak.

**Metode**

Penelitian ini menggunakkan metode observasional analitik, desain kohort retrospektif, menggunakkan rekam medis, jumlah sampel 242 subjek periode November 2020-november 2021, teknik pengambilan sampel adalah consecutive non random sampling. Sampel yang kami pilih adalah anak berusia 0-18 tahun, dinyatakan positif ataupun negatif hasil uji swab antigen dan atau RT-PCR, berada dalam kontrol dan pengawasan rutin pihak puskesmas.

**Hasil**

Menggunakkan uji Chi-Square dengan aplikasi SPSS, hasil penelitian kami menyatakan bahwa Ayah dan Ibu merupakan sumber utama penularan kontak erat dalam keluarga, anak usia 12-18 tahun, jenis kelamin perempuan adalah anak terbanyak yang terinfeksi COVID-19, hasil uji statistik p<0,05.

**Kesimpulan**

Terdapat hubungan antara kontak erat anggota keluarga terkonfirmasi dengan infeksi COVID-19 pada anak.

**Kata Kunci**: COVID-19, COVID-19 pada anak, kontak erat, family cluster, anggota keluarga terkonfirmasi positif

## INTRODUCTION

Coronavirus Disease (COVID-19) is an infectious disease caused by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), which according to many researchers, initially started from zoonosis until transmitted between humans. COVID-19 also caused a catastrophic impact on the world's demography, where around 2.9 million infected are reported to have passed from this disease. Data released by John Hopkins University reported that there are 1,400,000 positive cases of COVID-19 globally.[1,2] Due to a high number of infections worldwide, on January 31st 2020, World Health Organization (WHO) declared the infection a global pandemic.[1,2]

As of May 16th 2021, Indonesia has precisely 1,739,750 reported positive cases.[3] As written by the Indonesian Pediatrician Association (IPA), child SARS-CoV-2 infection as of 18th of May 2020 reached 3,324 cases of suspected cases, with 129 of them passed away and 584 positively confirmed to be infected with COVID-19 with 14 of them were passed away. On May 15th 2021, COVID-19 cases significantly increased, with 2,385 confirmed cases. Meanwhile, on June 15th 2021, there were 8,161 cases, 9,944 cases on the next day, and 12,624 confirmed cases on the day after. If we compare these data, 500% of cases escalated, followed by COVID-19 death. On June 28th 2021, 12.6% of patients were found in 1-5 years old, and 9.7% in children between 6-19 years old. The number of deaths in children between the ages of 1 to 5 was 0.6%, while in children between the ages of 6 to

18 was 0.6%. Based on the number of reported cases and death due to SARS-CoV-2 infections in children, we can say that the COVID-19 child infection case in Indonesia is quite significant, and the age of the children becomes the determining factor of the infection cases.[4–6]

SARS CoV-2 can be transferred between humans through close contact. Close contact can occur between children within a 1-meter radius in 15 minutes of minimum duration or children that travel together within a 1-meter radius to areas with an endemic report with various types of vehicles or transportations. A person confirmed as a supervised patient or confirmed positive with a COVID-19 case from 2 days before symptoms up until 14 days after symptoms are shown.[7] Around 56%-90% of COVID-19 infections in children are mostly found because of close contact with relatives infected with the disease.[8–10]

Pokorska et al. conducted research on 319 subjects between the ages of 14 days to 18 years old. 62.5% of 16 subjects with close contact history with family members with related symptoms were confirmed positive for COVID-19, and 37.5% were confirmed negative. Out of 27 subjects with close contact history with family members positively confirmed COVID-19, 18.5% showed no symptoms but positively confirmed COVID-19, and 81.5% confirmed negative. The other 276 subjects with no history of close contact with suspected family members were confirmed negative.[8] Liu Z et al. reported that out of 8 individuals, 5 (62.5%) were confirmed positive, and the other 3 (37.5%) were confirmed negative based on RT-PCR results.[11] Ladhani SN et al. reported that out of 126 families with 215 children, 21 families were confirmed to have at least one parent confirmed positive for COVID-19, and 9 out of these 21 families were indicated to have at least one child with IgG SARS CoV 2. Besides that, it was also discovered that out of 44 children, 20 of them (45.5%) were confirmed positive for COVID-19.[12]

Sirajuddin N. et al. researched the influence of close contact on COVID-19-confirmed cases in Makassar City. Out of 334 people, with an observational analytic design, 136 people were confirmed to have histories of close contact with 84 people; of them were confirmed COVID-19 positive (61.8%), and 52 were confirmed negative. However, out of the other 198 people who do not have histories of close contact, 38 people were confirmed positive (19.2%), and the additional 160 were confirmed negative.[13]

In Indonesia, research on COVID-19 infection in children is still hardly available. That is why this research is expected to drive Indonesian researchers to conduct similar research and act as a fundamental source of references for further study with more complete and comprehensive content.

## METHODS

This research is observational analytic research with a cohort retrospective design. The subjects were taken from the children population who visited the Panjatan II health centre between the periods of November 2020 to November 2021. The routine observation program included two hundred forty-two children between the ages of 0-18 with antigen or RT-PCR swab test results. Available medical records were sampled with a consecutive random sampling technique. The results of this research were tested with a chi-square method through SPSS version 26 software. Our research already had Ethical Clearance 19//KER-FK/IX/2021 from the Faculty of Medicine, Universitas Trisakti.

## RESULTS

Based on this research, the characteristic of the subjects are children that live together with confirmed COVID-19-positive family members based on antigen or RT-PCR swab test results. The number of confirmed positive dads was 30 people (24.6%) and 30 (24.6%). The age range with the highest probability of infecting children was between the ages of 21 and 35 (23%). As seen in Table 1, The largest population of research subjects in the perspective of age ranges (12 to 18 years old) were 67 children; meanwhile, on the perspective of sex type, the population is dominated by a female (73 children, 59.8%).

Table 1. Characteristics of Children

| Variables | n (%) |
|---|---|
| **Age ranges** | |
| 0-3 years old | 10 (8.2%) |
| 4-11 years old | 45 (36.9%) |
| 12-18 years old | 67 (54.9%) |
| **Sex** | |
| Male | 49 (40.2%) |
| Female | 73 (59.8%) |

Table 2 shows that 65 samples (53.35%) were tested with antigen swabs, and 57 samples (46.7%) were tested with RT-PCR swabs. Based on these results, children with close contact histories with confirmed positive family members that show significant symptoms show higher COVID-19 incidents, which is proven by higher antigen/RT-PCR swab test results than children with no close contact histories.

Table 2. Antigen and RT-PCR Test Results

| Confirmed Close Contact | Antigen Swab Test Results | RT-PCR Swab Test Results | Total |
|---|---|---|---|
| Family Members | 41 (33.6%) | 43 (35.2%) | 84 |
| Non-Family Members | 24 (19.7%) | 14 (11.5%) | 38 |
| Total | 65 (53.3%) | 57 (46.7%) | 122 |

Table 3, categorized as confirmed positive family members, are family members proven to be infected based on antigen/RT-PCR swab test results and live inside the same house with children research subjects. Based on medical records data, children confirmed positive for COVID-19 have histories of close contact with one of the confirmed positive family members.

As seen in Table 4, we can see that out of the 122 subjects, 55 children (65.5%) are children with histories of close contact with confirmed positive family members; meanwhile 29 (34.5%) are in contact with confirmed negative family members. Twenty-nine children (34.5%) with histories of close contact with non-family tested positive meanwhile, 31 children (81.6%) were confirmed negative. Close contact history with non-family represents close contact with suspected subjects outside the house, such as schools, playgrounds, communities, and other places.

Table 3. Characteristics of Confirmed Positive Family Members

| Variables | n (%) |
|---|---|
| Confirmed Positive Family Members | |
| Fathers | 30 (24.6%) |
| Mothers | 30 (24.6%) |
| Grandfathers | 20 (16.4%) |
| Grandmothers | 20 (16.4%) |
| Siblings | 22 (18%) |
| Age Ranges | |
| 4-11 Years old | 1 (0.8%) |
| 12-20 Years old | 15 (12.3%) |
| 21-35 Years old | 28 (23%) |
| 36-45 Years old | 24 (19.7%) |
| 46-55 Years old | 15 (12.3%) |
| 56-65 Years old | 15 (1.3) |
| > 65 Years old | 24 (19.7%) |

We obtained a $p<0.05$ value based on the chi-square test, which represents significant relationships between confirmed positive family members and COVID-19 infection in children.

Table 4. Relationships between COVID-19 Confirmed Positive Family Members and Child Infection

| Variable | Antigen/RT-PCR Swab Test Results | | Total | p |
|---|---|---|---|---|
| | Positive | Negative | | |
| Close contact with confirmed family members | 55 (65.5%) | 29 (34.5%) | 84 | 0.000* |
| No close contact with confirmed family members | 7 (18.4%) | 31 (81.6%) | 38 | |
| Total | 62 (50.8%) | 60 (49.2%) | 122 | |

*Results obtained by using the chi-square test with $p<0.05$ value

Based on the descriptive calculation, the most significant percentage of confirmed positive family members are fathers (30 people, 24.6%) and mothers (30 people, 24.6%). Meanwhile, based on the age range, the largest populations to infect children with COVID-19 are subjects between the ages of 21 and 35 (23%).

Based on the chi-square test, the $p<0.05$ was obtained, reflecting a significant relationship between positively confirmed family members and children with COVID-19 infections.

## DISCUSSION

**Univariate Analysis**

Based on our research in Panjatan II health centre in Kulon Program Yogyakarta, 242 children were confirmed positive for COVID-19 between November 2022 and November 2021. However, out of the 129 subjects, seven were excluded from the sample due to incomplete medical records. Based on that, the sample in this research is 122 subjects; 49 males (40.2%) and 73 females (59.8%).

Our research regarding COVID-19 infection in children based on age range show infections in 10 children of 0-3 years old (8.2%), 45 children of 4-11 years old (36.9%), 67 children of 12-18 years old, 67 (54,9%). The largest population of COVID-19-confirmed positive children based on age perspective is found in children between the ages of 12-18 (67 children, 54.9%). Meanwhile, from the perspective of sex type, female children dominate, with 73 children (59.8%).

Other researches concentrate on similar subjects. For example, research conducted by Bialek S et al. in The United States of America shows that out of 2,572 cases of COVID-19 in children, 813 children (32%) are in the age range of 15 to 17 years old, 682 children (27%) are on the age range of 10-14 years old, 398 children (15%) are under one year old, 291 children (11%) are on the age range of 1 to 4 years old, and 388 children (15%) are on the age range of 5 to 9 years old. Out of these 2,490 children, 1,408 (57%) are males. Based on the results, the most prominent COVID-19 cases in children occurred in children between the ages of 15 to 17 years old, with male children as dominated sex.[14] Pokorska M. et al. conducted a cohort perspective designed research on nine families with COVID-19-confirmed positive children; 14 male children (66.7%) and seven female children (3.3%), which indicates male children are dominating the infection number.[8] Research by Fisher K et al. was conducted on adults above 18 years old with a history of close contact, including with confirmed positive family members, with the case-control method. Out of the 314 samples gathered between 1 to 29 July 2020, 75 COVID-19 cases were in males (48.7%), and 79 were found in females (51.3%). Meanwhile, the controlled negative results in males were 72 cases (45%) and in females at 88 cases (55%), which indicates higher female infections than males.[15] Based on 2021 citizenship statistical data, the total population of males and females in Kulon Progo Yogyakarta were 442,838 people, divided into 219,386 males and 223,452 females. Epidemiologically, the Kulon Progo area, which consists of more females than males, is the most suitable area for this research.[16]

This research shows that confirmed positive family members are dominated by fathers, mothers, grandfathers, grandmothers, and other family members living in the same house as the subjects of this research; fathers (24.6%) and mothers (24.6%) are the first sources of COVID-19 infections on children in the house environment. In observational analytic research conducted by Pokorska M. et al. on 126 families, which consist of 12 COVID-19-negative children, infections were indicated to be passed from 5 fathers (41.7%) to 7 mothers (58.3%). Meanwhile, nine other families with COVID-19 confirmed positive children the infection indicated to be sourced from 5 fathers (55,6%) and three mothers (33,3%). That is why fathers and mothers are indicated to be the main sources of children's infections.[8] Mao L. et al. studies confirmed a positive family consisting of a grandmother, mother, father, and a 14-year-old child. The grandmother, mother, and child attended a family gathering with a confirmed positive patient with no symptoms. Three days after the gathering, a grandmother who suffered from a minor fever and slight cough tested positive with an RT-PCR swab test on January 29th. On the 31st of January, the mother was confirmed positive through an RT-PCR swab test. The infection continued to the child, but the father was confirmed negative. In the research, child infection happens in a family cluster with a history of close contact with a confirmed positive family member, the grandmother and the mother.[17] Based on a literature review conducted by Alshohime F. et al., asymptomatic confirmed child act as infection sources for parents and nurses.[18] Based on data published by the COVID-19 Task Force, COVID-19 infection prevalence in children is significant, especially in Yogyakarta, with 16.2% of prevalence in children between the age of 0-18 years old,[19] with positive case cumulative distribution among people

between the ages of 19-30 years old and 31-45 years old. These age ranges are categorized as early and late adulthood.[20]

**Bivariate Analysis**

In this research, we discovered the relationship between close contact with COVID-19 confirmed positive family members and children infection with p<0.05. The result is similar to the ones conducted by Sirajuddin N. et al. that focused on COVID-19-confirmed positive close contact cases with sample numbers of 334 people that, consists of 9 people between the age of 0-15 years old (7.1%), 50 people with the age of 16-40 years old (39,7%), 34 people above 40 years old (27%), and 33 people of the unknown age range (6,2%), with a result of p<0.05 which shows a significant influence of COVID 19 confirmed positive and close contact cases. A history of close contact with COVID-19 confirmed positive person would increase COVID-19 risk up to 6.802-fold than with no close contact history. In the South Sulawesi area, the highest COVID-19 infection occurred due to close contact with family members in the same house, close contact in social activities, and local transmission.[13] The influence of close contact history to increase positive confirmed cases in a house environment is in accordance with a review by Radiany F. et al., which stated that a family cluster happens when one of the family members is confirmed positive and infects the others. For example, when a father who works in an office is confirmed positive both with and without symptoms, he can infect his wife and children.[21]

In the Panjatan area, COVID-19 cumulative case is relatively higher than in the other regions of Kulon Progo.[22] Besides that, Kulon Progo is also categorized as a malaria-endemic area with fluctuating illnesses.[23] Co-infection of malaria and COVID-19 will lead to extensive immunity response and produce heavy manifestation and the worst prognosis.[24] During the pandemic era, a child's social environment tends to be more controlled. Therefore, children are driven to stay home to prevent infection, which also risks them of being infected by their family members due to close contact.[25] Based on WHO guidance, washing hands can become the best and the most effective way to prevent COVID-19 infection.[26] Research conducted by Wardhani et al. on children between the age of 4-6 years old stated that children's awareness regarding COVID-19 is still low, including their habit of washing their hands.[27] 55 children (65.5%) with close contact with their family members tested positive, and the other 29 (34.5%) tested negative. Meanwhile, 29 children (34.5%) with close contact with non-family members were confirmed positive, and 31 children (81.6%) were confirmed negative.

This research revealed that 84 children with close contact history with their family members were confirmed positive, and 38 children with close contact history with non-family members were confirmed positive. These results are similar to the results of cross-sectional research by Sirajuddin N. et al., which stated that 84 people (61.8%) with close contact history with COVID-19 confirmed positive persons, meanwhile, 52 people (38.2%) were confirmed negative despite their close contact history. Thirty-eight people (19.2%) do not have a history of close contact but confirmed positive, and 160 people (80.8%) with no close contact tested negative. The high number of people confirmed positive after their close contact history is in accordance with Blum's theory on health degree, where the most significant factors to prevent COVID-19 infection are a controlled environment by avoiding close contact possibility with a suspected or infected person, healthy lifestyle, and lower mobilization to areas with a high number of confirmed cases.[13] That is why

people with close contact history have a higher risk of infection. The statistical test results presented by Sirajuddin et al. are at p<0.05, representing the significant influence of close contact history and COVID-19-confirmed positive cases.[13] COVID-19 infection in children is dominated by close contact history with a percentage of 56%-90% of the possibility of infection.[8–10] Infection transmission in the family cluster cannot be prevented by creating regulations that lead to higher positive cases than negative ones.[21]

Research by Liu Z et al. with observational analytic and cohort retrospective designs on one family with eight family members shows that five (62.5%) were COVID-19 confirmed positive. Meanwhile, the other three members (37.5%) were confirmed negative after 2 RT-PCR tests. The five members tested positive because of their travel history to Hubei. Meanwhile, the other family members do not have a travel history and stay home in Guangzhou.[11] Based on a review by Almas, AL. during the pandemic era, children tend to stay at home. This situation risks them being infected through close contact activities with their family members than any other external sources.[25] Guo et al. stated that close contact with confirmed positive family members had become the main transmission source in confirmed cases. Two hundred ten children (66%) were infected through family clusters; meanwhile, the other ten children (3.1%) were infected by non-family members. The positive results on children show the importance of minimizing close contact with strangers.[26]

## CONCLUSION

The result shows that the number of confirmed COVID-19-positive close contact cases with family members was 84 children. COVID-19 positive prevalence percentage is 50.8%. Based on data analysis using SPSS, we obtained a p-value of p<0.05, which indicated a significant relationship between close contact history and confirmed COVID-19 positive in children.

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## AUTHORS CONTRIBUTION

Study conception and Design: ABH. Author, TFF. Author; data collection: ABH. Author, TFF. Author; analysis and interpretation of results: ABH. Author, TFF. Author; draft manuscript preparation: ABH. Author, TFF. Author.

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## CONFLICT OF INTEREST

There is no conflict of interest between the authors.

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