



MYSTERY OF THIS PANDEMIC: ADULTS V/S PEDIATRICS, WHY ARE PEDIATRIC POPULATION LESS AFFECTED?

Ashok Kumar*, Urvashi Khan and Shivani Bansal

Department of Medicine Santosh Medical College, Ghaziabad, U. P

ARTICLE INFO

Article History:

Received 13th February, 2021

Received in revised form 11th March, 2021

Accepted 8th April, 2021

Published online 28th May, 2021

Key words:

COVID 19, Pediatric, Clinical Outcome

ABSTRACT

Abstract: COVID 19 is affecting pediatric population less severely as compared to adult population has become a mystery during this pandemic.

The aim of this study was to describe the clinical characteristics and outcomes in COVID 19 patients in a tertiary care centre of Northern India with an objective of finding out among pediatric and adult population which group is more affected with COVID 19 and confirm the risk factors and its association with their clinical outcomes.

Methods: This observational retrospective study was conducted in Department of Medicine, Santosh Hospital, and Uttar Pradesh over 5 months (end May to October). 872 patients who were confirmed RTPCR positive of COVID 19 were included in the study. Age, sex, blood groups, co morbidities, need for high dependency unit ward admission, isolation ward or ICU admission were analyzed retrospectively.

Results: Mostly pediatric population was less severely affected amongst the COVID 19 patients. The co morbidities and the ward admissions did affect the clinical outcomes.

Conclusions: The results of present study suggest that while the adult population might have role in increased susceptibility to the COVID 19 infection, the pediatric population might be somewhat protective.

Copyright © 2021 Ashok Kumar et al. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

INTRODUCTION

In December, 2019, Wuhan city, the capital of Hubei province in China, became the centre of an outbreak of COVID 19. Majority of the population observed being affected was adults whereas pediatric population was less severely affected. This became a mystery during this pandemic. Majority of the pediatric population who have been COVID 19 positive are vastly asymptomatic and if are symptomatic, recover fast. The biological reasons for this difference remain to be elucidated. [1]

The corona viruses already identified might only be the tip of the iceberg, with potentially more novel and severe zoonotic events to be revealed. Among the COVID 19 confirmed cases admitted in our hospital, 65 out of 872 patients were pediatric population. This statistics reflects the rarity of COVID-19 in pediatric population. Additionally, all the cases neither were severe enough so that none of them required intensive care admission, mechanical ventilation nor developed complications.

Pathophysiology

There are many factors that could explain why SARS-Cov-2 is not primarily a disease with large consequences for pediatric populations. Common manifestations associated with COVID

19 are Fever, Sore throat, Dry Cough, Fatigue, and Shortness of breath, Diarrhea, Headache, Anosmia, Rash, Aches and pain.

Firstly, it could be explained by the distribution of ACE2 receptors in fetal lung compared to adult lung tissue. [Hoffmann et al] This finding infers that fetal lung ACE2 receptors have different characteristics than mature lung tissue. Secondly, besides the pediatric populations are exposed to various respiratory viruses such as respiratory syncytial virus, Influenza A and Influenza B viruses, which enhance their serum antibody levels and could provide cross protection [2]. Thirdly, the risk to pediatric population is reported to be small [3], but in India, with 130 million children under the age of five, the numbers with severe disease and death is a matter of concern during this pandemic period. Fourthly, there can be vertical transmission i.e. mother to fetus intrauterine transmission of virus. [4] Fifth, it can be due to family clustering which plays a major role in the transmission of the virus. [5] Last but not the least community transmission also holds an important place in transmission of COVID 19 virus. [6]

It was found that immune response is muted more in children. Infected pediatric populations generally developed mild symptoms and were less likely than adults to report as lower

*Corresponding author: Ashok Kumar

Department of Medicine Santosh Medical College, Ghaziabad, U. P

respiratory tract symptoms or loss of taste or smell. The findings provided additional confirmation that the overwhelming majority of children with SARS-CoV-2 infection developed mild symptoms, [2,7] but question was whether children are less susceptible to infection or less likely to transmit SARS-CoV-2.

It is plausible that weaker inflammatory responses in children may prolong virus survival and therefore transmission to adult contacts.

MATERIALS AND METHODOLOGY

A retrospective observational study conducted in Department of Medicine, Santosh Hospital, Ghaziabad, Uttar Pradesh. 872 consecutive admitted patients were considered who were diagnosed with COVID19 after being tested positive by RTPCR and antigen tests.

Methodology

- Epidemiological, demographic, clinical and outcome data were extracted from the medical records using the database, then screened, assessed for eligibility from time period of May to October 2020.
- Data was analyzed and tabulated.
- Results are calculated and presented in the form of percentages.

Study population

From May to October 2020, 872 individuals were tested by real-time polymerase chain reaction and antigen test for SARSCoV-2 infection in Ghaziabad, U.P. India. Patients less than 18 years were grouped as pediatric population while those > or equal to 18 years were considered as adults.

Statistical Analysis

- All data were entered into an excel sheet.
- Continuous Variables (quantitative data) will be represented as mean ± SD.
- Categorical variables (qualitative data) will be represented as proportion and percentage.
- Chi square test was applied wherever applicable
- P value<0.05 was considered significant.

RESULTS

A total of 872 patients included in our study are presented further in the form of values and graphs.

Table no 1 Clinical Profile among pediatric and adult patients suffering from COVID 19

Parameters	TOTAL (n=872)	PEDIATRICS (n=65)	ADULTS (n=807)	p Value
Age Mean(SD)	42.61±18.76	11.37 ± 4.37	45.18 ±17.01	0.001
Gender				
Male	462	20(30.8%)	442(54.8%)	0.001
Female	410	45(69.2%)	365(45.2%)	
Admission Ward				
ICU	135	0(0%)	135(16.7%)	0.001
Isolation	737	65(100%)	672(83.3%)	
Outcome				
Discharged	804	64(98.5%)	740(91.7%)	0.05
Referred	32	1(1.5%)	31(3.8%)	
Death	36	0(0%)	36(4.5%)	
Duration of stay-Mean(SD)	10.30±3.97	9.00 ± 1.77	10.42 ± 4.09	0.006

Demographic distribution of pediatric and adult patients: Out of total 872 patients, only 7 % of the population was of pediatric population whereas 93 % of the population was adults.

Distribution of patients on the basis of their age: Mean age of both the population was compared and it was found to be statistically significant. (p<0.05)

Distribution of patients on the basis of their gender: Correlation between both groups – pediatric and adult and among males and females were found to be statistically significant (p <0.05)

Distribution of patients according to the admission in the wards: Correlation between both groups – pediatric and adult and among admission in various wards were found to be statistically significant (p <0.05) Adult population were more admitted in the Isolation ward in the starting, out of which a certain population went into severe category and were admitted in ICU whereas comparatively there was no admission in ICU or severity observed among the pediatric population.

- Most frequently affected individuals in our data gathered among pediatrics are females (69.2%) whereas among adults males are mostly affected (54.8%)
- It was observed that the infection rate was statistically significantly higher in adults as compared to pediatric patients. (p<0.001)
- There was significant effect of Covid 19 demonstrated on the clinical outcomes of the patients.

DISCUSSION

The current worldwide spread of SARS-CoV-2 disease leads to serious endeavors to identify preventive methodologies and optimal clinical administration. In spite of the fact that there is moderately ample amount of data accessible for adult COVID-19 patients, our insight and investigation of the study of disease transmission and clinical attributes of pediatric COVID-19 is very limited. In India 41% of population is less than 18 years of age.[8] In the United States and throughout the world, fewer cases have been reported in children than in adults. Children comprise 22% of the US population, 8.7% of all cases reporting to the centre for disease control and prevention (CDC) were among pediatric population. (Up till October 7th 2020)[9]

In a study conducted by Wenjun Du, it was found most cases in children were mild (21.4%) and conventional cases (78.6%), with mild clinical signs and symptoms, and all cases were of family clusters. There were 8 (57.1%) asymptomatic cases and 6 (42.9%) symptomatic cases among the 14 children cases. The age of asymptomatic patients was younger than that of symptomatic patients (p = 0.03). Even among asymptomatic patients, 5 (62.5%) cases had lung injuries including 3 (60%) cases with bilateral involvement, which was not different compared with that of symptomatic cases (p = 0.58, p = 0.74). [10]

In our study conducted on COVID-19 in children under 18 years old and adults above 18 years to evaluate the epidemiological and clinical characteristics and their outcomes. Most of patients infected by SARS-CoV-2 presented as asymptomatic or mild/moderate/severe sickness.

All in all, the pediatric patients with COVID-19 had a good prognosis.

When compared, study conducted in China found only 416 (1%) and 549 (1%) were from age-groups <10 and 10–19 y, respectively. [11]

When the body encounters an unfamiliar pathogen, it responds within hours with a flurry of immune activity known as innate immune response. The body's defenders are quickly recruited to the fight and begin releasing signals calling for backup. Children more often encounter pathogens that are new to their immune systems. Their innate defense is fast and overwhelming. Over time the immune system encounters pathogen after pathogen, it builds up a repertoire of known villains. By the time the body reaches adulthood, it relies on a more sophisticated and specialized system adapted to remembering and fighting specific threats.

Similarly, out of 32,437 positive laboratory tests from public health laboratories in the United States of America (USA), 168 (0.5%) and 425 (1.3%) were the 0–4 and 5–17 y age-group, respectively. Test positivity rates among total tests were 3.9% and 6.3% in 0–4 y and 5–17 y age group compared to overall 14.4% positivity rates.[7]

The immunosenescence and changes in inflammatory responses with age likely account for the different spectrum and severity of disease in pediatric population as compared to adults.[12]

Frequency of common symptoms was lower in children compared to adults, implying more asymptomatic infections in children [7]. Median duration of fever in children was 3 d compared to 10 d in adult patients, implying shorter illness in children [13-15].

The corona virus is new disease to everyone and the innate system fades as adults grow older leaving them more vulnerable. In the time it takes for an adult body to get the specialized adaptive system up and running, the virus has had time to do harm. Some studies suggest that the infection is milder in children as compared to adults because of the difference in the characteristics of viral receptors. [16]

All viruses have tricks to evade the immune system and the corona virus is particularly adept. Produced early in the course of infection, interleukin 17 A may help children thwart the virus's attempts to evade the innate response and to ward off the later adaptive response.

The innate immune response is set off hours after exposure to a pathogen, but people generally don't come to hospital until about a week after infection with the corona virus, when symptoms are severe.

Everyone's been speculating around, exploring new studies, and publishing new stats, experts finding new symptoms daily. If the virus becomes endemic, like the corona viruses causing common flu, children eventually shall develop adaptive defenses so strong that they will not experience the problems that adults are facing now.

Greater understanding of why children appear to be less susceptible to severe COVID-19 than adults remains a key knowledge gap in the fight against this pandemic. Moreover, the role children play in the transmission of COVID-19 in the community will accelerate the development of interventions such as vaccines and other societal measures aimed at

protecting our most vulnerable populations against this virus. [17]

This difference might be explained by the fact that children's immune system is far from mature and may respond to pathogens differently to adults. Furthermore, younger children, especially at pre-school age, may not clearly describe their own health conditions and contact history, which could contribute to the delay in seeking medical attention and making the diagnosis.

Is BCG vaccine protective against pediatric population being infected with COVID 19?

It has been going around the talks about BCG (Bacille Calmette Guerin) vaccine being protective in patients infected with COVID 19.

However, it gives protection from tuberculosis by enhancing cellular immunity and mediates macrophage activation. [18]

A study described that BCG vaccination showed a reduced mortality rate in birth vaccinated population and was also seen to reduce the incidence of upper respiratory tract infections among adults. [19]

CONCLUSION

The present study outlines the clinical profile of COVID 19 patients among pediatric population and adult population. Our study highlights that severity of disease increases as the age increases. Also pediatric populations are less affected and carry a good prognosis. Being an observational study, it has its own limitations.

References

1. www.cdc.gov/coronavirus/2019-ncov/hcp/pediatric-hcp.html
2. Dong Y, Mo X, Hu Y, Qi X, Jiang F, Jiang Z, Tong S. Epidemiological characteristics of 2143 pediatric patients with 2019 coronavirus disease in China. *Pediatrics*. 2020 Mar 1.
3. Jordan RE, Adab P, Cheng KK. Covid-19: risk factors for severe disease and death.
4. Wyckoff AS. AAP updates guidance on newborns whose mothers have suspected or confirmed COVID-19. *AAP News*. Available at: <https://www.aappublications.org/news/2020/05/21/covid19newborn052120>. Accessed August. 2020;18.
5. She J, Liu L, Liu W. COVID-19 epidemic: disease characteristics in children. *Journal of medical virology*. 2020 Mar 31.
6. Cruz AT, Zeichner SL. COVID-19 in children: initial characterization of the pediatric disease. *Pediatrics*. 2020 Jun 1;145(6).
7. Covid CD, COVID C, COVID C, Bialek S, Gierke R, Hughes M, McNamara LA, Pilishvili T, Skoff T. Coronavirus Disease 2019 in Children-United States, February 12–April 2, 2020. *Morbidity and Mortality Weekly Report*. 2020 Apr 10;69(14):422.
8. Devakumar D, Cumarasamy A, Nielsen M, de Sousa P. Impact of the COVID-19 pandemic on global child health: joint statement of the International Child Health Group and the Royal College of Paediatrics and Child Health.

9. Tracker CC. Demographic trends of COVID-19 cases and deaths in the US reported to CDC. Centers for Disease Control and Prevention. 2020.
10. Du W, Yu J, Wang H, Zhang X, Zhang S, Li Q, Zhang Z. Clinical characteristics of COVID-19 in children compared with adults in Shandong Province, China. *Infection*. 2020 Jun;48(3):445-52.
11. Flegal KM, Graubard BI, Williamson DF, Gail MH. Cause-specific excess deaths associated with underweight, overweight, and obesity. *Jama*. 2007 Nov 7;298(17):2028-37.
12. Wiersinga WJ, Rhodes A, Cheng AC, Peacock SJ, Prescott HC. Pathophysiology, transmission, diagnosis, and treatment of coronavirus disease 2019 (COVID-19): a review. *Jama*. 2020 Aug 25;324(8):782-93.
13. Mehta N, Kalra A, Nowacki AS. original: Association of Use of Angiotensin-Converting Enzyme Inhibitors and.
14. Alhazzani W, Møller MH, Arabi YM, Loeb M, Gong MN, Fan E. & Du, B.(2020). Surviving Sepsis Campaign: guidelines on the management of critically ill adults with Coronavirus Disease 2019 (COVID-19). *Intensive care medicine*.:1-34.
15. Chen J, Qi T, Liu L, Ling Y, Qian Z, Li T, Li F, Xu Q, Zhang Y, Xu S, Song Z. Clinical progression of patients with COVID-19 in Shanghai, China. *Journal of infection*. 2020 May 1;80(5):e1-6.
16. Lee PI, Hu YL, Chen PY, Huang YC, Hsueh PR. Are children less susceptible to COVID-19?. *Journal of Microbiology, Immunology, and Infection*. 2020 Feb 25.
17. Do LA, Anderson J, Sutton P, Pellicci DG, Mulholland K, Licciardi PV. Understanding COVID-19 in children may provide clues to protect at-risk populations. *BMJ Paediatrics Open*. 2020;4(1).
18. Rossouw M, Nel HJ, Cooke GS, van Helden PD, Hoal EG. Association between tuberculosis and a polymorphic NFκB binding site in the interferon γ gene. *The lancet*. 2003 May 31;361(9372):1871-2.
19. Wardhana DE, Sultana A, Mandang VV, Jim E. The efficacy of Bacillus Calmette-Guerin vaccinations for the prevention of acute upper respiratory tract infection in the elderly. *Acta Med Indones*. 2011 Jul;43(3):185-90.

How to cite this article:

Ashok Kumar *et al* (2021) 'Mystery of this Pandemic: Adults V/S Pediatrics, Why Are Pediatric Population less affected?', *International Journal of Current Medical and Pharmaceutical Research*, 07(05), pp 5761-5764.
