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*Article*

# The Prevalence of COVID-19 among Pediatric Age Group in Duhok City, Kurdistan, Iraq

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**Abstract: Background:** COVID-19 is a respiratory illness caused by SARS-CoV-2 that has become a global pandemic. Although children can contract the virus, they are generally less likely than adults to develop severe symptoms. Parents and caregivers should monitor their children for symptoms and seek medical attention if their child becomes ill. Practicing good hygiene and social distancing can help prevent the spread of the virus. Vaccines are available for children and can provide additional protection against COVID-19. Understanding the impact of COVID-19 on children is crucial for developing effective public health strategies to control the pandemic. **Objectives:** The current study aims to determine the prevalence of Covid-19 in pediatric age group in Duhok province and Zakho city, in Kurdistan region. among the children who tested positive for IgG test. If IgG antibodies are detected in a person's blood sample, it suggests that they have been infected with SARS-CoV-2 at some point in the past and their immune system has responded by producing antibodies against the virus. **Methods:** A cross-sectional investigation was undertaken involving youngsters aged 5 to 12 years. The study encompassed a total of 330 participants, selected between October and December 2022. The children underwent testing to detect IgG antibodies. Moreover, a questionnaire was employed to gather demographic and individual information from each contributor. **Results:** Among the studied sample, 302/330 (91.5%) of children were positive to IgG antibody test. No gender difference for COVID-19 was found in pediatric age group. Case fatality rate was 0%. 22/302 (6.6%) cases were symptomatic during the infection. However, 282(93.4%) cases were asymptomatic. **Conclusions:** Covid-19 infection in pediatric age group has good prognosis compared to adults. Intensive care unit (ICU) and death are rare. High-risk groups should be targeted for education and immunization/vaccination. Furthermore, more studies are needed to be conducted in order to investigate the risk factors of the infection and to assess the awareness among the general population about the risk of infection.

**Keywords:** Prevalence; COVID-19; Children; Duhok City; Kurdistan; Iraq

## 1. Background

In the last few years, the world has witnessed the reemergence of different viral infections [1–3]. In December 2019, an abrupt emergence of a new coronavirus, designated as SARS-CoV-2, occurred in Wuhan, China. It was later formally designated as COVID-19 by the World Health Organization (WHO), reflecting the year of its identification [4]. Since then, COVID-19 has rapidly evolved into a global health crisis, primarily transmitted through human-to-human contact via respiratory droplets released during talking, sneezing, or coughing [4,5]. Contrary to initial beliefs that children might be less susceptible, COVID-19 affects people of all ages, including children [[6]. Although children generally experience milder symptoms than adults, they can still manifest a range of signs such as fever, cough, runny nose, sore throat, fatigue, body aches, and loss of taste or smell. Some children may also present gastrointestinal symptoms like nausea, vomiting, and diarrhea [6]. Severe illness in children is relatively uncommon, except for those with underlying medical conditions like asthma or diabetes, who are at higher risk of hospitalization. The initial cases of COVID-19 were diagnosed in the early part of March 2022 in the Kurdistan Region. Subsequently, there was a rapid surge in the number of cases, including a few children [7–11]. The pandemic had a detrimental impact on all aspects of life, including health services and education in our Region [12–15]. It is worth mentioning

that, the overall prevalence of the infection in children may be underestimated due to asymptomatic or mild cases going undetected or unreported. Moreover, factors such as school closures, social distancing measures, and vaccination rates can influence the incidence [6]. Ongoing monitoring and research are essential to comprehend the impact of COVID-19 on children and to inform public health interventions aimed at controlling the virus's spread. While children generally experience milder effects, their role in transmission dynamics remains crucial, necessitating continued efforts to mitigate the pandemic's impact on all age groups. The aim of this research is to collect data to estimate the prevalence of Covid-19 among the pediatric age group in Duhok province and Zakho City.

## **2. Materials and Methods**

### *2.1. Study design and ethics*

This cross-sectional study was conducted among the pediatric age group (5-12 years) in Duhok province and Zakho City from October to December 2022.

#### **Blood samples**

The research recruited every child aged 5 to 12 who visited Hevi Pediatric Teaching Hospital and the laboratory of Zakho General Teaching Hospital during the period from October to December 2022. In addition to collecting blood samples, the researchers administered a questionnaire to gather data about the children and their families. The questionnaire covered essential personal information, such as the child's name, age, and gender. Besides it inquired about the socio-economic status of the families, categorized as good, acceptable, or poor. Other information included the history of premature labor, birth weight, and the child's feeding method, whether through breastfeeding, formula feeding, or a combination of both. Furthermore, the questionnaire sought to determine the children's immunization status, whether they were fully immunized, partially immunized, or unimmunized. It also gathered data on any known chronic illnesses, documented prior COVID-19 episodes, and any evidence of pneumonia in the children. Additionally, the questionnaire sought information about the family's history of documented COVID-19 cases.

### *2.2. Serologic assay*

The blood samples that were withdrawn from the children have been used to detect IgG antibody. If IgG antibodies are detected in a person's blood sample, it suggests that they have been infected with SARS-CoV-2 at some point in the past and their immune system has responded by producing antibodies against the virus

### *2.3. Statistical assessment*

The collected data of this study had been analyzed by SPSS software. Chi-square test was used to study the association between the different variables. A p-value of 0.05 or less was considered statistically significant.

## **4. Results**

### *4.1. Characteristics of Participants*

Over the period of the study, 330 blood samples were taken from children. Of all cases, 170 (51.5%) and 160 (48.5%) were male and female, respectively. Out of 330 cases, 144 (43.6%) children were aged between (5-7 years), 123 (37.3%) children were aged between (8-10 years), 62 (18.8%) children were aged (+11 years), and (0.3%) of children were below 5 years old of age.

### *4.2. Positive IgG antibody among the participants*

Of all 330 participants, 302 cases were positive for IgG antibody. Out of all the 302 positive cases, 156 (51.7%) and 146(48.3%) were male and female, respectively. Additionally, 25/302(8.3%) cases had history of documented prior Covid-19 episode. 4 (1.3%) cases had evidence of pneumonia, while 298

(98.7%) had no evidence of pneumonia. Moreover, 22(6.6%) were symptomatic during the infection. However, 282(93.4%) cases were asymptomatic (Table 1).

#### 4.3. Positive IgG antibody associated with different variables

This study demonstrated the correlation between positive IgG donors and several different other variables, such as (birth weight, Premature labor, feeding, chronic disease, immunization status, family history of documented covid-19, socioeconomic status, mother's occupation, and the number of family members). The results went as follow; ( number of children born with birth weight of (  $\leq 1$  kg, 2-3 kg, 3-4 kg, 4-5 kg,  $>5$  kg) were ( 4 (1.3%), 26 (8.6%), 237 (78.5%), 33 (10.9%), and 2 (0.7%) with a P-value of 0.314), respectively. Positive children having a history of premature labor were 17 (5.6%) while the remaining 285 (94.4%) denied having premature labor (P-value 0.585). Regarding the feeding, 73 (24.2%) of children had breastfeeding, 71(23.5%) had formula feeding, and 158(52.3%) had mixed feeding (P-value 0.394). 23 (7.6%) of children had chronic disease. However, 279 (92.4%) didn't have any chronic disease, (P-value 0.175). Regarding the immunization status, 278(92.4%) of children were completely immunized. 21(7.0%) were partially immunized, and 2 (0.7%) were Unimmunized, (P-value 0.707%). 198(65.6%) of children were reported having a family history of documented covid-19. On the other hand, 104(34.4%) denied this, (P-value 0.277). The socio-economic status of children is as following (64(21.2%), 188(62.3%), 50(16.6%) ) had ( poor, accepted, good) status, respectively. (P-value 0.956). 267(88.4%) of children mothers were housewives while 35(11.6%) mothers were employed, (P-value 0.393). The number of family members ( $\leq 3$ , 4-6, 7-9, 10-12, and 13+ members) were (8(2.6%), 180(59.6%), 86(28.5%), 22(7.3%), 6(2.0%) ) members, respectively. P-value 0.667 (Table 1).

**Table 1.** Characteristics and associations of IgG positive patients with different variables.

Characteristics	Positive IgG (N=302)		Negative IgG (28)		P-value
	N	%	N	%	
Age group					
5-7	131	43.3	13	46.4	0.116
8-10	113	37.4	10	35.7	
11+	58	19.2	4	14.3	
Gender					
Male	156	51.7	14	50.0	0.867
Female	146	48.3	14	50.0	
Birth Weight					
<=1	4	1.3	0	0	0.573
2-3	59	19.5	3	10.7	
4-5	237	78.5	25	89.3	
5+	2	0.7	0	0	
Socioeconomic Status					
Poor	64	21.2	6	21.4	0.504
Accepted	188	62.3	15	53.6	
Good	50	16.6	7	25.0	
Mother Occupation					
Employ	35	11.6	4	14.3	0.627
House wife	267	88.4	24	85.7	
Premature Labor					
Yes	17	5.6	3	10.7	0.281
No	285	94.4	25	89.3	
Feeding					
Brest feeding	73	24.2	6	21.4	0.421

Formula feeding	71	23.5	4	14.3	
Mixed feeding	158	52.3	18	64.3	
Chronic diseases					
Yes	23	7.6	3	10.7	0.56
No	279	92.4	25	89.3	
History of documented prior COVID-19 episodes					
Yes	25	8.3	1	3.6	0.376
No	277	91.7	27	96.4	
Any evidence of pneumonia					
Yes	4	1.3	0	0.0	0.540
No	298	98.7	28	100.0	
Immunization status					
Complete	278	92.4	24	85.7	0.348
Partial	21	7.0	4	14.3	
Unimmunized	2	0.7	0	0.0	
Family history of documented COVID-19					
Yes	198	65.6	13	46.4	0.044
No	104	34.4	15	53.6	
Number of family members					
2-4	47	15.6	7	25	0.532
5-7	175	57.9	16	57.1	
8-10	62	20.5	5	17.9	
11-13	13	4.3	0	0	
14+	5	1.7	0	0.0	

## 5. Discussion

The last decade witnessed a number of outbreaks of reemerging infectious diseases [16–19]. COVID-19 is an infectious disease caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). It was first identified in December 2019 in Wuhan, China, and has since become a global pandemic, affecting millions of people worldwide. COVID-19 is primarily transmitted through respiratory droplets that are emitted when an infected person talks, coughs, or sneezes. Touching a virus-infected surface and then touching the mouth, nose, or eyes can also spread the virus in some cases. In Iraq, the first confirmed case of COVID-19 was reported in Najaf province on 24 February 2020 from an Iranian student who had returned from Iran, followed by four cases from a family in Kirkuk province on 25 February, all of whom had traveled to Iran. On February 27, there was a new case reported in Baghdad involving a patient who had recently traveled to Iran. As of March 12, 2020, Iraq had documented 74 confirmed cases and 8 fatalities due to the virus. By April 16, 2020, the tally of confirmed cases had risen to 1415, accompanied by 78 recorded deaths. As of May 24, 2020, the count of confirmed COVID-19 cases had surged to 4469, resulting in 160 reported deaths, while 2738 patients had successfully recovered from the infection [20–22]. During the early phase of the outbreak, adults over the age of 15 were primarily likely to be infected with COVID-19, and children made up a relatively small proportion of confirmed cases [22]. However, due to the lack of unique preventive and control measures, reinfection [23–25] and the fact that vaccine did not prevent infection [26], such as not being able to wear a mask in the younger age group, the number of infected children has increased significantly. There are not many data of COVID-19 cases in children. According to published data, children constitute approximately 1-5% of confirmed COVID-19 cases. Deaths have been extremely uncommon and the condition has been diagnosed in 90% of cases as



asymptomatic, mild, or moderate. Although up to 6.7% of cases could be serious, they mostly affect children under the age of one and those with underlying illnesses. In Kurdistan, few cases of pediatric COVID-19 were reported. However, the true prevalence of pediatric COVID-19 cases is underestimated in Iraq. The reasonable explanations are various, including the following: (1) the milder clinical manifestations of the disease in children as compared to adults mimicking simple flu (2) limited awareness of the disease itself by pediatricians (3) public misinformation about the seriousness of the disease and (4) limited laboratory testing capacity. Out of the 330 recruited samples of our current cross-sectional study, 302 (91.5%) children were positive for IgG antibodies. 156 (51.7%) were male and 282 (93.4%) cases were asymptomatic. Moreover, the prevalence of COVID-19 in children in the countries surrounding Iraq varies as well, for example; In Iran, a study was conducted and confirmed that 278 children were infected with COVID-19. The average age was 5.3 years and 59.4% were male [27]. In Saudi Arabia, a study was conducted, enrolling 567 confirmed cases. (51.5%) were males, and asymptomatic patients accounted for (38.98%) of the cases [28]. However, the findings of our study have to be seen in the light of some limitations. These limitations include time constraints, children being scared of needles, or parents refusing to allow us to take blood samples from their children. In addition to this, our study includes children aged from 5 to 12 years of age. However, a lot of children were aged either above or below this range of age. Together lead to insufficient sample size for statistical measurements.

## 6. Ethics

This study was approved by the Ethics and scientific committee of the College of Medicine, university of zakho, Kurdistan Region, Iraq. All the subjects included in this study have been informed that their personal data will not be shared, and formal consent has been taken from each individual.

## 7. Conclusion

The current study highlights the prevalence of Covid-19 in the pediatric age group from 5 to 12 years in Duhok province and Zakho City. Out of 330 children, 302 (91.5%) cases were confirmed to have covid-19 infection. No gender difference for COVID-19 was found in pediatric age group. Case fatality rate was 0%. 22/302 (6.6%) cases were symptomatic during the infection. However, 282(93.4%) cases were asymptomatic. Although children are generally less likely to experience severe illness from COVID-19, certain groups of children are at higher risk and may experience long-term effects of the virus. Prevention and control measures, including vaccines, are critical in protecting children and reducing the spread of COVID-19. Research on COVID-19 in the pediatric age group has improved our understanding of the virus and informed public health efforts to prevent transmission and mitigate the impact of the pandemic on children and families [29].

## 8. Recommendations

COVID-19 pandemic has highlighted the need for improved global preparedness and response to infectious disease outbreaks. Further studies are required to identify the unique characteristics and consequences of the infection and to improve the management and treatment of COVID-19 illness among children. The indirect effects of COVID-19, such as the impact on mental health status, well-being, and delayed health-seeking behavioral patterns should not be underestimated.

## References

1. Sah, R.; Hada, V.; Mohanty, A.; Padhi, B.; Chandran, D.; Hussein, N.R.; Emran, T.B.; Chaicumpa, W.; Dhama, K. Re-emergence of Sudan ebolavirus after a decade: new challenge to Ebola control. *International Journal of Surgery* **2023**, *109*, 131-133.
2. Sah, R.; Mohanty, A.; Rohilla, R.; Asija, A.; Sedhai, Y.R.; Chandran, D.; Emran, T.B.; Hussein, N.R.; Sharma, A.K.; Dhama, K. Japanese encephalitis prevalence and outbreaks in Nepal and mitigation strategies: an update on this mosquito-borne zoonotic disease posing public health concerns. *International Journal of Surgery* **2023**, 10.1097.

3. Sah, R.; Siddiq, A.; Al-Ahdal, T.; Maulud, S.; Mohanty, A.; Padhi, B.; El-Shall, N.; Chandran, D.; Emran, T.; Hussein, N. The emerging scenario for the Eastern equine encephalitis virus and mitigation strategies to counteract this deadly mosquito-borne zoonotic virus, the cause of the most severe arboviral encephalitis in humans—an update. *Front. Trop. Dis* **2023**, *3*, 1077962.
4. Hao, Y.J.; Wang, Y.L.; Wang, M.Y.; Zhou, L.; Shi, J.Y.; Cao, J.M.; Wang, D.P. The origins of COVID-19 pandemic: A brief overview. *Transbound Emerg Dis* **2022**, *69*, 3181-3197, doi:10.1111/tbed.14732.
5. Hussein, N.R.; Saleem, Z.S.M.; Rashad, B.H.; Naqid, I.A.; Ibrahim, N.; Musa, D.H.; Khezaqia, N.D.; Yousif, A.H. Home management scheme for patients with severe covid-19 in Duhok city, Kurdistan region of Iraq: a possible role for family physicians. *Journal of Family Medicine and Primary Care* **2021**, *10*, 4260.
6. Lopez-Leon, S.; Wegman-Ostrosky, T.; Ayuzo del Valle, N.C.; Perelman, C.; Sepulveda, R.; Rebolledo, P.A.; Cuapio, A.; Villapol, S. Long-COVID in children and adolescents: a systematic review and meta-analyses. *Scientific Reports* **2022**, *12*, 9950, doi:10.1038/s41598-022-13495-5.
7. Hussein, N.R.; Naqid, I.A.; Saleem, Z.S.M. A retrospective descriptive study characterizing coronavirus disease epidemiology among people in the Kurdistan Region, Iraq. *Mediterranean Journal of Hematology and Infectious Diseases* **2020**, *12*.
8. Hussein, N.R.; Naqid, I.A.; Saleem, Z.S.M.; Almizori, L.A.; Musa, D.H.; Ibrahim, N. A sharp increase in the number of COVID-19 cases and case fatality rates after lifting the lockdown in Kurdistan region of Iraq. *Annals of medicine and surgery* **2020**, *57*, 140-142.
9. Mosa, A.A.; Ibrahim, S.V.; Naqid, I.A.; Hawezzy, D.J.; Al-Jaf, S.M.A.; Hussein, N.R. The Impact of SARS-CoV-2 Pandemic on Medical Students: Knowledge, Attitudes, and Practices towards E-Learning: An Online Cross-Sectional Study in the Kurdistan Region, Iraq. *Galician Medical Journal* **2023**, *30*, E202314, doi:10.21802/gmj.2023.1.4.
10. Hussein, N.; Naqid, I. Shortage of Coronavirus RT-PCR Kits May Increase the Spread of Infection in Kurdistan Region of Iraq. *Arch Clin Infect Dis* **2022**, *17*, e102896, doi:10.5812/archcid-102896.
11. Hussein, N.R.; Naqid, I.A.; Saleem, Z.S.M.; Musa, D.H.; Ibrahim, N. The Impact of Breaching Lockdown on the Spread of COVID-19 in Kurdistan Region, Iraq. *Avicenna J Clin Microbiol Infect* **2020**, *7*, 34-35, doi:10.34172/ajcmi.2020.07.
12. Hussein, N.R.; Musa, D.H.; Ibrahim, N.; Naqid, I.A.; Saleem, Z.S.M.; Jacksi, K. Impact of Covid-19 pandemic on surgical practice in Kurdistan, Iraq: An online cross-sectional survey. *International Journal of Surgery Open* **2020**, *27*, 47-51.
13. Hussein, N.R.; Daniel, S.; Mirkhan, S.A.; Saleem, Z.S.M.; Musa, D.H.; Ibrahim, N.; Naqid, I.A. Impact of the Covid-19 pandemic on the elimination of hepatitis C virus in Duhok, Kurdistan, Iraq: a retrospective cross-sectional study. *Journal of family medicine and primary care* **2020**, *9*, 6213.
14. Mosa, A.A.; Ibrahim, S.V.; Naqid, I.A.; Hawezzy, D.J.; Al-Jaf, S.M.; Hussein, N.R. The Impact of SARS-CoV-2 Pandemic on Medical Students: Knowledge, Attitudes, and Practices towards E-Learning: An Online Cross-Sectional Study in the Kurdistan Region, Iraq. *Galician Medical Journal* **2023**, *30*, E202314-E202314.
15. Daniel, S.; Mohammed, A.S.; Ibrahim, N.; Hussein, N.R.; Balatay, A.A.; Naqid, I.A.; Shekho, C.K.; Musa, D.H.; Saleem, Z.S.M. Human papillomavirus (HPV) genotype prevalence and impact of COVID-19 on the HPV prevention program in Duhok city. *Dialogues in Health* **2022**, *1*, 100055.
16. Hussein, N.R.; Rasheed, N.A.; Dhama, K. Cholera in Iraq and Syria: a silent outbreak with a serious threat to the middle-east and beyond. *International Journal of Surgery: Global Health* **2023**, *6*, e108.
17. Mosa, A.; Hussein, N. Impact of Three Outbreaks on Mpox Prevention Program in Iraq: Lessons and Recommendations. *J Pure Appl Microbiol* **2022**.
18. Sah, R.; Borde, K.; Mohanty, A.; Chandran, D.; Hussein, N.R.; Lorenzo, J.M.; Dhama, K. Recent outbreaks of West Nile Virus (WNV) in the United States of America and European countries; current scenario and counteracting prospects—Correspondence. *International Journal of Surgery* **2022**, *106*, 106946.
19. Hussein, N.R.; Balatay, A.A.; Saleem, Z.S.; Hassan, S.M.; Assafi, M.S.; Sheikhan, R.S.; Amedi, F.R.; Hafzullah, S.S.; Hafzullah, M.S.; Xedr, A.M. A clinical study of cutaneous leishmaniasis in a new focus in the Kurdistan region, Iraq. *PloS one* **2019**, *14*, e0217683.
20. Hussein, N.R.; Naqid, I. Strict social distancing measures helped early control of SARS-CoV-2 spread in Duhok city, Iraq. *The Journal of Infection in Developing Countries* **2022**, *16*, 1370-1371.
21. Naqid, I.A.; Abdi, B.A.; Ahmed, R.H.; Ibrahim, N.; Musa, D.H.; Saleem, Z.S.M.; Chafrash, A.M.; Hussein, N.R.; Saeed, K.A. Public knowledge, attitudes, and practices regarding the coronavirus disease pandemic: a cross-sectional study in the Kurdistan region, Iraq. *European Journal of Molecular & Clinical Medicine* **2021**, *8*, 1148-1161.
22. Hussein, N.R. The Role of Self-Responsible Response Versus Lockdown Approach in Controlling COVID-19 Pandemic in Kurdistan Region of Iraq. *International Journal of Infection* **2020**, *7*.
23. Hussein, N.R.; Musa, D.H.; Ibrahim, N.; Saleem, Z.S.M.; Naqid, I.A. COVID-19 Reinfection in a nurse working in Emergency Hospital in Duhok City, Kurdistan region of Iraq. *Asian Journal of Case Reports in Medicine and Health* **2021**, *5*, 27-30.

24. Hussein, N.R.; Musa, D.H.; Naqid, I.A.; Saleem, S.M.; Ibrahim, N. The First Case of COVID-19 Reinfection in Duhok City, Kurdistan Region of Iraq: A Case Report. *Journal of Kermanshah University of Medical Sciences* **2020**.
25. Hussein, N.R.; Musa, D.H.; Saleem, Z.S.M.; Naqid, I.A.; Ibrahim, N. Possible COVID-19 reinfection case in Duhok City, Kurdistan: A case report. *Journal of Family Medicine and Primary Care* **2021**, *10*, 2035.
26. Hussein, N.R.; Rasheed, B.N.; Naqid, I.A.; Dirbaz, A.M.; Saleem, Z.S.M.; Ibrahim, N.; Musa, D.H.; Mohammed, S.M. A study of SARS-CoV-2 delta variant breakthrough infections and side effects of the Oxford-AstraZeneca vaccine. *Public Health in Practice* **2022**, *4*, 100303.
27. Armin, S.; Mirkarimi, M.; Pourmoghaddas, Z.; Tariverdi, M.; Jafrasteh, A.; Marhamati, N.; Shirvani, A.; Karimi, A.; Rafiei Tabatabaei, S.; Mansour Ghanaei, R.; et al. Iranian Pediatric COVID-19 Epidemiology and Clinical Characteristics. *Can J Infect Dis Med Microbiol* **2021**, *2021*, 4914371, doi:10.1155/2021/4914371.
28. AlGhamdi, A.; Al Talhi, Y.; Al Najjar, A.; Sobhi, A.; Al Juaid, A.; Ibrahim, A.; Alshengeti, A.; Al-Hebshi, A.; Farahat, F.; Al Qurainees, G.; et al. Epidemiology, clinical characteristics and risk factors of COVID-19 among children in Saudi Arabia: a multicenter chart review study. *BMC Pediatr* **2022**, *22*, 86, doi:10.1186/s12887-021-02959-8.
29. Hussein NR, Ahmed MT, Rashad BH, et al. A Cross-sectional Study of Clinical Characteristics and Outcomes among Adults with Laboratory-confirmed SARS-CoV-2 Infection with Omicron Variant. *J Pure Appl Microbiol.* **2023**, *17*, 1814-1823. doi: 10.22207/JJPAM.17.3.46.

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